Georgia-Pacific

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Consumer Products Division
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April 5, 2005

Trina L. Vielhauer, Chief
Bureau of Air Regulation
State of Florida
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

RECEIVED
APR 07 2005
BUREAU OF AIR REGULATION

RE: Georgia Pacific Palatka Mill
Title V Permit No. 1070005-029-AV
Request to Replace the Lime Kiln Shell and Associate Tube Coolers
Project No.: 1070005-030-AC/PSD-FL-345
Draft Response to RAI #2

Dear Ms. Vielhauer:

Georgia-Pacific Corporation (GP) has received the Florida Department of Environmental Protection's (FDEP's) second request for additional information (RAI #2), dated January 7, 2005. We believe that in order to resolve all the issues raised in RAI #2, GP and FDEP need to have a meeting or conference call as soon as it can be arranged. In the meantime, please consider the enclosed as **draft responses** to each of the Department's questions.

1. **In the October 1, 2004 RAI, a cost analysis of a new lime kiln with tube coolers of like-and-kind pursuant to the definition of an "affected facility" in accordance to 40 CFR 60, Subpart BB, was requested. The response just provided a total cost estimate with no itemized breakdown for a new lime kiln. Again, please provide a cost analysis of a new lime kiln with tube coolers of like-and-kind pursuant to the definition of an "affected facility" in accordance to 40 CFR 60, Subpart BB, and 40 CFR 63, Subpart MM. Please be sure to provide within the analysis the ability to distinguish the "capital costs" from other costs of a new lime kiln. If the proposed modified lime kiln becomes subject to either or both of these regulations, then the BACT determination's starting base emissions will be much lower than the original submission and the proposed BACT determination will have to be reevaluated and resubmitted.**

As shown in Table No. 1, the itemized costs for a new lime kiln with like-kind tube coolers, would total $20-22 million ($12 million for equipment and $8 million for installation). Since the time the permit application was submitted, we have determined that the engineering costs that were provided were for an entire causticizing facility. The appropriate replacement cost for the Lime Kiln is as shown in Table No. 1."

2. **Due to the age and physical deterioration of the existing lime kiln, the apparent reduction of actual production efficiency over the years of operation, the recent replacement of the ID fan (May 2004) and the upcoming replacement of the burner, this current request to replace the hot end of the lime kiln, including the associated tube coolers, does not appear to be routine maintenance. This project appears to be**

a physical modification of the existing lime kiln to improve reliability of lime (CaO) production, allowing for an increase in actual emissions and production and, therefore, be able to potentially increase actual emissions and production from upstream and downstream emissions unit operations to the lime kiln. Please explain why these collective changes should be considered routine maintenance.

GP is not claiming that the Lime Kiln Shell project is "routine" maintenance; just that it is "maintenance." As stated in the Executive Summary of our PSD permit application, GP conducted a PSD applicability assessment for the project because this type of repair is not made on a routine basis. As explained in our PSD permit application, this is strictly a maintenance project, and preventative maintenance at that. In November 2003, the Lime Kiln experienced a very serious failure of the shell with cracks all the way through the shell in several different areas of the hot end. This outage resulted in unbudgeted maintenance and maintenance-related costs of $1.5 million. These costs were escalated due to the fact that the failure was very serious and repairs had to be made quickly. The Lime Kiln has not experienced maintenance-related downtime since and it is not a bottleneck at the Mill. This is strictly a maintenance project that is focused on a single piece of equipment, the Lime Kiln, in order to prevent very serious failures in the future. There are no other sources that will be impacted as a result of this maintenance project.

3. **Independent funding of various projects does not establish independence of the activity and remove the potential of a modification or new construction from being a Phased PSD Project or to be considered one. Hence, all contemporaneous emission changes that have occurred over the last five years shall be considered contemporaneous with this proposed activity. Therefore, please establish the past contemporaneous emission changes and evaluate them in conjunction with the emission changes proposed for this project for significant impact analyses, increment consumption and ambient air quality impact analyses. Also, please include any future contemporaneous emission changes that will be associated with and affected by this proposed change from other emission unit operations, both upstream and downstream.**

This is one of the primary issues we need to discuss face-to-face. GP is not sure what the Department's concern is here. If the Department is saying that the prior contemporaneous projects and even future projects are all part of the same project (*i.e.*, a "phased" PSD project) and need to be evaluated together for purposes of determining PSD applicability, GP strongly disagrees, for the reasons explained subsequently, in part 3A. If the Department is saying that prior contemporaneous and future projects must be considered only for purposes of the air quality modeling analysis, this is not normally required in other states, nor has it been required for other projects in Florida in the past. However, GP is in the process of completing this analysis for the FDEP and it should be submitted this week, along with the flow rate revisions that were referenced in the answer to Question 8 of our response to RAI #1 (December 7, 2004 letter to Ms. Trina Vielhauer). To the extent the Department wants GP to include "any future contemporaneous emission changes" from other, still speculative, projects, we disagree (see part 3B). The contemporaneous period for this project ends when operation begins following completion of the maintenance activities.

A. While Georgia-Pacific agrees that the factor mentioned above, "independent funding", alone, does not establish the "independence" of the projects, it is one of many factors that has been consistently considered by EPA and states as part of past determinations on this topic.

EPA guidance, over a period of almost 25 years, makes it clear that emission increases from small (less than PSD-significant) projects are not aggregated for purposes of determining PSD applicability and Best Available Control Technology (BACT) unless it appears that the source deliberately split a larger project into smaller pieces to circumvent PSD review. The bulk of this guidance, up through and including that contained in the 1990 draft New Source Review Manual, suggests that a finding of PSD circumvention must be based on clear evidence that the source consciously tried to avoid PSD by knowingly misrepresenting the scope and relationship of the individual projects. In the only EPA Headquarters memo that we are aware of since 1990, the June 1993 3M-Maplewood memo, EPA set out "objective" criteria which it used to determine retroactively whether a source circumvented PSD. Even that memo suggests that all of the facts and circumstances regarding the projects in question, including five identified criteria, should be considered in determining whether the work constitutes separate projects or one phased project. And even that memo does not suggest that all projects with associated emission increases within a five-year period must be rolled up into one as "contemporaneous" projects.[1]

Georgia-Pacific relied on EPA's past determinations in concluding that the projects that have been, or will be, undertaken at the Palatka Mill are separate projects, rather than mere components of a phased project. We summarize the key determinations below.

One of the earliest (1983) determinations, from Sheldon Meyers to David Howekamp, squarely states the issue as "whether sources and control agencies need to aggregate small changes (*i.e.,* those below de minimus levels) which occur over time so that once the cumulative effect of the changes exceeds de minimus levels, PSD is triggered." The memo concludes that PSD is not triggered in this situation:

> *"...the Agency has maintained since 1981 that no such aggregation is required. This interpretation was first articulated in a memo from SSCD...to Region VII dated January 22, 1981, and has been reiterated in memoranda to Region IX and X since then. The SSCD interpretation was concurred in by the Office of General Counsel (Peter Wyckoff) as legally supportable..."*

A subsequent memorandum (October 21, 1986) from Darryl Tyler to David Kee reiterates this conclusion. While the situation addressed in this memorandum (a minor source that becomes major through a series of modifications) is somewhat different than the situation being questioned for the Palatka Mill, the findings are still relevant. This memorandum concludes that

> *"In the extreme case where the source has made a deliberate effort to circumvent PSD review (by the systematic construction of carefully sized emissions units which only in the aggregate would trigger review) a permitting agency, may, however, make a finding that PSD applies to the total plant. Such a finding would have to be based on clear evidence that the source made a conscious effort to escape review by knowingly misrepresenting the intended source size through the calculated juggling of actual and scheduled construction of emission units."*

This determination clearly directs state agencies to consider the funding relationships that exist between various projects, although the FDEP conversely states in its question that this factor does not establish independence of projects.

[1] The 3M situation was extreme. The facility, a research and development center, had obtained four synthetic minor construction permits within six months and twelve within eighteen months. The focus of EPA's inquiry was whether the facility had intentionally permitted new units or processes at synthetic minor emission levels, knowing that the projects were part of a larger project for which emission increases exceeded "major modification" levels.

A September 1989 memo from John Calcagni to William Hathaway reaffirms EPA's prior policy on non-aggregation in the context of determining whether a "net emissions increase" from a project should include prior de minimis increases. EPA determined that it should not:

> *"...the Environmental Protection Agency's (EPA's) historic policy has been not to consider accumulated emissions from a series of small (i.e., less than significant) emissions increases if the emissions increase from the proposed modification to the source is, standing alone without regard to any decreases, less than significant. In other words, the netting calculus (the summation of contemporaneous emissions increases and decreases) is not triggered unless there will be a significant emissions increase associated with the proposed modification. This policy was discussed in detail in a 1983 EPA memorandum...titled "Net Emission Increases Under PSD". In October 1988 the Policy and Guidance Section of the Stationary Source Compliance Division (SSCD) sent a memorandum to Region V restating the policy and indicating that is applied only to applicability determinations made under PSD...we understand that there are no plans to revise this policy."*

EPA went on to review the underlying policy considerations, and reaffirmed those as well, along with the non-circumvention rules:

> *"This office has reviewed the considerations (as discussed in the 1983 memorandum) which led to the policy and continue to find them to be reasonable and appropriate...The PSD reviews of such small emissions could place a significant resource burden on both applicants and review agencies and would likely result in minimal, if any emissions reductions or air quality benefits from the application of BACT. Consequently, I reaffirm that EPA's current policy is not to aggregate less than significant increases at a major source when the emissions increase from a proposed modification is less than significant. Of course, attempts by applicants to avoid PSD review by splitting a modification into two or more minor modifications constitutes circumvention of the PSD requirements. Two or more related minor changes over a short period of time should be studied for possible circumvention."*

EPA's 1990 Draft New Source Review Workshop Manual is very clear with regard to the Agency's policy on project aggregation. On Page A.33, EPA states the following:

> *"A modification is subject to PSD review only if (1) the existing source that is modified is "major," and (2) the net emissions increase of any pollutant emitted by the source, as a result of the modification, is "significant," i.e., equal to or greater than the emissions rates given on Table A-4..."*

As for "accumulation of emissions", the manual states the following (p. A.36):

> *"If the proposed emissions increase at a major source is by itself (without considering any decreases) less than "significant", EPA policy does not require consideration of previous contemporaneous small (i.e., less than significant) emissions increases at the source. In other words, the netting equation (the summation of contemporaneous emissions increases and decreases) is not triggered unless there will be a significant emissions increase from the proposed modification."*

The Manual then restates EPA's circumvention policy:

> *"A deliberate decision to split an otherwise "significant" project into two or more smaller projects to avoid PSD review would be viewed as circumvention and would subject the entire project to enforcement action if construction on any of the small projects commences without a valid PSD permit."*

The latest EPA HQ memorandum that we are aware of is 3M-Maplewood (June 17, 1993). That memo was a retrospective enforcement response to a series of twelve minor construction permits issued to an R&D facility within an eighteen-month period, presumably for successive capital projects designed to allow initiation or enhancement of the facility's research capabilities. In that context, EPA suggested a number of criteria for use in determining "whether a source is circumventing major NSR through the minor modification process": (1) whether the source has filed more than one minor source or minor modification request within a "short time period"; (2) whether the project would be funded, or whether it would be economically viable for an extended period, without the other projects; (3) whether the source has projected consumer demand or production levels that cannot be reached at the requested permit levels; (4) whether the source has made representations to EPA or the state that indicate an intent to circumvent major NSR; and (5) the "economic realities" of the projects when considered together (i.e., whether the projects are so intrinsically related to each other, in terms of physical proximity, stages of the production process, and effect on the plant's economic viability, that they must logically be considered together). Using these criteria, EPA concluded with respect to 3M that the successive modifications had been improperly permitted.

The 3M memo merely clarified EPA's longstanding non-circumvention rules that apply when a source has tried to evade PSD by constructing a large project in smaller pieces, i.e., "where it appears obvious that a proposed source or modification, by its physical and operational design characteristics, could not economically be run at minor source levels for an appreciable length of time", in which cases EPA "will consider minor source limits taken by the source unrealistic and sham." (3M memo, p.3).

The 3M situation is not comparable to the Palatka situation. Most of the recent projects at the Palatka Mill are either for maintenance purposes or to comply with a new regulatory requirement. The projects that the Department has sought to combine – replacement of the lime kiln shell and coolers, bark hog replacement, and MACT compliance projects – are not intrinsically related to each other in terms of physical proximity, production, purpose, or Mill viability, and in fact are completely unrelated except with regard to their timing.

More importantly, the Mill is not trying to circumvent PSD for anything. All of these projects have either netted out of PSD review, have undergone PSD review, or have been authorized under a pollution control project (PCP) exclusion. The application at hand, for the lime kiln shell replacement and coolers, is undergoing PSD review for nitrogen oxides, particulate matter, ozone (due to a significant increase in volatile organic compounds), and total reduced sulfur compounds. Furthermore, the conclusion regarding this applicability is the same, regardless of whether a contemporaneous netting analysis is conducted or not. The Mill clearly has not attempted to avoid PSD or any associated modeling or other obligation for any units being modified. Therefore, the concerns that might prompt a 3M-type analysis of all of the projects combined are not present here.

In short, it is clear that EPA, over the years, has developed consistent criteria that may be used by regulatory agencies in determining if projects are related, and should therefore be aggregated for PSD applicability purposes. The guidance is designed to prevent or ensure enforcement attention to cases where it appears that sources have deliberately avoided major NSR obligations by constructing new or modified sources with minor source permits, only to increase emissions overall in a way that would have required preconstruction NSR review if the overall project had not been artificially divided.

In the case of the Palatka Mill, none of these criteria has been met as part of the recent permitting activities. None of the projects has resulted in the filing of a minor source permit application – all of the projects that have been mentioned by FDEP have undergone PSD review. Moreover, the projects have been conducted for very different reasons and under different funding. For the most part, these projects involve maintenance activities that are required for the purposes of worker and/or public safety. Finally, production increases are not expected as a result of any of these projects – they all involve cost savings, operating flexibility, and maintenance.

If the FDEP does not accept these facts, GP requests feedback from FDEP regarding their decision, including references to past FDEP and EPA policy decisions on this subject, where appropriate.

B. GP does not believe that it is appropriate or even practicable to include potential **future** emission changes from unrelated projects in the current evaluation of the lime kiln shell project. Future projects that the Mill may or may not be considering, for which budgeting authorization and planning are not even complete, let alone final, cannot be lumped in with the current lime kiln shell project. When any such unrelated projects are final enough to be presented in a permit application, GP will include a full and appropriate PSD and air quality evaluation of them in a permit application. GP does not intend to avoid any PSD or other permit obligations by applying for such projects separately.

To the extent the Department is simply saying that any upstream/downstream emission changes that would result from the lime kiln shell project itself should be included and properly evaluated in the current application, GP agrees and routinely follows this methodology in conducting evaluations for PSD applicability. As explained in our PSD permit application and in our answer to Question 2 above, this is strictly a maintenance project. As mentioned above, the very serious failure in late 2003 resulted in unbudgeted maintenance and maintenance-related costs of $1.5 million. The Lime Kiln has not experienced maintenance-related downtime since and it is not a bottleneck at the Mill at any rate. This is strictly a maintenance project that is focused on a single piece of equipment, the Lime Kiln, in order to prevent serious failures in the future. There are no other sources that will be impacted as a result of this maintenance project.

4. **You did not provide an adequate response to the original request (#4) previously submitted in the RAI dated October 1, 2004. For PSD purposes, please provide the daily production rate of the lime kiln for the last two years (24-months) in order to determine the baseline production rate of the lime kiln; and please include 2004 data.**

Please see Table No. 2 for the daily production rates and note that this data is considered *Confidential Business Information (CBI)*. The annual CaO produced (as calculated from lime mud) for 2002-2004 was 111,564 tons/yr, 112,423 tons/yr, and 111,731 tons/yr; respectively. Please note that these values are slightly different than the values in the original application and the application will be updated accordingly.

5. You did not answer the question (#6) previously submitted in the RAI dated October 1, 2004. Even though the information is attempting to state that the Kiln shell portion and tube coolers that are being replaced are part of a maintenance project, will the proposed changes allow for an increase in production from its present configuration and operation? A yes or no is the preferred response.

No increase in production is anticipated as a result of this project. After the repairs in 2003 there has not been any downtime in 2004 due to the existing shell or tube coolers. This project is being conducted in order to prevent lost production in the future that would eventually result, for any piece of equipment, if that equipment were not properly maintained.

6. You did not answer the question (#7) previously submitted in the RAI dated October 1, 2004. Will there be an increase in production from the baseline production rate (see No. 4, above) after the proposed changes are completed? A yes or no is the preferred response.

None is anticipated. See response to Question #5.

7. Was the new ID fan that was installed in March 2004, sanctioned under an air construction permit? If so, please provide the project number. Also, please provide the design calculations and vendor order for the latest ID fan.

It might be helpful to note at the outset that the ID fan consists of four basic components: the motor, the fluid drive, the wheel and shaft, and the housing. Since 1976, the Mill has always maintained on-site spares for the first three components. Motor and fluid drive maintenance has occurred on an annual or biennial basis depending upon the condition of the units during routine inspections. In May 2004, the Mill replaced the housing and the wheel and shaft. The components that were installed in May 2004 were consistent with the Original Equipment Manufacturer's (OEM) equipment. GP conducted a detailed review and considered this work to be routine maintenance that did not require a construction permit.

Note that, while the ID fan is important to the operation of the Lime Kiln, it is not by itself a major component of the Lime Kiln facility. The fan components were replaced during a routine Lime Kiln outage. The intent of the replacement was to maintain then-current operations, not to expand production. The new fan wheel, shaft and housing cost about $100,000 or about 0.5% of the cost of a new Lime Kiln, and it was funded through maintenance accounts.

The design parameters for the fan are shown in the response to Question No. 9.

8. Please provide all of the dates that the ID fan has been replaced since the existing lime kiln was built.

Maintenance records are limited for any time period prior to January 1999. The manager of the area has been with GP since 1976, however, and he has provided his best recollection of historical events along with current practices. We cannot be sure that the dates and events are entirely accurate, but we provide this in a good faith attempt to answer the question.

To the best of this manager's recollection, the ID fan as a whole (*i.e.*, all four components) had never been totally replaced at once. The motor and fluid drive have always been inspected annually and repaired when necessary (typically about every 1-2 years). Historically, the fan wheel is replaced and the shaft is remachined about every 10 years. The fluid drive and the fan wheel were both replaced in 1994. At that time the fan was also "tipped" (added three inches to the fan blades) at a cost of less than $10,000 prior to putting it back in service. The tipping was needed solely in order to improve the efficiency of the dust collectors/scrubbers installed at that time to collect and recycle lime.

There are two methods for tipping a fan (i.e. on the ends or on the sides). "End tipping" is performed to increase static pressure while "side tipping" is done to increase airflow. In the case of the GP lime kiln "end tipping" was done in order to overcome the head losses due to the added ductwork for the dust collector system.

Testing prior to tipping showed about 95,000 acfm at 31" static pressure and tipping was expected to result in 85,000 acfm but at 36" static pressure. The ID fan housing was replaced in 2004, along with the components mentioned above that have been routinely replaced. The current ID fan is similar to the original (untipped) fan but lime kiln operations intend to tip the current fan for the same reasons that tipping was done in 1994.

9. On all of the previous and new ID fans, please provide the design fan characteristics for each unit, including their rpms, pressure drops, curves, volumetric flow rates, etc. In addition and for the previous/last and new ID fans, please provide the volumetric flow rates established in the performance tests conducted on the lime kiln since 1998.

As mentioned above, maintenance records are limited prior to January 1999 when the current maintenance computer system was put in service. Also, as mentioned above, the ID fan as a whole has never been totally replaced; rather its components have been replaced, as maintenance needs dictated. With that understanding, the specifications available in our maintenance files are the following for the original ID fan installed in 1976:

3530-DIDW fan designed for 100,000 acfm at 36 inches static pressure.
Speed = 1,157 RPM and load = 810 Brake HP
Inlet design conditions = 85,000 acfm at 450 deg-F and 34.95% humidity.
Exit design conditions = 65,520 acfm at 172 deg-F and 45.96% humidity.

Volumetric flow rates established in performance tests since 1998 are as follows:

Year	Flow Rate(acfm)/dscfm		Year	Flow Rate (acfm) /dscfm
1998	47,800/35,600		2002	55,800/38,300
1999	50,200/38,500		2003	55,000/42,800
2000	63,400/42,600		2004 (Mar)	64,800/54,200
2001	57,000/43,300		2004 (Aug)	70,500/51,300

10. If any of this RAI's responses require any changes to the pollutant emissions and subsequent modeling issues, specifically significant impact analyses, increment consumption and ambient air quality impact analyses, then please make sure that these changes are addressed in the associated modeling and increment

requirements and exercises per the regulations. Therefore, the previous RAI's #10 will be restated in case there is/are some emissions change in the response(s) to this RAI:

Pursuant to Rule 62-212.400(5)(h)5., F.A.C., please provide the information relating to the air quality impacts of, and the nature and extent of, all general commercial, residential, industrial and other growth that has occurred since August 7, 1977, in the area the facility or modification would affect.

Per our response to the Agency's Request for Information (letter from Georgia-Pacific to Ms. Vielhauer, dated December 7, 2004), a letter is being submitted under separate cover that provides the updated information for the application as referenced in our answer to Question 8 in RAI #1. Also, an updated air quality analysis, reviewing all contemporaneous emission changes, should be submitted to FDEP this week.

11. You did not answer the question (#11) previously submitted in the RAI dated October 1, 2004. For the potential applicability of 40 CFR 60, Subpart BB, please use Appendix C, 40 CFR 60, to determine if there is/are an emissions rate increase for the pollutants affected by this project.

Georgia-Pacific did provide an answer to Question 11 in our response to the Agency's Request for Information (letter from Georgia-Pacific to Ms. Vielhauer, dated December 7, 2004). Per our response in that letter, we did not, and still do not, feel that the test is required, nor is it warranted in this situation.

As stated in the opening paragraph, GP would like to meet with FDEP regarding all the issues raised in RAI's #1 and #2 to make sure that we understand each other. I will be contacting your office to set up the meeting.

Please contact me at 386-329-0918 if you have questions.

Sincerely;

Myra Carpenter
Environmental Superintendent
Georgia-Pacific, Palatka Operations

Attachments: 2

cc: W. Jernigan, S. Matchett, T. Wyles, E. Jamro

Table No. 1 - LIME KILN CONSTRUCTION COSTS
BASIS - NOMINAL 390 TPD (as CaO) PLANT

LK Component Description	COST - $ Million Equipment	Installation	Total
Kiln	2.4	1.6	4.0
Concrete / Foundations	1.8	1.2	3.0
Steel	1.2	0.8	2.0
Pollution Control	1.2	0.8	2.0
E&I / Controls	1.8	1.2	3.0
Material Handling / Tanks	1.8	1.2	3.0
Burners / Fans / Misc.	1.8	1.2	3.0
			+10%
TOTAL	12	8	20-22

	Table No. 2-c LIME PRODUCTION - 2002					**Highest Production Days**	
						11/26	
	Lime Mud =	**278,910**	**Tons / yr**				
	Lime as CaO =	**111,564**	**Tons / yr**				
1Q2002	**Lime mud, TPD**	**2Q2002**	**Lime mud, TPD**	**3Q2002**	**Lime mud, TPD**	**4Q2002**	**Lime mud, TPD**
January 1, 2002	890	April 1, 2002	874	July 1, 2002	844	October 1, 2002	904
January 2, 2002	895	April 2, 2002	873	July 2, 2002	842	October 2, 2002	785
January 3, 2002	854	April 3, 2002	874	July 3, 2002	849	October 3, 2002	800
January 4, 2002	895	April 4, 2002	876	July 4, 2002	852	October 4, 2002	541
January 5, 2002	816	April 5, 2002	867	July 5, 2002	825	October 5, 2002	718
January 6, 2002	679	April 6, 2002	864	July 6, 2002	846	October 6, 2002	889
January 7, 2002	842	April 7, 2002	628	July 7, 2002	846	October 7, 2002	915
January 8, 2002	667	April 8, 2002	down	July 8, 2002	841	October 8, 2002	913
January 9, 2002	706	April 9, 2002	down	July 9, 2002	841	October 9, 2002	915
January 10, 2002	562	April 10, 2002	down	July 10, 2002	838	October 10, 2002	805
January 11, 2002	552	April 11, 2002	down	July 11, 2002	837	October 11, 2002	912
January 12, 2002	557	April 12, 2002	down	July 12, 2002	837	October 12, 2002	918
January 13, 2002	523	April 13, 2002	down	July 13, 2002	838	October 13, 2002	868
January 14, 2002	566	April 14, 2002	down	July 14, 2002	676	October 14, 2002	909
January 15, 2002	742	April 15, 2002	down	July 15, 2002	726	October 15, 2002	905
January 16, 2002	773	April 16, 2002	down	July 16, 2002	699	October 16, 2002	898
January 17, 2002	605	April 17, 2002	down	July 17, 2002	847	October 17, 2002	573
January 18, 2002	610	April 18, 2002	down	July 18, 2002	830	October 18, 2002	449
January 19, 2002	617	April 19, 2002	down	July 19, 2002	832	October 19, 2002	871
January 20, 2002	869	April 20, 2002	504	July 20, 2002	831	October 20, 2002	879
January 21, 2002	862	April 21, 2002	607	July 21, 2002	844	October 21, 2002	880
January 22, 2002	898	April 22, 2002	652	July 22, 2002	849	October 22, 2002	881
January 23, 2002	852	April 23, 2002	761	July 23, 2002	861	October 23, 2002	877
January 24, 2002	881	April 24, 2002	455	July 24, 2002	868	October 24, 2002	886
January 25, 2002	794	April 25, 2002	802	July 25, 2002	840	October 25, 2002	864
January 26, 2002	866	April 26, 2002	829	July 26, 2002	854	October 26, 2002	479
January 27, 2002	814	April 27, 2002	810	July 27, 2002	849	October 27, 2002	77
January 28, 2002	876	April 28, 2002	843	July 28, 2002	751	October 28, 2002	212
January 29, 2002	871	April 29, 2002	695	July 29, 2002	768	October 29, 2002	268
January 30, 2002	828	April 30, 2002	476	July 30, 2002	793	October 30, 2002	438
January 31, 2002	672	May 1, 2002	674	July 31, 2002	772	October 31, 2002	714
February 1, 2002	down	May 2, 2002	783	August 1, 2002	802	November 1, 2002	753
February 2, 2002	down	May 3, 2002	712	August 2, 2002	691	November 2, 2002	804
February 3, 2002	down	May 4, 2002	800	August 3, 2002	702	November 3, 2002	791
February 4, 2002	756	May 5, 2002	856	August 4, 2002	725	November 4, 2002	804
February 5, 2002	828	May 6, 2002	878	August 5, 2002	800	November 5, 2002	830
February 6, 2002	835	May 7, 2002	869	August 6, 2002	534	November 6, 2002	835
February 7, 2002	862	May 8, 2002	868	August 7, 2002	706	November 7, 2002	762
February 8, 2002	922	May 9, 2002	799	August 8, 2002	867	November 8, 2002	768
February 9, 2002	871	May 10, 2002	773	August 9, 2002	774	November 9, 2002	752
February 10, 2002	830	May 11, 2002	860	August 10, 2002	811	November 10, 2002	746
February 11, 2002	830	May 12, 2002	849	August 11, 2002	820	November 11, 2002	737
February 12, 2002	895	May 13, 2002	806	August 12, 2002	822	November 12, 2002	789
February 13, 2002	881	May 14, 2002	849	August 13, 2002	830	November 13, 2002	805
February 14, 2002	763	May 15, 2002	802	August 14, 2002	853	November 14, 2002	780
February 15, 2002	667	May 16, 2002	848	August 15, 2002	859	November 15, 2002	728
February 16, 2002	854	May 17, 2002	871	August 16, 2002	858	November 16, 2002	574
February 17, 2002	914	May 18, 2002	874	August 17, 2002	866	November 17, 2002	down
February 18, 2002	905	May 19, 2002	863	August 18, 2002	865	November 18, 2002	126
February 19, 2002	902	May 20, 2002	879	August 19, 2002	853	November 19, 2002	219
February 20, 2002	905	May 21, 2002	841	August 20, 2002	849	November 20, 2002	426
February 21, 2002	902	May 22, 2002	752	August 21, 2002	848	November 21, 2002	470
February 22, 2002	907	May 23, 2002	879	August 22, 2002	836	November 22, 2002	556
February 23, 2002	907	May 24, 2002	868	August 23, 2002	739	November 23, 2002	875
February 24, 2002	907	May 25, 2002	7	August 24, 2002	833	November 24, 2002	924
February 25, 2002	902	May 26, 2002	down	August 25, 2002	812	November 25, 2002	910
February 26, 2002	895	May 27, 2002	795	August 26, 2002	808	November 26, 2002	968
February 27, 2002	893	May 28, 2002	865	August 27, 2002	809	November 27, 2002	650
February 28, 2002	893	May 29, 2002	875	August 28, 2002	833	November 28, 2002	855
March 1, 2002	893	May 30, 2002	871	August 29, 2002	844	November 29, 2002	844
March 2, 2002	907	May 31, 2002	849	August 30, 2002	829	November 30, 2002	874
March 3, 2002	857	June 1, 2002	768	August 31, 2002	825	December 1, 2002	862
March 4, 2002	890	June 2, 2002	611	September 1, 2002	823	December 2, 2002	875
March 5, 2002	876	June 3, 2002	724	September 2, 2002	830	December 3, 2002	877
March 6, 2002	905	June 4, 2002	660	September 3, 2002	828	December 4, 2002	882

	Table No. 2-c LIME PRODUCTION - 2002					**Highest Production Days**	
						11/26	
	Lime Mud =	**278,910**	**Tons / yr**				
	Lime as CaO =	**111,564**	**Tons / yr**				
1Q2002	**Lime mud, TPD**	**2Q2002**	**Lime mud, TPD**	**3Q2002**	**Lime mud, TPD**	**4Q2002**	**Lime mud, TPD**
March 7, 2002	866	June 5, 2002	896	September 4, 2002	801	December 5, 2002	886
March 8, 2002	850	June 6, 2002	918	September 5, 2002	820	December 6, 2002	883
March 9, 2002	890	June 7, 2002	911	September 6, 2002	829	December 7, 2002	882
March 10, 2002	886	June 8, 2002	897	September 7, 2002	838	December 8, 2002	879
March 11, 2002	826	June 9, 2002	913	September 8, 2002	837	December 9, 2002	881
March 12, 2002	845	June 10, 2002	917	September 9, 2002	521	December 10, 2002	880
March 13, 2002	864	June 11, 2002	909	September 10, 2002	154	December 11, 2002	858
March 14, 2002	881	June 12, 2002	878	September 11, 2002	761	December 12, 2002	687
March 15, 2002	886	June 13, 2002	896	September 12, 2002	872	December 13, 2002	878
March 16, 2002	898	June 14, 2002	903	September 13, 2002	821	December 14, 2002	882
March 17, 2002	905	June 15, 2002	916	September 14, 2002	903	December 15, 2002	883
March 18, 2002	902	June 16, 2002	917	September 15, 2002	879	December 16, 2002	884
March 19, 2002	905	June 17, 2002	922	September 16, 2002	869	December 17, 2002	883
March 20, 2002	857	June 18, 2002	897	September 17, 2002	868	December 18, 2002	882
March 21, 2002	847	June 19, 2002	788	September 18, 2002	859	December 19, 2002	831
March 22, 2002	906	June 20, 2002	875	September 19, 2002	837	December 20, 2002	870
March 23, 2002	904	June 21, 2002	846	September 20, 2002	899	December 21, 2002	878
March 24, 2002	905	June 22, 2002	863	September 21, 2002	882	December 22, 2002	880
March 25, 2002	906	June 23, 2002	860	September 22, 2002	881	December 23, 2002	882
March 26, 2002	905	June 24, 2002	748	September 23, 2002	896	December 24, 2002	871
March 27, 2002	885	June 25, 2002	318	September 24, 2002	903	December 25, 2002	879
March 28, 2002	870	June 26, 2002	809	September 25, 2002	909	December 26, 2002	879
March 29, 2002	880	June 27, 2002	813	September 26, 2002	921	December 27, 2002	888
March 30, 2002	860	June 28, 2002	844	September 27, 2002	880	December 28, 2002	860
March 31, 2002	865	June 29, 2002	843	September 28, 2002	877	December 29, 2002	878
		June 30, 2002	842	September 29, 2002	909	December 30, 2002	868
				September 30, 2002	908	December 31, 2002	801
Quarterly Total	**72383**		**62305**		**74234**		**69989**

Table No. 2-b Lime Kiln Production - 2003

Highest Production Days
1/27 to 1/28

Lime Mud = 281056 Tons
Lime as CaO = 112423 Tons

1Q2003	mud, TPD	2Q2003	mud, TPD	3Q2003	mud, TPD	4Q2003	mud, TPD
January 1, 2003	846	April 1, 2003	903	July 1, 2003	826	October 1, 2003	897
January 2, 2003	871	April 2, 2003	960	July 2, 2003	863	October 2, 2003	800
January 3, 2003	877	April 3, 2003	937	July 3, 2003	563	October 3, 2003	871
January 4, 2003	874	April 4, 2003	729	July 4, 2003	758	October 4, 2003	860
January 5, 2003	875	April 5, 2003	903	July 5, 2003	773	October 5, 2003	878
January 6, 2003	846	April 6, 2003	918	July 6, 2003	773	October 6, 2003	881
January 7, 2003	904	April 7, 2003	914	July 7, 2003	526	October 7, 2003	880
January 8, 2003	893	April 8, 2003	841	July 8, 2003	740	October 8, 2003	879
January 9, 2003	795	April 9, 2003	903	July 9, 2003	826	October 9, 2003	880
January 10, 2003	918	April 10, 2003	887	July 10, 2003	863	October 10, 2003	857
January 11, 2003	918	April 11, 2003	793	July 11, 2003	865	October 11, 2003	859
January 12, 2003	914	April 12, 2003	783	July 12, 2003	869	October 12, 2003	869
January 13, 2003	918	April 13, 2003	848	July 13, 2003	868	October 13, 2003	755
January 14, 2003	922	April 14, 2003	884	July 14, 2003	881	October 14, 2003	879
January 15, 2003	908	April 15, 2003	801	July 15, 2003	880	October 15, 2003	884
January 16, 2003	929	April 16, 2003	804	July 16, 2003	869	October 16, 2003	899
January 17, 2003	933	April 17, 2003	889	July 17, 2003	843	October 17, 2003	899
January 18, 2003	939	April 18, 2003	854	July 18, 2003	868	October 18, 2003	858
January 19, 2003	940	April 19, 2003	765	July 19, 2003	872	October 19, 2003	735
January 20, 2003	933	April 20, 2003	845	July 20, 2003	874	October 20, 2003	882
January 21, 2003	887	April 21, 2003	812	July 21, 2003	875	October 21, 2003	781
January 22, 2003	937	April 22, 2003	757	July 22, 2003	860	October 22, 2003	695
January 23, 2003	954	April 23, 2003	718	July 23, 2003	881	October 23, 2003	660
January 24, 2003	958	April 24, 2003	760	July 24, 2003	873	October 24, 2003	885
January 25, 2003	924	April 25, 2003	731	July 25, 2003	871	October 25, 2003	869
January 26, 2003	958	April 26, 2003	882	July 26, 2003	865	October 26, 2003	885
January 27, 2003	969	April 27, 2003	913	July 27, 2003	841	October 27, 2003	911
January 28, 2003	960	April 28, 2003	908	July 28, 2003	849	October 28, 2003	867
January 29, 2003	634	April 29, 2003	907	July 29, 2003	840	October 29, 2003	821
January 30, 2003	876	April 30, 2003	851	July 30, 2003	849	October 30, 2003	592
January 31, 2003	680	May 1, 2003	477	July 31, 2003	814	October 31, 2003	717
February 1, 2003	926	May 2, 2003	896	August 1, 2003	135	November 1, 2003	809
February 2, 2003	924	May 3, 2003	900	August 2, 2003	853	November 2, 2003	856
February 3, 2003	926	May 4, 2003	903	August 3, 2003	865	November 3, 2003	753
February 4, 2003	921	May 5, 2003	down	August 4, 2003	792	November 4, 2003	218
February 5, 2003	889	May 6, 2003	down	August 5, 2003	745	November 5, 2003	360
February 6, 2003	915	May 7, 2003	down	August 6, 2003	810	November 6, 2003	777
February 7, 2003	896	May 8, 2003	down	August 7, 2003	842	November 7, 2003	833
February 8, 2003	939	May 9, 2003	down	August 8, 2003	842	November 8, 2003	826
February 9, 2003	905	May 10, 2003	down	August 9, 2003	834	November 9, 2003	826
February 10, 2003	930	May 11, 2003	down	August 10, 2003	821	November 10, 2003	827
February 11, 2003	934	May 12, 2003	down	August 11, 2003	844	November 11, 2003	775
February 12, 2003	935	May 13, 2003	down	August 12, 2003	723	November 12, 2003	837
February 13, 2003	904	May 14, 2003	down	August 13, 2003	587	November 13, 2003	804
February 14, 2003	852	May 15, 2003	down	August 14, 2003	840	November 14, 2003	730
February 15, 2003	926	May 16, 2003	down	August 15, 2003	802	November 15, 2003	754
February 16, 2003	941	May 17, 2003	down	August 16, 2003	764	November 16, 2003	801
February 17, 2003	940	May 18, 2003	down	August 17, 2003	701	November 17, 2003	831
February 18, 2003	935	May 19, 2003	down	August 18, 2003	335	November 18, 2003	827
February 19, 2003	934	May 20, 2003	down	August 19, 2003	553	November 19, 2003	684
February 20, 2003	894	May 21, 2003	435	August 20, 2003	822	November 20, 2003	796
February 21, 2003	816	May 22, 2003	291	August 21, 2003	855	November 21, 2003	727
February 22, 2003	937	May 23, 2003	894	August 22, 2003	866	November 22, 2003	779
February 23, 2003	930	May 24, 2003	896	August 23, 2003	795	November 23, 2003	808
February 24, 2003	938	May 25, 2003	805	August 24, 2003	736	November 24, 2003	778
February 25, 2003	884	May 26, 2003	769	August 25, 2003	801	November 25, 2003	817
February 26, 2003	910	May 27, 2003	855	August 26, 2003	828	November 26, 2003	250
February 27, 2003	908	May 28, 2003	887	August 27, 2003	851	November 27, 2003	459
February 28, 2003	902	May 29, 2003	891	August 28, 2003	861	November 28, 2003	470
March 1, 2003	934	May 30, 2003	814	August 29, 2003	865	November 29, 2003	523
March 2, 2003	898	May 31, 2003	739	August 30, 2003	853	November 30, 2003	677
March 3, 2003	916	June 1, 2003	625	August 31, 2003	782	December 1, 2003	571
March 4, 2003	923	June 2, 2003	139	September 1, 2003	780	December 2, 2003	659

Table No. 2-b Lime Kiln Production - 2003

Highest Production Days

1/27 to 1/28

Lime Mud = 281056 Tons

Lime as CaO = 112423 Tons

1Q2003	mud, TPD		2Q2003	mud, TPD		3Q2003	mud, TPD		4Q2003	mud, TPD
March 5, 2003	923		June 3, 2003	752		September 2, 2003	780		December 3, 2003	723
March 6, 2003	923		June 4, 2003	861		September 3, 2003	825		December 4, 2003	810
March 7, 2003	890		June 5, 2003	873		September 4, 2003	820		December 5, 2003	843
March 8, 2003	812		June 6, 2003	725		September 5, 2003	752		December 6, 2003	787
March 9, 2003	860		June 7, 2003	535		September 6, 2003	865		December 7, 2003	112
March 10, 2003	907		June 8, 2003	779		September 7, 2003	880		December 8, 2003	496
March 11, 2003	864		June 9, 2003	857		September 8, 2003	893		December 9, 2003	339
March 12, 2003	815		June 10, 2003	884		September 9, 2003	953		December 10, 2003	200
March 13, 2003	869		June 11, 2003	807		September 10, 2003	918		December 11, 2003	459
March 14, 2003	870		June 12, 2003	717		September 11, 2003	888		December 12, 2003	235
March 15, 2003	875		June 13, 2003	718		September 12, 2003	740		December 13, 2003	831
March 16, 2003	750		June 14, 2003	806		September 13, 2003	857		December 14, 2003	845
March 17, 2003	861		June 15, 2003	367		September 14, 2003	898		December 15, 2003	826
March 18, 2003	799		June 16, 2003	26		September 15, 2003	889		December 16, 2003	756
March 19, 2003	762		June 17, 2003	32		September 16, 2003	876		December 17, 2003	822
March 20, 2003	862		June 18, 2003	745		September 17, 2003	695		December 18, 2003	829
March 21, 2003	812		June 19, 2003	836		September 18, 2003	733		December 19, 2003	817
March 22, 2003	881		June 20, 2003	839		September 19, 2003	770		December 20, 2003	842
March 23, 2003	926		June 21, 2003	845		September 20, 2003	832		December 21, 2003	849
March 24, 2003	882		June 22, 2003	832		September 21, 2003	826		December 22, 2003	859
March 25, 2003	920		June 23, 2003	822		September 22, 2003	827		December 23, 2003	812
March 26, 2003	924		June 24, 2003	811		September 23, 2003	729		December 24, 2003	828
March 27, 2003	913		June 25, 2003	805		September 24, 2003	544		December 25, 2003	808
March 28, 2003	904		June 26, 2003	787		September 25, 2003	781		December 26, 2003	852
March 29, 2003	913		June 27, 2003	814		September 26, 2003	858		December 27, 2003	864
March 30, 2003	888		June 28, 2003	741		September 27, 2003	824		December 28, 2003	869
March 31, 2003	687		June 29, 2003	813		September 28, 2003	832		December 29, 2003	839
			June 30, 2003	816		September 29, 2003	878		December 30, 2003	798
						September 30, 2003	890		December 31, 2003	801
Quarterly Total	80243			57861	0		73876	0		69077

Highest Production Days
3/3
4/18 to 4/20
4/25

Table No. 2-a LIME KILN PRODUCTION - 2004

Total mud in 2004 =	279328	tons
Total lime in 2004	111731	Tons CaO

1Q2004	Lime Mud TPD	2Q2004	Lime Mud TPD	3Q2004	Lime Mud TPD	4Q2004	Lime Mud TPD
January 1, 2004	837	April 1, 2004	890	July 1, 2004	871	October 1, 2004	917
January 2, 2004	854	April 2, 2004	847	July 2, 2004	908	October 2, 2004	722
January 3, 2004	840	April 3, 2004	893	July 3, 2004	839	October 3, 2004	797
January 4, 2004	853	April 4, 2004	865	July 4, 2004	845	October 4, 2004	854
January 5, 2004	852	April 5, 2004	741	July 5, 2004	867	October 5, 2004	869
January 6, 2004	875	April 6, 2004	801	July 6, 2004	907	October 6, 2004	874
January 7, 2004	829	April 7, 2004	888	July 7, 2004	920	October 7, 2004	869
January 8, 2004	857	April 8, 2004	862	July 8, 2004	910	October 8, 2004	881
January 9, 2004	592	April 9, 2004	913	July 9, 2004	780	October 9, 2004	881
January 10, 2004	785	April 10, 2004	898	July 10, 2004	883	October 10, 2004	883
January 11, 2004	857	April 11, 2004	909	July 11, 2004	889	October 11, 2004	883
January 12, 2004	825	April 12, 2004	898	July 12, 2004	920	October 12, 2004	883
January 13, 2004	298	April 13, 2004	896	July 13, 2004	515	October 13, 2004	883
January 14, 2004	542	April 14, 2004	942	July 14, 2004	869	October 14, 2004	782
January 15, 2004	722	April 15, 2004	813	July 15, 2004	899	October 15, 2004	883
January 16, 2004	641	April 16, 2004	889	July 16, 2004	847	October 16, 2004	883
January 17, 2004	872	April 17, 2004	959	July 17, 2004	776	October 17, 2004	883
January 18, 2004	869	April 18, 2004	972	July 18, 2004	779	October 18, 2004	883
January 19, 2004	802	April 19, 2004	965	July 19, 2004	863	October 19, 2004	883
January 20, 2004	847	April 20, 2004	962	July 20, 2004	846	October 20, 2004	895
January 21, 2004	845	April 21, 2004	956	July 21, 2004	801	October 21, 2004	787
January 22, 2004	856	April 22, 2004	933	July 22, 2004	908	October 22, 2004	890
January 23, 2004	854	April 23, 2004	939	July 23, 2004	899	October 23, 2004	902
January 24, 2004	860	April 24, 2004	931	July 24, 2004	733	October 24, 2004	900
January 25, 2004	856	April 25, 2004	961	July 25, 2004	157	October 25, 2004	900
January 26, 2004	880	April 26, 2004	957	July 26, 2004	139	October 26, 2004	907
January 27, 2004	886	April 27, 2004	470	July 27, 2004	814	October 27, 2004	902
January 28, 2004	868	April 28, 2004	Down	July 28, 2004	897	October 28, 2004	910
January 29, 2004	145	April 29, 2004	Down	July 29, 2004	898	October 29, 2004	910
January 30, 2004	807	April 30, 2004	Down	July 30, 2004	920	October 30, 2004	912
January 31, 2004	839	May 1, 2004	Down	July 31, 2004	903	October 31, 2004	919
February 1, 2004	872	May 2, 2004	Down	August 1, 2004	878	November 1, 2004	929
February 2, 2004	875	May 3, 2004	Down	August 2, 2004	862	November 2, 2004	907
February 3, 2004	845	May 4, 2004	Down	August 3, 2004	925	November 3, 2004	905
February 4, 2004	831	May 5, 2004	Down	August 4, 2004	909	November 4, 2004	900
February 5, 2004	833	May 6, 2004	Down	August 5, 2004	505	November 5, 2004	859
February 6, 2004	813	May 7, 2004	Down	August 6, 2004	774	November 6, 2004	905
February 7, 2004	843	May 8, 2004	Down	August 7, 2004	891	November 7, 2004	881
February 8, 2004	878	May 9, 2004	Down	August 8, 2004	838	November 8, 2004	881
February 9, 2004	850	May 10, 2004	Down	August 9, 2004	890	November 9, 2004	852
February 10, 2004	841	May 11, 2004	Down	August 10, 2004	823	November 10, 2004	864
February 11, 2004	864	May 12, 2004	Down	August 11, 2004	877	November 11, 2004	864
February 12, 2004	831	May 13, 2004	Down	August 12, 2004	869	November 12, 2004	864
February 13, 2004	508	May 14, 2004	Down	August 13, 2004	787	November 13, 2004	859
February 14, 2004	863	May 15, 2004	Down	August 14, 2004	885	November 14, 2004	799
February 15, 2004	884	May 16, 2004	Down	August 15, 2004	839	November 15, 2004	838
February 16, 2004	902	May 17, 2004	Down	August 16, 2004	603	November 16, 2004	893
February 17, 2004	913	May 18, 2004	Down	August 17, 2004	702	November 17, 2004	905
February 18, 2004	904	May 19, 2004	Down	August 18, 2004	885	November 18, 2004	542
February 19, 2004	275	May 20, 2004	Down	August 19, 2004	949	November 19, 2004	900
February 20, 2004	726	May 21, 2004	427	August 20, 2004	851	November 20, 2004	905
February 21, 2004	803	May 22, 2004	538	August 21, 2004	677	November 21, 2004	910
February 22, 2004	855	May 23, 2004	748	August 22, 2004	859	November 22, 2004	912
February 23, 2004	874	May 24, 2004	694	August 23, 2004	908	November 23, 2004	914
February 24, 2004	871	May 25, 2004	637	August 24, 2004	843	November 24, 2004	917
February 25, 2004	880	May 26, 2004	717	August 25, 2004	798	November 25, 2004	914
February 26, 2004	916	May 27, 2004	705	August 26, 2004	830	November 26, 2004	917
February 27, 2004	931	May 28, 2004	804	August 27, 2004	888	November 27, 2004	922
February 28, 2004	898	May 29, 2004	809	August 28, 2004	884	November 28, 2004	862
February 29, 2004	917	May 30, 2004	795	August 29, 2004	861	November 29, 2004	919
March 1, 2004	940	May 31, 2004	792	August 30, 2004	870	November 30, 2004	893
March 2, 2004	947	June 1, 2004	831	August 31, 2004	820	December 1, 2004	917
March 3, 2004	971	June 2, 2004	789	September 1, 2004	829	December 2, 2004	910
March 4, 2004	952	June 3, 2004	725	September 2, 2004	868	December 3, 2004	754
March 5, 2004	902	June 4, 2004	809	September 3, 2004	921	December 4, 2004	638
March 6, 2004	954	June 5, 2004	792	September 4, 2004	939	December 5, 2004	768
March 7, 2004	928	June 6, 2004	797	September 5, 2004	587	December 6, 2004	922

Table No. 2-a LIME KILN PRODUCTION - 2004

Total mud in 2004 = 279328 tons

Total lime in 2004 111731 Tons CaO

Highest Production Days
3/3
4/18 to 4/20
4/25

1Q2004	Lime Mud TPD	2Q2004	Lime Mud TPD	3Q2004	Lime Mud TPD	4Q2004	Lime Mud TPD
March 8, 2004	933	June 7, 2004	801	September 6, 2004	269	December 7, 2004	down
March 9, 2004	910	June 8, 2004	415	September 7, 2004	887	December 8, 2004	down
March 10, 2004	912	June 9, 2004	down	September 8, 2004	959	December 9, 2004	down
March 11, 2004	916	June 10, 2004	283	September 9, 2004	900	December 10, 2004	535
March 12, 2004	865	June 11, 2004	793	September 10, 2004	857	December 11, 2004	782
March 13, 2004	846	June 12, 2004	824	September 11, 2004	903	December 12, 2004	809
March 14, 2004	797	June 13, 2004	829	September 12, 2004	930	December 13, 2004	850
March 15, 2004	844	June 14, 2004	819	September 13, 2004	895	December 14, 2004	874
March 16, 2004	837	June 15, 2004	739	September 14, 2004	922	December 15, 2004	751
March 17, 2004	688	June 16, 2004	821	September 15, 2004	613	December 16, 2004	655
March 18, 2004	902	June 17, 2004	824	September 16, 2004	888	December 17, 2004	766
March 19, 2004	904	June 18, 2004	832	September 17, 2004	908	December 18, 2004	809
March 20, 2004	911	June 19, 2004	786	September 18, 2004	872	December 19, 2004	838
March 21, 2004	922	June 20, 2004	755	September 19, 2004	834	December 20, 2004	814
March 22, 2004	902	June 21, 2004	509	September 20, 2004	840	December 21, 2004	773
March 23, 2004	907	June 22, 2004	737	September 21, 2004	833	December 22, 2004	857
March 24, 2004	911	June 23, 2004	836	September 22, 2004	854	December 23, 2004	845
March 25, 2004	910	June 24, 2004	827	September 23, 2004	842	December 24, 2004	840
March 26, 2004	820	June 25, 2004	834	September 24, 2004	794	December 25, 2004	737
March 27, 2004	877	June 26, 2004	837	September 25, 2004	521	December 26, 2004	833
March 28, 2004	875	June 27, 2004	816	September 26, 2004	down	December 27, 2004	852
March 29, 2004	908	June 28, 2004	866	September 27, 2004	down	December 28, 2004	862
March 30, 2004	890	June 29, 2004	902	September 28, 2004	557	December 29, 2004	790
March 31, 2004	896	June 30, 2004	738	September 29, 2004	869	December 30, 2004	893
				September 30, 2004	926	December 31, 2004	898
Quarterly Total	75918		53786		73597		76027

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Georgia-Pacific Corporation
Law Department

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(404) 652-4816
(404) 584-1461 fax
www.gp.com

Scott D. Matchett
Principal Counsel
Environmental

September 16, 2005

Via First Class Mail

Ms. Trina Vielhauer
Chief, Bureau of Air Regulation
Florida Department of Environmental Protection
Division of Air Resource Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Re: GP Palatka Sawmill Particulate Issues

Dear Trina:

Thanks very much for your voicemail and phone call this week. I appreciate you getting back to me so promptly after our group conference call this past Monday.

As I mentioned on the call Monday, GP's Palatka Sawmill is committed to addressing the modeled ambient Sawmill exceedances as promptly as reasonably possible. To that end, as I mentioned yesterday, enclosed is a proposed action plan, with concrete steps and milestones, for doing so. You will see that it would result in GP submitting a minor source construction permit application for whatever changes are necessary at the Sawmill by February 15, or sooner if possible. We will try to squeeze any additional time out of the schedule if possible, realizing that (as Forrest Denney explained in the Monday call) the issues regarding characterization and quantification of particulate at such a facility are complicated and novel.

Please feel free to call me if you have any questions. If your staff has technical questions, we will put them in touch with the right technical people on our end.

Thanks again.

Sincerely,

Scott Matchett

Scott D. Matchett

Enclosure

cc: Myra Carpenter
Ed Jamro
Mark Aguilar
Tammy Wyles
Forrest Denney
Terry Cole

GP Palatka Sawmill Action Plan

Step 1. Analyze with model to determine more sensitivities. Allow time to review modeling protocol with current model with FDEP. This step includes adding hypothetical enclosures around fugitives, adjusting kiln exhaust temperatures, turning sources off at night, etc. Complete by October 5th.

Step 2. Evaluate AERMET data (available from contractors) and running AERMOD. Allow time to review modeling protocol for this model with FDEP. Complete by October 10th.

Step 3. Conduct a source test on one of the existing kilns to determine Method 5 PM. Include time for a source test protocol to be reviewed by FDEP. Test execution will take up to two days. To make the results useful in scenarios involving power vents, the test should include PM emissions over an entire charge (approximately 20 hours) and other guidance from contractor and NCASI. Method also needs to consider particle size data as the ambient standards only apply to PM10. Allow 3 weeks after the test for test report to be finalized and report the results to FDEP. Complete by November 5th.

Step 4. Review test results internally with any data available from kiln manufacturers or trade groups (e.g., NCASI). Complete by November 1st.

Step 5. Develop general engineering solutions and cost estimates to mitigate fugitive PM emissions from the most culpable sources (e.g., enclosures). Also, develop general design for modeling a power vent configuration. Allow for additional site visits as needed. Complete by November 15th.

Step 6. Re-analyze with preferred air model the best engineering solutions for fugitives and the stack test results. Complete by November 20.

Step 7. Iterate to solve any issues, including a power vent. Complete by November 30.

Step 8. Report model solution to FDEP in a letter report and begin scoping any final engineering plans and prepare a construction schedule. Complete by December 15.

Step 9. Complete draft construction schedule and submit to FDEP. Complete by Feb 1.

Step 10. Reconcile any differences to account for air quality goals and construction logistic and resources issues. Submit permit application for new enforceable limits/operations that demonstrate compliance with construction schedule. Complete by February 15.

Georgia-Pacific

Palatka Pulp and Paper Operations
Consumer Products Division

P.O. Box 919
Palatka, FL 32178-0919
(386) 325-2001

RECEIVED
APR 08 2005
DIVISION OF AIR
RESOURCE MANAGEMENT

April 4, 2005

CERTIFIED MAIL

EPA Regon IV
Director
Air, Pesticides, and Toxics Management Division
61 Forsyth Street, SW
Atlanta, Georgia 30303

RE: MACT Compliance Status – Non-binding Control Strategy Report

Dear Director:

As required by 40 CFR Sections 63.9(b)(2) and 63.455(b), Georgia-Pacific Corporation, Palatka Operations, submits this update of the required non-binding control strategy report.

Section 63.9(b)(2):

(i) Address of the owner:
Georgia-Pacific Corporation
P. O. Box 105605
Atlanta, GA 30348-5605

(ii) Address of the affected source:
Georgia-Pacific, Palatka Operations
County Road 216
P. O. Box 919
Palatka, FL 32178

(iii) The relevant standard is the National Emission Standard for Hazardous Air Pollutants, Section 63.440(d)(1) which has a compliance date of April 27, 2006.

(iv) The Facility is a fully integrated pulp and paper mill designed to produce approximately 1850 tons per day (monthly average) of kraft pulp, which is processed into either unbleached or bleached kraft paper and tissue products. Hazardous air pollutant sources are identified as the bleaching system, evaporator system, pulping system, HVLC and LVHC systems, pulping process condensates, chemical recovery system (includes recovery boiler and smelt dissolving tank) and turpentine recovery system.

(v) The facility is a major source.
Section 63.445(b):
Georgia-Pacific operates a Kraft pulping operation as specified in Section 63.440(d)(1) and provides the following information:

(1) The requirements of Section 63.443(a)(1)(iii), pulp washing system and 63.334(a)(1)(iv), decker system are applicable. Under the requirements of Section 63.443(a)(1)(ii) the knotter and screen system will be tested to determine if they are subject to the standard. If applicable, a vent collection system will be designed and installed to facilitate the required control of said HAP emissions from the knotter and screen system.

(2) The attached Table 1, Non-binding Control Strategy, lists the dates as required by Section 63.455(b)(2)(I,ii,iii,iv,v, and vii).

(3) Compliance with the standards for the High Volume Low Concentration systems must be achieved as expeditiously as possible, but in no event later than April 16, 2006. Georgia-Pacific estimates that compliance with the HVLC system requirements will be achieved by start-up of the new Brown Stock Washing System or April 16, 2006, whichever is earlier.

I, the undersigned, am the responsible official of the source for which this document is being submitted. I hereby certify, based on information and belief formed after reasonable inquiry, the statements made and the data contained in this document are true, accurate, and complete.

This letter should meet the update notification reporting requirements. If you have questions or need additional information, please contact me at (386) 329-0918.

Sincerely,

Theodore D Kennedy

Theodore D. Kennedy
Vice President

Attachment

cc: M. J. Carpenter
R. R Kaminskas
W. M. Jernigan
S. D. Matchett
Christopher L. Kirts, FDEP, Jacksonville
Howard L. Rhodes, FDEP, Tallahassee

Table 1 - Non-Binding Control Strategy Report (April 2005 Update)
MACT I Requirements for the Pulp and Paper Industry
Georgia-Pacific Corporation
County Road 216, Post Office Box 919
Palatka, Florida 32178

Description of Process Modifications Required				MACT Compliance Schedule					
Control Requirement	Process Equipment Affected by Control Requirement	Process Modication Selected	Implementation Status	Date of Completion of Major Engineering Study	Contract Award Date for Process Modifications	Initiation Date for On Site Construction	Completion Date for On-Site Construction	Performance Date for Final Compliance Tests	Final Compliance
HVLC System	Foam Towers (4) Brown Stock Washers (4) Deckers	Replacement of the Brown Stock Washing System with a new washing system from which the off-gases will be collected and combusted.	Engineering Study Complete	Engineering Study Completed May 1, 2004	February 4, 2005	August 17, 2004	April 16, 2006	October 15, 2006	October 15, 2006
	Knotter/Screen systems	Evaluate these systems to determine if they will require collection and control	Engineering Study Complete	Engineering Study Completed May 1, 2004	February 4, 2005	August 17, 2004	April 16, 2006	October 15, 2006	October 15, 2006
	Oxygen Delignification System	Off gases will be collected and combusted	Engineering Study Complete	Engineering Study Completed May 1, 2004	February 4, 2005	August 17, 2004	May 1, 2008	October 15, 2008	October 15, 2008

Georgia-Pacific

Palatka Pulp and Paper Operations
Consumer Products Division

P.O. Box 919
Palatka, FL 32178-0919
(386) 325-2001

July 11, 2006

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JUL 13 2006
BUREAU OF AIR REGULATION

Ms. Trina L. Vielhauer, Chief
Bureau of Air Regulation
Florida Department of Environmental Protection
Division of Air Resource Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Re: Georgia-Pacific Palatka Mill - PSD Permit Applications – Withdrawal Request

Lime Kiln (LK) Shell	Project No.:	1070005-030-AC/PSD-FL-345
#4 Combination Boiler (CB)	Project No.:	1070005-003-AC/PSD-FL-357
#4 Recovery Boiler (RB)	Project No.:	1070005-035-AC/PSD-FL-367

Dear Ms. Vielhauer:

With this letter Georgia-Pacific respectfully withdraws the above referenced PSD Permit Applications previously sent to the Department. As GP and DEP have discussed recently, it is our intent to prepare the RB and LK Shell as one new application and submit it and a revised #4CB PSD Application in one package in the very near future. In discussions with your staff, it is our understanding that DEP will process the applications concurrently and issue one overall permit.

If you have any questions please call Myra Carpenter at (386) 329-0918.

Sincerely,

Theodore D Kennedy

Theodore D. Kennedy
Vice President

cc: M.J. Carpenter, T. Champion, S.D. Matchett, T. Wyles, E. Jamro
Mr. D. Buff – Golder Asso.

cc: Jeff Koerner } 7-13-06
Bruce Mitchell

cc: Lea Crandall, OGC 7-14-06

GEORGIA-PACIFIC PALATKA OPERATIONS
P.O. BOX 919
PALATKA, FLORIDA 32178-0919
TELEPHONE: (386) 325-2001
FAX NUMBER: (386) 328-0014

Fax

To:	Fl - DEP	**From:**	ED JAMRO
Attn:	Bruce Mitchell		Environmental Department
Fax:	850 - 921 - 9533	**Phone:**	386-~~325-2001~~ 329-0027
Phone:	850 - 413 - 9158	**Fax:**	386-328-0014
Pages:	3 (including cover)	**Date:**	2/15/06

Comments

Bruce,

Here's the letter we are sending to TRINA.

Ed

Georgia-Pacific

Palatka Pulp and Paper Operations
Consumer Products Division

P.O. Box 919
Palatka, FL 32178-0919
(386) 325-2001

February 14, 2006

Ms. Trina L. Vielhauer, Chief
Bureau of Air Regulation
Florida Department of Environmental Protection
Division of Air Resource Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Re: Georgia-Pacific Palatka Mill - PSD Application – Lime Kiln Shell
PSD Permit Application – Resume Processing Request
Project No.: 1070005-030-AC/PSD-FL-345

Dear Ms. Vielhauer:

This letter is a follow up to my letter to you dated September 22, 2005 regarding the above referenced PSD Application. Recall that the application was for what GP considered a maintenance project, as opposed to a production expansion project, and that it triggered PSD review solely because of the required "actual-to-potential" emissions increase evaluation that was required at the time of the application. In the September 22 letter, GP requested that your department hold the application in abeyance while GP updated the application to include the burning of Petcoke in the Lime Kiln.

However, as discussed with Mr. Bruce Mitchell on Friday, February 10, 2006, the Lime Kiln shell has developed cracks that forced us to shut it down that day. This is the sort of contingency that we were anticipating when we first submitted the LK shell repair application in September 2004. Now the kiln requires immediate repairs to allow it to operate. These immediate "routine maintenance" repairs will allow the Lime Kiln to run until the planned mill outage in early May 2006. At that time GP may need to perform the more extensive repairs to the Lime Kiln shell that are covered in the PSD Application.

With this letter Georgia-Pacific respectfully requests that FDEP resume processing the PSD Permit application for the Lime Kiln Shell Project and issue it concurrently with the PSD Application Permit for the Recovery Boiler projects. It is GP's plan to continue preparing a Lime Kiln Pet Coke project PSD Application and submitting to DEP in the near future.

If you have any questions please call Myra Carpenter at (386) 329-0918.

Sincerely,

Theodore D Kennedy

Theodore D. Kennedy
Vice President

cc: M.J. Carpenter, W.M. Jernigan, S.D. Matchett, T. Wyles, E. Jamro
Mr. D. Buff – Golder Asso.

1070005-030-AC : #4 Lime Kiln
1070005-033-AC : #4 Combination Boiler

Georgia-Pacific

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OCT 11 2005

BUREAU OF AIR REGULATION

Georgia-Pacific Corporation

133 Peachtree Street NE (30303)
P.O. Box 105605
Atlanta, Georgia 30348-5605
(404) 652-4000
www.gp.com

October 4, 2005

Jeffery F. Koerner P.E.
Florida Department of Environmental Protection
2600 Blair Stone Road
Tallahassee, Florida 32399

Re: Georgia-Pacific Corporation Palatka Sawmill Particulate Matter Issue Update

Mr. Koerner:

Georgia-Pacific Corporation (GP) has continued to make significant progress in resolving our particulate matter issues at our Palatka Sawmill. Our modeling analyses completed in May and July this year indicated predicted exceedances of the National Ambient Air Quality Standards and PSD Class II allowable increments. The analyses implicated the modeled emission rates at the sawmill were primarily responsible. We appreciate the opportunity to work with the Department to resolve these issues. We submitted a work plan to the Department on September 16th. At this time, we would like to advise you of several developments relevant to the first few milestones on the work plan:

1. We have obtained more representative particle size distribution data for many sources. The data reduces the PM10 fraction of total PM emissions from 50% or greater to less than 1%. For example, sawdust from block saws was provided to our control equipment vendor, Fischer-Klausterman for their design of a cyclone system for this material. Their analyses indicate less than 1% is PM10. Using the new data dramatically reduces modeled emissions and predicted impact for these sources. We have completed other sensitivity analyses for the remaining sources.

2. We have reviewed draft AERMOD guidance presented at the 8th Modeling Conference by USEPA (September 22, Research Triangle Park) and continue to evaluate AERMET. Cleve Holladay has provided us with a template from EPA Region IV (Stan Krivo) to request a case-by-case approval of using AERMOD.

3. We have hired DEECO as a stack test contractor to measure PM emissions from our lumber kilns. The sampling is scheduled for the week of October 17, 2005. A brief description of the testing protocol is attached for your review.

Should you have any questions regarding this, feel free to contact me at (404) 652-5042 or by email at fddenney@gapac.com or Mark Aguilar at (404) 652-4293, mjaguila@gapac.com .

Sincerely,

Forrest D. Denney

Forrest D. Denney
Senior Environmental Manager
Environmental Affairs

Cc:
Chris Kirts, PE Regional Air Administrator
Scott Matchett
Mark Aguilar
Lawrence Otwell
Glenn Moseley
Fritz Mason
Dan Bowen
Myra Carpenter

Georgia Pacific Corporation
Palatka, FL Sawmill
Lumber Kiln Particulate Testing Protocol
October 2005

Emission Unit No: 001
Kilns 1 and 2
Each fired by a direct-fired sawdust burners (26 MMBtu/hr)

Emission Points: EP01 – Kiln No. 1
EP02 – Kiln No. 2

Test Methods: EPA Methods 3, 4 and 14 for determining velocity, flow rate, oxygen and carbon dioxide content and moisture.

EPA Method 5 for determining filterable particulate matter

Testing will be conducted with a field staff of three with one recovery trailer. Flue gas flowrate will be monitored continuously for each of the twelve kiln vents during the entire kiln drying cycle. Particulate will be measured over the entire cycle (which averages 19 hours) with four sample systems (two on each side). Sampling boxes constructed out of plywood lined with sheet metal will cover each kiln vent. Field erected stacks will be attached to the sampling boxes. A man-lift will be used to access the sampling locations.

Georgia-Pacific

Palatka Pulp and Paper Operations
Consumer Products Division

P.O. Box 919
Palatka, FL 32178-0919
(386) 325-2001

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SEP 27 2005
BUREAU OF AIR REGULATION

September 22, 2005

Ms. Trina L. Vielhauer, Chief
Bureau of Air Regulation
Florida Department of Environmental Protection
Division of Air Resource Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Re: Georgia-Pacific Palatka Mill - PSD Application – Lime Kiln Shell
PSD Permit Application – Hold Request
Project No.: 1070005-030-AC/PSD-FL-345

Dear Ms. Vielhauer:

With this letter Georgia-Pacific respectfully requests that FDEP hold the PSD Permit application for the Lime Kiln Shell Project in abeyance. It is GP's plan to combine a Lime Kiln Pet Coke fuel project with the Lime Kiln shell project and update the current application sometime in early November 2005.

If you have any questions please call Myra Carpenter at (386) 329-0918.

Sincerely,

Theodore D Kennedy

Theodore D. Kennedy
Vice President

cc: M.J. Carpenter, W.M. Jernigan, S.D. Matchett, T. Wyles, E. Jamro
Mr. D. Buff – Golder Asso.

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Department of Environmental Protection

Jeb Bush
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Colleen M. Castille
Secretary

September 23, 2005

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Theodore D. Kennedy, V.P Palatka Operations
Georgia-Pacific Corporation
P.O. Box 919
Palatka, FL 32178

Re: **Request for Additional Information – Project Status Update**
Georgia-Pacific Corporation, Palatka Mill
Project No. 1070005-030-AC - Lime Kiln Shell Replacement
Project No. 1070005-033-AC - No. 4 Combination Boiler Modification

Dear Mr. Kennedy:

The purpose of this letter is to remind you that the above applications for air permits remain incomplete. However, there are several ongoing related issues at the Palatka Mill. This letter will also serve as a general summary of each of these issues.

Multiple Contemporaneous Applications

Within the past year, Georgia-Pacific submitted separate PSD applications for the bark hog project, the lime kiln shell replacement project, and the No. 4 combination boiler project. Georgia-Pacific is also preparing to submit a separate application to modify the existing No. 4 recovery boiler. In addition, Georgia-Pacific intends to modify the application for the lime kiln shell replacement project to add petcoke as an authorized fuel. These projects are being planned within the same relative time frame and the Department believes the projects are sufficiently related in terms of PSD preconstruction review. The projects should be combined for review to determine PSD applicability, BACT determinations, and modeled impacts. The Department is concerned with the proper application of the PSD preconstruction review requirements for the pending projects. These concerns have been previously relayed to the plant through the permitting process and phone conversations as well as during the recent September 12th teleconference.

Permit No. PSD-FL-341 - Bark Hog Expansion Project

During January of 2005, the Department issued a permit to expand the wood/bark hog handling operations at the plant. This project now appears to be related to the increased wood/bark feed rate for the No. 4 combination boiler project. Emissions impacts from the related projects should be reviewed together. The bark hog emissions should be included in your modeling and analysis for the lime kiln and No. 4 combination boiler projects.

Project No. 1070005-030-AC - Lime Kiln Shell Replacement

This PSD application to modify the existing lime kiln was submitted in September of 2004. By July 2005, it appeared that Georgia-Pacific and the Department had resolved most of the outstanding issues. However, the latest submittal of additional information included an ambient air quality analysis that indicated modeled exceedances of the Ambient Air Quality Standard and PSD Increment for particulate matter. The area of concern is near a saw mill facility that is also owned by Georgia-Pacific. In a July 26th letter, the Department indicated that the modeled exceedances must be investigated and resolved before a draft permit for the lime kiln project could be issued. This problem, as well as the Department's concerns regarding the multiple contemporaneous applications, was discussed during a September 12th teleconference with Georgia-Pacific.

On September 13th, we discussed several issues by phone with personnel from the Palatka Mill. The plant intends to modify the application for the lime kiln shell replacement project to add petcoke as an authorized fuel. This is expected to substantially change the emissions for the project as well as PSD applicability. This application remains incomplete due to the issues regarding potential adverse particulate matter impacts, multiple contemporaneous applications, and petcoke firing.

Project No. 1070005-033-AC - No. 4 Combination Boiler

In June of 2005, the Department received your application for a PSD air construction permit for the existing No. 4 combination boiler at the Palatka Mill. To increase the bark/wood firing capacity of the boiler, the following modifications are proposed: install a bark/wood feed system including replacement of the existing bark bin with a live bottom bark/wood bin; upgrade the bark/wood fuel delivery system to accommodate the modified feed system; install an underfire air (UFA) system; upgrade the existing overfire air (OFA) system; install a new ash removal system to handle increased ash generation; and repair warped plates on existing electrostatic precipitator and optimize rapping rates to improve control efficiency. The Department requested additional details to clarify the netting analysis (Table 3-3) used to determine which pollutants would be subject to PSD preconstruction review. For example, the lime kiln replacement project was included in this analysis as if a PSD permit were issued and the project had commenced construction, which is not the case.

On August 26th, the Department received your response to our initial request for additional information. The response seems to indicate the following as Georgia-Pacific's position: each of the identified projects is separate and distinct; all contemporaneous increases and decreases were included in the netting analysis; and the netting analysis properly includes all permitted projects. It also mentions that another PSD application will be submitted shortly for the No. 4 recovery boiler, which is again identified as a separate and distinct project. The response also suggests that the No. 4 recovery boiler project could be constructed before the No. 4 combination boiler project, in which case the netting analysis would be revised. The Department has concerns with regard to this approach to PSD preconstruction review for multiple projects.

GP Palatka Sawmill - Particulate Matter Issues

As previously mentioned, the air quality modeling analysis supporting the lime kiln shell replacement project shows modeled potential exceedances near Georgia-Pacific's Palatka sawmill facility. On September 12th, Georgia-Pacific and the Department held a teleconference to clarify this issue. Georgia-Pacific identified that the saw mill facility appeared to be causing the predicted exceedances and that options to mitigate the problem were being developed. The Department intends to treat the issue as it would if the facilities were separately owned.

On September 16th, the Department received an email from Georgia-Pacific that committed to resolving the modeled exceedances as quickly as possible and presented an action plan. The Department appreciates the prompt response to this issue. For pending projects to proceed, the Department believes the following are necessary:

- The recent projects for the Palatka Mill should be combined and reviewed as a single project. The combined emissions impacts should be modeled to determine whether or not the "combined project" is causing or contributing to a significant impact near the sawmill facility. As stated previously, these activities constitute one PSD project and must be reviewed as such.
- If it is determined that the "combined project" does not cause or contribute to the modeled problems, a draft permit may be issued for the combined project. The Department will continue to work with Georgia-Pacific to resolve the sawmill issue independently.
- If it is determined that the "combined project" causes or contributes to the modeled problems, the issue must be resolved before a draft permit can be issued. The Department will need a federally enforceable plan of action for this sawmill prior to issuing the combined project.

To resolve the modeled particulate matter problems, it is recommended that the sawmill facility apply for a minor source air construction permit. This would require a 14-day public notice and comments period. The application should include an ambient air quality analysis that shows the modeled problems will be resolved by implementing the conditions specified in the permit. Many of the items included in the action plan should be included in the application. The purpose of the draft permit would be to identify the measures being taken to mitigate the problem and provide the necessary enforceable mechanism. Once the enforceable air construction permit is issued, the reduced emissions from the sawmill facility can be used in an ambient air quality analysis to support an air permit application for the Palatka Paper Mill. It will be possible to modify the draft permit as necessary to support the actual corrective actions be taken.

Conclusion

The applications for the lime kiln shell replacement and the No. 4 combination boiler are incomplete. The Department requests a revised PSD netting analysis to include all contemporaneous emissions increases and decreases. At this point, the

Department believes that the bark hog project, lime kiln shell replacement (plus petcoke), the No. 4 combination boiler modifications, and the No. 4 recovery boiler modifications should be reviewed for PSD applicability as a single project.

The Department will resume processing your applications after receipt of the requested information. Rule 62-4.050(3), F.A.C. requires that all applications for a Department permit must be certified by a professional engineer registered in the State of Florida. This requirement also applies to responses to Department requests for additional information of an engineering nature. For any material changes to the application, please include a new certification statement by the authorized representative or responsible official. You are reminded that Rule 62-4.055(1), F.A.C. requires applicants to respond to requests for information within 90 days or provide a written request for an additional period of time to submit the information.

It is our understanding that Georgia-Pacific is internally reviewing the issue of multiple contemporaneous applications and may have a different opinion. We welcome the opportunity to meet with you to discuss further details and develop a strategy for proceeding. If you have any questions regarding this matter, please call me at 850/921-9536.

Sincerely,

Jeffery F. Koerner, P.E.
Air Permitting North Program

cc: Myra Carpenter, GP
David Buff, Golder Associates Inc
Greg Worley, EPA Region 4
John Bunyak, NPS
Chris Kirts, NED

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Mr. Theodore D. Kennedy
Vice President – Palatka Operations
Georgia Pacific
Palatka Mill
Post Office Box 919
Palatka, Florida 32178-0919

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X John Alexander ☐ Agent ☐ Addressee

B. Received by (*Printed Name*) John Alexander
C. Date of Delivery 9/26/05

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If YES, enter delivery address below: ☐ No

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Vice President – Palatka Operations
Georgia Pacific
Palatka Mill
Post Office Box 919
Palatka, Florida 32178-0919

PS Form 3800, June 2002 See Reverse for Instructions

Georgia-Pacific

Palatka Pulp and Paper Operations
Consumer Products Division

P.O. Box 919
Palatka, FL 32178-0919
(386) 325-2001

July 13, 2005

RECEIVED
JUL 14 2005
BUREAU OF AIR REGULATION

Mr. Jeff Koerner, Chief – Air Permitting North
Bureau of Air Regulation
Florida Department of Environmental Protection
Division of Air Resource Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Re: Georgia-Pacific Palatka Mill - Title V Permit No. 1070005-029-AV
Request to Replace the Lime Kiln Shell and Associated Tube Coolers
Project No.: 1070005-030-AC/PSD-FL-345

Dear Mr. Koerner:

Georgia-Pacific Corporation (GP) met with Mr. Bruce Mitchell of your staff to review certain issues regarding PM, TRS, NOx, and VOC emissions as related to this project. Based on those discussions an agreement was reached regarding those emissions. The following table presents the proposed emission rates resulting from these discussions. Engineering calculations are presented below the table.

Table 1. Summary of Proposed Lime Kiln 4 Emission Rates and Calculations, GP Palatka

Pollutant	Concentration			Emission Rate (lbs/hr)	Emission Rate (TPY)
PM	0.064	GR/DSCF		29.7	130.2
TRS	17	PPM	(Corrected to 10% O2)	4.9	21.4
NOx	175	PPM	(Corrected to 10% O2)	67.9	297.3
VOC	70	PPM	(Corrected to 10% O2)	9.4	41.6

Detailed Calculations:
Particulate Matter (PM)
Based on 0.064 gr/dscf at 10% oxygen (lowered from existing limit of 0.81 gr/dscf)
Corresponding mass emission limits are calculated as follows:
0.064 gr/dscf x 54,200 dscf/min x 60 mins/hour x lb/7000 grains = 29.7 lbs/hour (130.2 tpy)

Total Reduced Sulfur
Based on 17 ppmvd at 10% oxygen
Corresponding mass emission limits are calculated as follows:
(17 ft3 TRS/106 ft3 air x 2116.8 lb/ft2 x 34.1 lb/lb-mole)/(1545.6 ft-lbf/lb mole-R x 528 R) = 1.50 x 10-6 lb/ft3
Mass emission rate = 1.50 x 10-6 lb/ft3 x 54,200 dscf/min x 60 mins/hour = 4.9 lbs/hour (21.4 tpy)

Nitrogen Oxides
Based on 175 ppmvd at 10% oxygen (lowered from existing limit of 290 ppmvd)
Corresponding mass emission limits are calculated as follows:
(175 ft3 NOx/106 ft3 air x 2116.8 lb/ft2 x 46 lb/lb-mole)/(1545.6 ft-lbf/lb mole-R x 528 R) = 2.09 x 10-5 lb/ft3
Mass emission rate = 2.09 x 10-5 lb/ft3 x 54,200 dscf/min x 60 mins/hour = 67.9 lbs/hour (297.3 tpy)

Volatile Organic Compounds
Based on 70 ppmvd at 10% oxygen (lowered from existing limit of 185 ppmvd); used molecular weight for methane (CH4)
(70 ft3 VOC/106 ft3 air x 2116.8 lb/ft2 x 16 lb/lb-mole)/(1545.6 ft-lbf/lb mole-R x 528 R) = 2.91x 10-6 lb/ft3
Mass emission rate = 2.91 x 10-6 lb/ft3 x 54,200 dscf/min x 60 mins/hour = 9.4 lbs/hour (41.6 tpy)

Also, please find enclosed a CD with air quality modeling files requested in your July 8th letter. I have already transmitted these files via electronic mail to Mr. Cleve Holladay and discussed the contents in regards to your requests.

If you have any questions please call me at (404) 652-4293.

Sincerely,

Mark J. Aguilar, PE
Georgia-Pacific Corporation

cc: M.J. Carpenter, W.M. Jernigan, S.D. Matchett, T. Wyles, E. Jamro
Enclosure: CD, 2 copies
B. Mitchell
C. Holladay
C. Kirts NED
D. Worley, EPA
D. Bunyak, NPS

Jeb Bush
Governor

Department of Environmental Protection

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Colleen M. Castille
Secretary

July 8, 2005

CERTIFIED MAIL – Return Receipt Requested

Mr. Theodore D. Kennedy
Vice President – Palatka Operations
Georgia-Pacific
Palatka Mill
P.O. Box 919
Palatka, Florida 32178-0919

RE: Request to Replace the Lime Kiln Shell and Associated Tube Coolers
Project No.: 1070005-030-AC/PSD-FL-345

Dear Mr. Kennedy:

On September 4, 2004, the Department received a request to replace a portion of the lime kiln shell and all of the associated tube coolers. On June 8, 2005, the Department received a response to the department's third RAI letter dated May 13, 2005. We have determined that the following additional information is needed in order to continue processing this application package. Please provide all assumptions, calculations, and reference material(s) that are used or reflected in any of your responses to the following issues:

1. No modeling input or output files supporting your response to Request 2 were submitted. Please submit these files.
2. The department was unable to verify the All Sources values in Tables 1 and 2. Please provide this information.

The Department will resume processing this application after receipt of the requested information. If you have any questions regarding this matter, please call Bruce Mitchell at (850)413-9198 or Cleve Holladay at (850)921-8986.

Sincerely,

Cleve Holladay for

Jeff Koerner
Air Permitting North
Bureau of Air Regulation

JFK/ch

cc: Gregg Worley, U.S. EPA, Region 4
Dave McNeal, U.S. EPA, Region 4
Lee Page, U.S. EPA, Region 4
John Bunyak, NPS
Chris Kirts, NED
Myra J. Carpenter, G-PC
Mark J. Aguilar, P.E., G-PC

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- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Mr. Theodore D. Kennedy
Vice President – Palatka Operations
Georgia Pacific
Palatka Mill
Post Office Box 919
Palatka, Florida 32178-0919

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A. Signature [signature] ☐ Agent ☐ Addressee

B. Received by (Printed Name) John N Alexander

C. Date of Delivery

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Georgia Pacific
Palatka Mill
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Georgia-Pacific

Palatka Pulp and Paper Operations
Consumer Products Division

P.O. Box 919
Palatka, FL 32178-0919
(386) 325-2001

RECEIVED
JUN 08 2005
BUREAU OF AIR REGULATION

June 2, 2005

Mr. Jeff Koerner, Chief – Air Permitting North
Bureau of Air Regulation
Florida Department of Environmental Protection
Division of Air Resource Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Re: Georgia-Pacific Palatka Mill - Title V Permit No. 1070005-029-AV
Request to Replace the Lime Kiln Shell and Associated Tube Coolers
Project No.: 1070005-030-AC/PSD-FL-345

Dear Mr. Koerner:

Georgia-Pacific Corporation (GP) has received the Florida Department of Environmental Protection's (FDEP's) third request for additional information (RAI #3), dated May 13, 2005. Responses to each of the Department's requests are provided in the remainder of this letter.

1. **Rule 62-212.400(5)(h)5, F.A.C. requires the applicant to provide information relating to the air quality impact of, and the nature and extent of, all general commercial, residential, industrial, and other growth which has occurred since August 7, 1977, in the area the facility or modification would affect. Please provide this information. The additional impacts section in the updated response, Section 3.5, does not adequately address this requirement.**

<u>RESPONSE:</u> Attachment A is the report entitled "Additional Impact Analysis for the Vicinity of the GP Palatka Mill". This report expands upon the information provided in "section 3.5" referenced in DEP's question. Specifically, Section 1.2 addresses "Impacts Due to Associated Direct Growth"

2. **In Section 3.2.10 (Source Impact Analysis Results) maximum annual and 24-hour PM_{10} NAAQS results and 24-hour PM_{10} PSD Class II increment results show predicted violations of the respective NAAQS and increments at receptors located on or near GP's Sawmill Mill. However, in this same section, the maximum project impacts are shown to be less than significant at the receptors showing violations. Do the modeled impacts of all of the PM_{10} sources at the Georgia-Pacific Palatka facility result in violations of the applicable PM10 NAAQS or increment at any of these receptors entirely on their own?**

<u>RESPONSE:</u> This question is answered fully in Attachment B.

If you have any questions please call Myra Carpenter at (386) 329-0918.

Sincerely,
Theodore D. Kennedy
Theodore D. Kennedy
Vice President

cc: M.J. Carpenter, W.M. Jernigan, S.D. Matchett, T. Wyles, E. Jamro
B. Mitchell
C. Holladay
C. Kirts, NED
G. Worley, EPA
G. Bunyak, NPS

APPLICATION INFORMATION

Professional Engineer Certification

1. Professional Engineer Name: **Mark J. Aguilar**
   Registration Number: **52248**
2. Professional Engineer Mailing Address:
   Organization/Firm: **Georgia-Pacific Corporation**
   Street Address: **133 Peachtree St**
   City: **Atlanta** State: **GA** Zip Code: **30303**
3. Professional Engineer Telephone Numbers...
   Telephone: **(404) 652-4293** ext. Fax: **(404) 654-4706**
4. Professional Engineer Email Address: **mjaguila@gapac.com**
5. Professional Engineer Statement:

I, the undersigned, hereby certify, except as particularly noted herein, that:*

(1) To the best of my knowledge, there is reasonable assurance that the air pollutant emissions unit(s) and the air pollution control equipment described in this application for air permit, when properly operated and maintained, will comply with all applicable standards for control of air pollutant emissions found in the Florida Statutes and rules of the Department of Environmental Protection; and

(2) To the best of my knowledge, any emission estimates reported or relied on in this application are true, accurate, and complete and are either based upon reasonable techniques available for calculating emissions or, for emission estimates of hazardous air pollutants not regulated for an emissions unit addressed in this application, based solely upon the materials, information and calculations submitted with this application.

(3) If the purpose of this application is to obtain a Title V air operation permit (check here ☐, if so), I further certify that each emissions unit described in this application for air permit, when properly operated and maintained, will comply with the applicable requirements identified in this application to which the unit is subject, except those emissions units for which a compliance plan and schedule is submitted with this application.

(4) If the purpose of this application is to obtain an air construction permit (check here ☒, if so) or concurrently process and obtain an air construction permit and a Title V air operation permit revision or renewal for one or more proposed new or modified emissions units (check here ☐, if so), I further certify that the engineering features of each such emissions unit described in this application have been designed or examined by me or individuals under my direct supervision and found to be in conformity with sound engineering principles applicable to the control of emissions of the air pollutants characterized in this application.

(5) If the purpose of this application is to obtain an initial air operation permit or operation permit revision or renewal for one or more newly constructed or modified emissions units (check here ☐, if so), I further certify that, with the exception of any changes detailed as part of this application, each such emissions unit has been constructed or modified in substantial accordance with the information given in the corresponding application for air construction permit and with all provisions contained in such permit.

[signature] 6/1/05

Signature Date

(seal)

PROFESSIONAL ENGINEER MARK J. AGUILAR CERTIFICATE No. 52248 STATE OF FLORIDA

* Attach any exception to certification statement

ATTACHMENT A

APPENDIX A – LK SHELL RAI
PROJECT NO.: 1070005-030-AC/PSD-FL-345

1.0 ADDITIONAL IMPACT ANALYSIS FOR THE VICINITY OF THE GP PALATKA MILL

1.1 IMPACTS TO SOILS, VEGETATION, AND VISIBILITY IN THE VICINITY OF THE GP PALATKA MILL

1.1.1 PREDICTED AIR QUALITY IMPACTS

The results of the ambient air quality modeling for the proposed GP modification, in the vicinity of the plant, are presented in Table 1-1. The predicted maximum increase in pollutant concentrations due to the proposed project are presented for the annual, 24-hour, 8-hour, 3-hour, and 1-hour averaging times.

Table 1-1. Summary of Maximum Pollutant Concentrations Predicted for the Lime Kiln Project to Address Impacts to Soils and Vegetation in the GP Mill Vicinity

Pollutant and Averaging Time	Emission Rate [a] (g/s)	Concentration [b] ($\mu g/m^3$)	Receptor Location [c] x (m)	Receptor Location [c] y (m)	Time Period [d] YYMMDDHH
SO_2					
Annual	0.85	0.1	800	-600	--------
24-hour	0.85	1.5	500	-400	86082424
8-hour	0.85	3.8	500	-500	87071416
3-hour	0.85	5.9	500	-300	86060212
1-hour	0.85	9.6	500	-800	86062110
PM_{10}					
Annual	2.84	0.340	800	-600	--------
24-hour	2.84	4.97	500	-400	86082424
NO_2					
Annual	8.14	0.97	800	-600	--------
24-hour	8.14	14.2	500	-400	86082424
8-hour	8.14	36.0	500	-500	87071416
3-hour	8.14	56.9	500	-300	86060212
1-hour	8.14	91.7	500	-800	86062110
CO					
Annual	1.52	0.2	800	-600	--------
24-hour	1.52	2.7	500	-400	86082424
8-hour	1.52	6.8	500	-500	87071416

Table 1-1. Summary of Maximum Pollutant Concentrations Predicted for the Lime Kiln Project to Address Impacts to Soils and Vegetation in the GP Mill Vicinity

Pollutant and Averaging Time	Emission Rate [a] (g/s)	Concentration [b] ($\mu g/m^3$)	Receptor Location [c] x (m)	y (m)	Time Period [d] YYMMDDHH
3-hour	1.52	10.7	500	-300	86060212
1-hour	1.52	17.2	500	-800	86062110
SAM					
Annual	0.043	0.005	800	-600	--------
24-hour	0.043	0.076	500	-400	86082424
8-hour	0.043	0.191	500	-500	87071416
3-hour	0.043	0.302	500	-300	86060212
1-hour	0.043	0.486	500	-800	86062110

[b] Based on the highest concentrations predicted from the generic modeling analysis (modeled using 10 g/s emissions)

[c] Relative to the old TRS Incinerator stack.

[d] YY = Year; MM = Month; DD = Day; HH = Hour ending.

1.1.2 IMPACTS TO SOILS

Air contaminants can affect soils through fumigation by gaseous forms, accumulation of compounds transformed from the gaseous state, or by the direct deposition of PM or PM to which certain contaminants are absorbed. According to the Putnam County Soil Survey (1990), the soils in the vicinity of the GP Palatka Mill are dominated by Terra Ceia muck, with Cassia fine sand and Pamona fine sand also present. The Terra Ceia muck, Cassia fine sand, and Pomona fine sand series are described in the Putnam County Soil Survey as follows:

Terra Ceia muck, frequently flooded – This soil is nearly level and very poorly drained, found on broad to narrow plains along the St. Johns River and its tributaries. Typically the upper part of this organic soil is dark reddish brown muck approximately 28 inches thick, while the lower portion to a depth of approximately 80 inches is black muck. This soil has a high water table at the surface except during extended dry periods. The available water capacity is very high, permeability is rapid, and natural fertility is moderate. Typical vegetation includes wetlands forested with sweetgum, red maple, cypress, bay, and cabbage palm. The soil reaction for Terra Ceia muck is classified as slightly acid within the top 28 inches, and mildly alkaline between 28 and 80 inches below the surface.

Pomona fine sand – This soil is nearly level and poorly drained, found in broad flatwoods areas. Typically this soil has a surface layer of black fine sand approximately 6 inches thick underlain by a subsurface layer of gray and light gray fine sand to a depth of 20 inches. In most years this soil has a high water table at a depth of less than 12 inches for 1 to 3 months. The available water capacity is very low, permeability is rapid, and natural fertility is low. Typical vegetation is pine flatwoods. The soil reaction for Pomona fine sand is classified as extremely acid within the top 6 inches, very strongly acidic between 6 to 10 inches, and strongly acidic between 10 and 20 inches below the surface.

Cassia fine sand – This soil is nearly level and somewhat poorly drained, found on small knolls within flatwoods and in low positions on uplands. Typically, this soil has a surface layer of gray fine sand approximately 4 inches thick, and a subsurface layer of light gray fine sand to a depth of 28 inches. In most years, this soil has a water table at a depth of 15 to 40 inches for about 6 months. The available water capacity is very low, permeability is rapid, and natural fertility is low. Natural vegetation includes pine flatwoods and oak. Cassia fine sand is classified as extremely acid within the top 4 inches, very strongly acidic between 4 to 9 inches, and strongly acidic between 9 and 24 inches below the surface.

The dominant soil in the vicinity of the GP facility, Terra Ceia muck, is a highly organic wetland soil and has an extremely high buffering capacity based on the cation exchange capacity, base saturation, and bulk density. Therefore, this soil would be relatively insensitive to atmospheric inputs. The maximum predicted concentrations for all pollutants in the vicinity of the site as a result of the proposed project are below the significant impact levels. Further, the maximum predicted SO_2 concentrations in the vicinity of the site are below the AAQS. Since the AAQS are designed to protect the public welfare, including effects on soils and vegetation, no detrimental effects on soils should occur in the vicinity of the GP Palatka Mill due to the proposed project.

1.1.3 IMPACTS TO VEGETATION

1.1.3.1 Vegetation Analysis

In general, the effects of air pollutants on vegetation occur primarily from SO_2, NO_2, O_3, and PM. Effects from minor air contaminants such as fluoride, chlorine, hydrogen chloride, ethylene, ammonia, hydrogen sulfide, CO, and pesticides have also been reported in the literature. The effects of air pollutants are dependent both on the concentration of the contaminant and the duration of the exposure. The term "injury," as opposed to damage, is commonly used to describe all plant responses to air contaminants and will be used in the context of this analysis. Air contaminants are thought to interact primarily with plant foliage which is considered to be the major pathway of exposure. For purposes of this analysis, it was assumed that 100 percent of each air contaminant of concern is accessible to the plants.

Injury to vegetation from exposure to various levels or air contaminants can be termed acute, physiological, or chronic. Acute injury occurs as a result of a short-term exposure to a high contaminant concentration and is typically manifested by visible injury symptoms ranging from chlorosis (discoloration) to necrosis (dead areas). Physiological or latent injury occurs as the result of a long-term exposure to contaminant concentrations below that which results in acute injury symptoms. Chronic injury results from repeated exposure to low concentrations over extended periods of time, often without any visible symptoms, but with some effect on the overall growth and productivity of the plant. In this assessment, 100 percent of the particular air pollutant in the ambient air was assumed to interact with the vegetation. This is a conservative approach.

Sulfur Dioxide

Sulfur is an essential plant nutrient usually taken up as sulfate ions by the roots from the soil solution. When SO_2 in the atmosphere enters the foliage through pores in the leaves, it reacts with water in the leaf interior to form sulfite ions. Sulfite ions are highly toxic. They interact with enzymes, compete with normal metabolites, and interfere with a variety of cellular functions (Horsman and Wellburn, 1976). However, within the leaf, sulfite is oxidized to sulfate ions, which can then be used by the plant as a nutrient. Small amounts of sulfite may be oxidized before they prove harmful.

SO_2 gas at elevated levels has long been known to cause injury to plants. Acute SO_2 injury usually develops within a few hours or days of exposure, and symptoms include marginal, flecked, and/or intercoastal necrotic areas that appear water-soaked and dullish green initially. This injury generally occurs to younger leaves. Chronic injury usually is evident by signs of chlorosis, bronzing, premature senescence, reduced growth, and possible tissue necrosis (EPA, 1982). Observed SO_2 effect levels for several plant species and plant sensitivity groupings are presented in Tables 1-2 and 1-3, respectively.

Table 1-2. SO_2 Effects Levels for Various Plant Species

Plant Species	Observed Effect Level ($\mu g/m^3$)	Exposure (Time)	Reference
Sensitive to tolerant	920 (20 percent displayed visible injury)	3 hours	McLaughlin and Lee, 1974
Lichens	200-400	6 hr/wk for 10 weeks	Hart *et al.*, 1988
Cypress, slash pine, live oak, mangrove	1,300	8 hours	Woltz and Howe, 1981
Jack pine seedlings	470-520	24 hours	Malhotra and Kahn, 1978
Black oak	1,310	Continuously for 1 week	Carlson, 1979

Table 1-3. Sensitivity Groupings of Vegetation Based on Visible Injury at Different SO_2 Exposures[a]

Sensitivity Grouping	SO_2 Concentration		Plants
	1-Hour	3-Hour	
Sensitive	1,310 - 2,620 $\mu g/m^3$ (0.5 - 1.0 ppm)	790 - 1,570 $\mu g/m^3$ (0.3 - 0.6 ppm)	Ragweeds, Legumes Blackberry , Southern pines Red and black oaks White ash Sumacs
Intermediate	2,620 - 5,240 $\mu g/m^3$ (1.0 - 2.0 ppm)	1,570 - 2,100 $\mu g/m^3$ (0.6 - 0.8 ppm)	Maples, Locust Sweetgum, Cherry Elms, Tuliptree Many crop and garden species.
Resistant	>5,240 $\mu g/m^3$ (>2.0 ppm)	>2,100 $\mu g/m^3$ (>0.8 ppm)	White oaks, Potato Upland cotton, Corn Dogwood, Peach

[a] Based on observations over a 20-year period of visible injury occurring on over 120 species growing in the vicinities of coal-fired power plants in the southeastern United States.

Source: EPA, 1982a.

Many studies have been conducted to determine the effects of high-concentration, short-term SO_2 exposure on natural community vegetation. Sensitive plants include ragweed, legumes, blackberry, southern pine, and red and black oak. These species are injured by exposure to 3-hour average SO_2 concentrations of 790 to 1,570 $\mu g/m^3$. Intermediate plants include locust and sweetgum. These species are injured by exposure to 3-hour average SO_2 concentrations of 1,570 to 2,100 $\mu g/m^3$. Resistant species (injured at concentrations above 2,100 $\mu g/m^3$ for 3 hours) include white oak and dogwood (EPA, 1982).

A study of native Floridian species (Woltz and Howe, 1981) demonstrated that cypress, slash pine, live oak, and mangrove exposed to 1,300 $\mu g/m^3$ SO_2 for 8 hours were not visibly damaged. This finding supports the levels cited by other researchers on the effects of SO_2 on vegetation. A corroborative study (McLaughlin and Lee, 1974) demonstrated that approximately 20 percent of a cross-section of plants ranging from sensitive to tolerant was visibly injured at 3-hour average SO_2 concentrations of 920 $\mu g/m^3$.

Jack pine seedlings exposed to SO_2 concentrations of 470 to 520 $\mu g/m^3$ for 24 hours demonstrated inhibition of foliar lipid synthesis; however, this inhibition was reversible (Malhotra and Kahn, 1978). Black oak exposed to 1,310 $\mu g/m^3$ SO_2 for 24 hours a day for 1 week demonstrated a 48 percent reduction in photosynthesis (Carlson, 1979).

Two lichen species indigenous to Florida exhibited signs of SO_2 damage in the form of decreased biomass gain and photosynthetic rate as well as membrane leakage when exposed to concentrations of 200 to 400 $\mu g/m^3$ for 6 hours/week for 10 weeks (Hart et al., 1988).

The predicted maximum 3- and 24-hour average SO_2 concentrations due to the proposed project are 31.4 and 10.1 $\Phi g/m^3$, respectively, which are well below the injury threshold of sensitive species of vegetation.

Nitrogen Dioxide

A review of the literature indicates great variability in NO_2 dose-response relationship in vegetation. Acute NO_2 injury symptoms are manifested as water-soaked lesions, which first appear on the upper surface, followed by rapid tissue collapse. Low-concentration, long-term exposures as frequently encountered in polluted atmospheres often do not induce the lesions associated with acute exposures but may still result in some growth suppression. Citrus trees exposed to 470 $\Phi g/m^3$ of NO_2 for

290 days showed injury (Thompson *et al.*, 1970). Sphagnum exposed for 18 months at an average concentration of 11.7 Φg/m^3 showed reduced growth (Press *et al.*, 1986)

The maximum increase in ground-level 1-hour and annual average NO_2 concentrations predicted to occur in the vicinity of the plant during the operation of the proposed project are 3.3 and 0.10 Φg/m^3, respectively (see Table 1-1). These maximum predicted concentrations are well below reported effects levels.

Carbon Monoxide

Concentrations of CO even in polluted atmospheres are not detrimental to vegetation (EPA, 1976). CO has not been found to produce detrimental effects on plants at concentrations below 100 ppm (114,500 Φg/m^3) for exposures from 1 to 3 weeks (EPA, 1976). The predicted maximum concentrations shown in Table 1-1 are well below levels reported to cause detrimental effects.

Particulate Matter (PM_{10})

Although information pertaining to the effects of particulate matter on plants is scarce, some threshold concentrations are available. Mandoli and Dubey (1998) exposed ten species of native Indian plants to levels of particulate matter ranging from 210 to 366 $\mu g/m^3$ for an 8-hour averaging period. Damage in the form of a higher leaf area/dry weight ratio was observed at varying degrees for most plants tested. Concentrations of particulate matter lower than 163 $\mu g/m^3$ did not appear to be injurious to the tested plants. The maximum predicted 24-hour and annual average PM_{10} concentrations due to the proposed project of 4.86 and 0.50 $\mu g/m^3$, respectively, are well below the injury thresholds reported in the literature.

VOC Emissions and Impacts on Ozone

It is difficult to predict what effect the proposed project's emissions of VOC will have on ambient O_3 concentrations from either a local or regional scale. VOC and NO_x emissions are precursors to the formation of O_3. O_3 is formed down-wind from emission sources when VOC, and NO_x emissions from the facility react in the presence of sunlight. Background (without man-made sources) ambient concentrations of O_3 are normally in the range of 20 to 39 $\mu g/m^3$ (0.01 to 0.02 ppm) (Heath, 1975).

O_3 can cause various damage to broad-leaved plants including: tissue collapse, interveinal necrosis and markings on the upper surface of leaves known as stippling (pigmented yellow, light tan, red brown, dark brown, red, or purple), flecking (silver or bleached straw white), mottling, chlorosis or bronzing, and bleaching. O_3 can also stunt plant growth and bud formation. On certain plants such as citrus, grape, and tobacco, it is common for leaves to wither and drop early. A literature review suggests that exposure for 4 hours at levels of 0.04 to 11.0 ppm of O_3 will result in plant injury for sensitive plants. The extent of the injury depends on the plant species and environmental conditions prior to and during exposure.

Given that the O_3 measurements in the region comply with the AAQS (see Sections 4.0 and 7.2.5) and the increase in VOC emissions for the project represents less than a 1-percent change in regional VOC emissions, no adverse effects on vegetation due to the project's VOC emissions are expected.

Sulfuric Acid Mist

Acidic precipitation or acid rain is coupled to SO_2 emissions mainly formed during the burning of fossil fuels. This pollutant is oxidized in the atmosphere and dissolves in rain forming SAM, which falls as acidic precipitation (Ravera, 1989). Although concentration data are not available, SAM has been reported to yield necrotic spotting on the upper surfaces of leaves (Middleton *et al.*, 1950).

No significant adverse effects on vegetation are expected from the project's emissions because SO_2 concentrations, which lead directly to the formation of SAM concentrations, are predicted to be well below levels that have been documented as negatively affecting vegetation.

1.1.4 IMPACTS UPON VISIBILITY

All air emission sources affected by the proposed modification are existing sources. No increase in permitted emissions is requested, although actual emissions are predicted to increase. All these sources are in compliance with opacity regulations and should remain in compliance after the modification. As a result, no adverse impacts upon visibility are expected.

1.2 <u>IMPACTS DUE TO ASSOCIATED DIRECT GROWTH</u>

1.2.1 INTRODUCTION

Rule 62-212.400(3)(h)(5), F.A.C., states that an application must include information relating to the air quality impacts of, and the nature and extent of all general, residential, commercial, industrial and other growth which has occurred since August 7, 1977, in the area the facility or modification would affect. This growth analysis considers air quality impacts due to emissions resulting from the industrial, commercial, and residential growth associated with the proposed expansion at the GP Palatka Mill. This information is consistent with the EPA Guidance related to this requirement in the *Draft New Source Review Workshop Manual* (EPA, 1990).

In general, there has been minimal growth in the GP Palatka Mill area since 1977. Putnam County is surrounded by Marion County to the south and west, Alachua County to the west, Clay County to the north, St. John's County to the north and east, Flagler County to the east, and Volusia County to the south. Putnam County encompasses an 827-square mile area including 733-square miles of land area.

The Lime Kiln Shell is being repaired to replace coolers and mounting brackets. As the kiln has developed cracks form thermal stress, the proposed project will improve the reliability of the kiln and maintain a safe operation. Additional growth as a direct result of the proposed modification is not expected.

The project will not require any additional operational workers once the project is completed.

There are also expected to be no air quality impacts due to associated commercial and industrial growth given the location of the existing GP Palatka Mill. The existing commercial and industrial infrastructure should be adequate to provide any support services that the project might require and would not increase with the operation of the project.

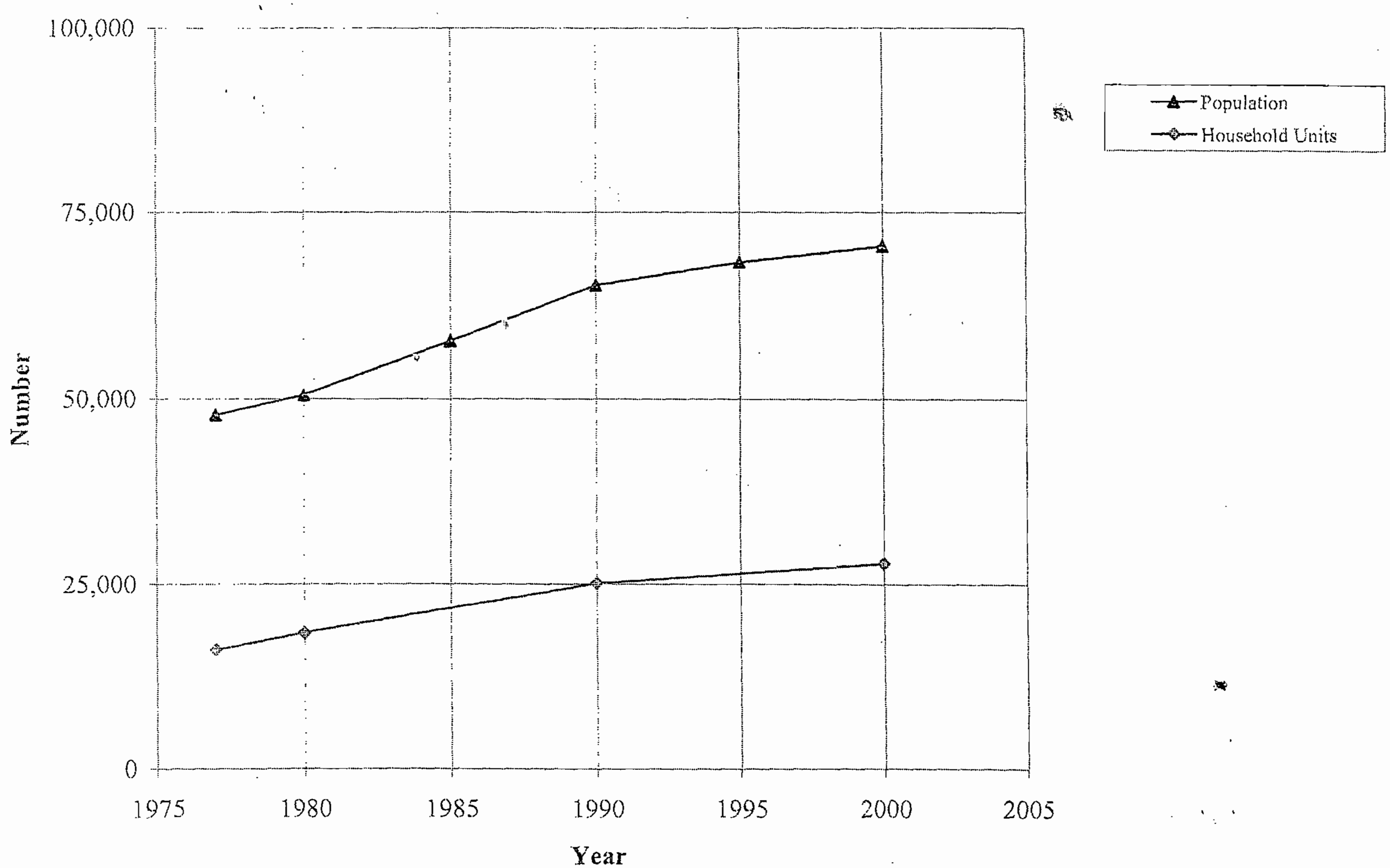
The following discussion presents general trends in residential, commercial, industrial, and other growth that has occurred since August 7, 1977, in Putnam County. As such, the information presents information available from a variety of sources (*i.e.*, Florida Statistical Abstract, FDEP, etc.) that characterize Putnam County as a whole.

1.2.2 RESIDENTIAL GROWTH

1.2.2.1 <u>Population and Household Trends</u>

As an indicator of residential growth, the trend in the population and number of household units in Putnam County since 1977 are shown in Figure 1-1. The county experienced a 47-percent increase in population for the years 1977 through 2000. During this period, there was an increase in population of about 22,600. Similarly, the number of households in the county increased by about 12,000, or 73 percent, since 1977.

Figure 1-1. Population and Household Unit Trends in Putnam County



9a.

1.2.2.2 Growth Associated with the Operation of the Project

Because there will be no additional workers needed to operate the project, there will be no residential growth due to the project.

1.2.3 COMMERCIAL GROWTH

1.2.3.1 Retail Trade and Wholesale Trade

As an indicator of commercial growth in Putnam County, the trends in the number of commercial facilities and employees involved in retail and wholesale trade are presented in Figure 1-2. The retail trade sector comprises establishments engaged in retailing merchandise. The retailing process is the final step in the distribution of merchandise. Retailers are, therefore, organized to sell merchandise in small quantities to the general public. The wholesale trade sector comprises establishments engaged in wholesaling merchandise. This sector includes merchant wholesalers who buy and own the goods they sell; manufacturers' sales branches and offices that sell products manufactured domestically by their own company; and agents and brokers who collect a commission or fee for arranging the sale of merchandise owned by others.

Since 1977, retail trade has increased by about 14 establishments and 2,000 employees or 6 and 118 percent, respectively. For the same period, wholesale trade has increased by 28 establishments and 346 employees, or 82 and 126 percent, respectively.

1.2.3.2 Labor Force

The trend in the labor force in Putnam County since 1977 is shown in Figure 1-3. The greatest number of persons employed in Putnam County has been in the manufacturing, government, and retail trade sectors. Between 1977 and 1999, approximately 5,000 persons were added to the available work force, for an increase of 34 percent.

1.2.3.3 Tourism

Another indicator of commercial growth in Putnam County is the tourism industry. As an indicator of tourism growth in the county, the trend in the number of hotels and motels and the number of units at the hotels and motels are presented in Figure 1-4.

Figure 1-2. Retail and Wholesale Trade Trends in Putnam County

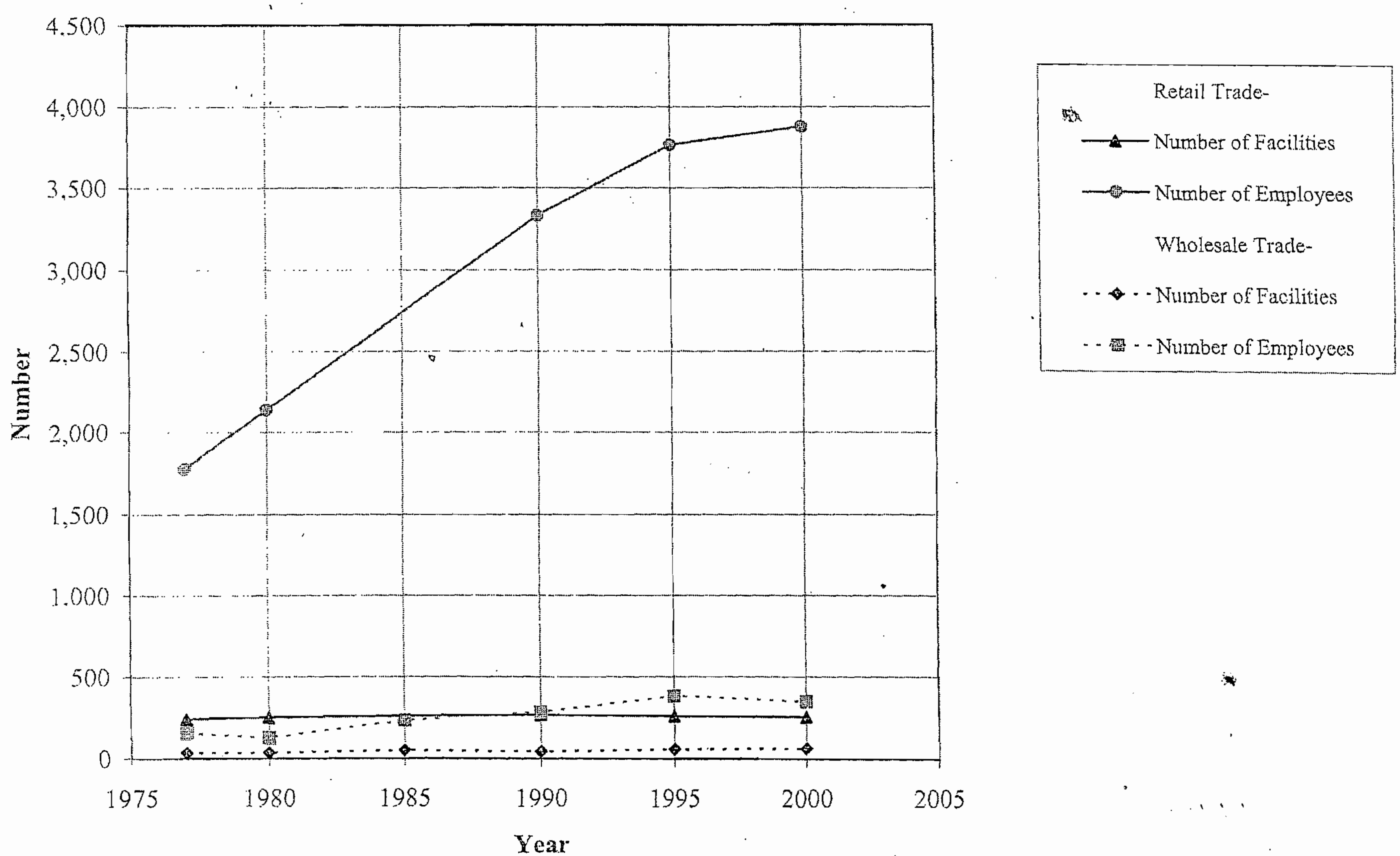
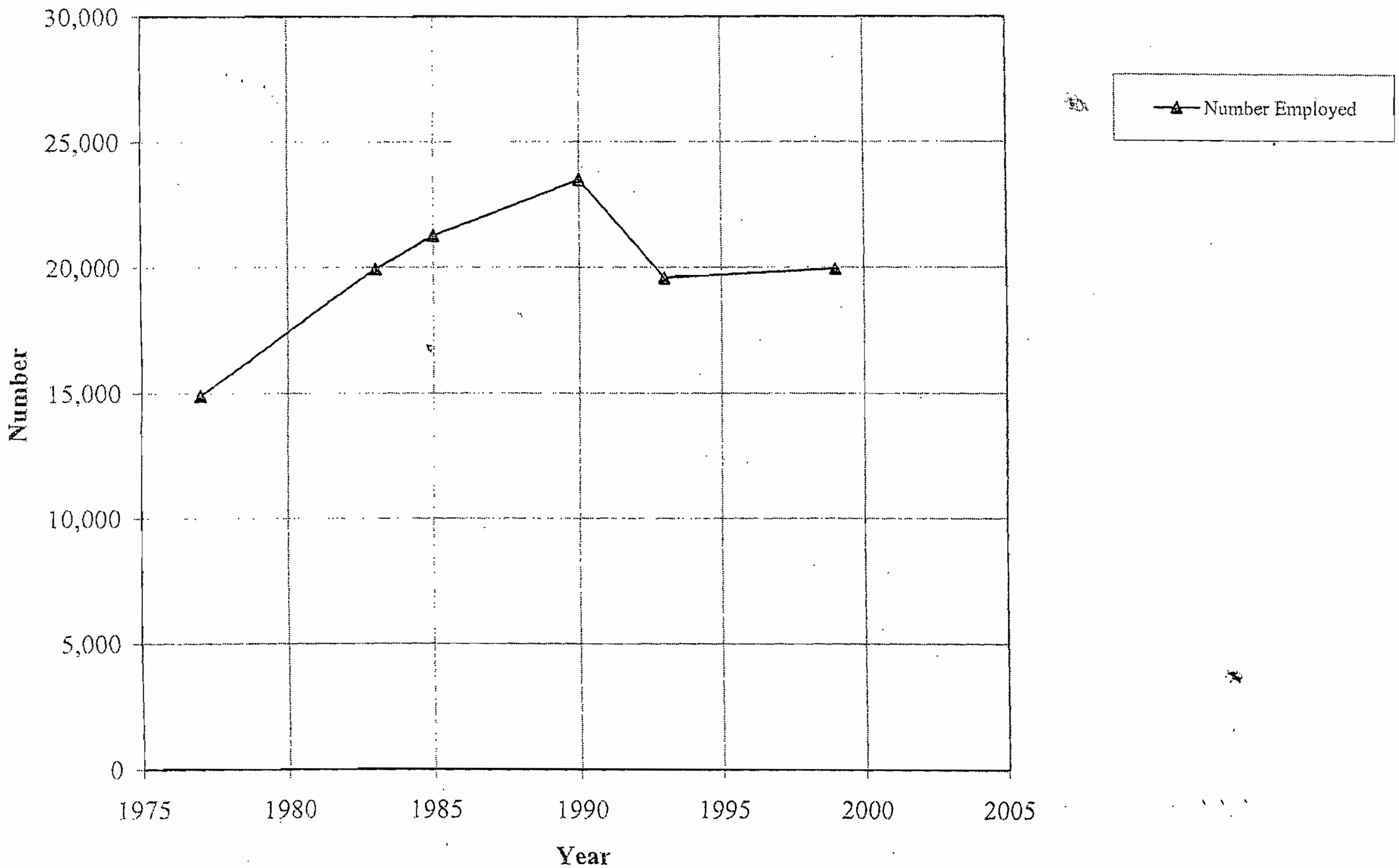
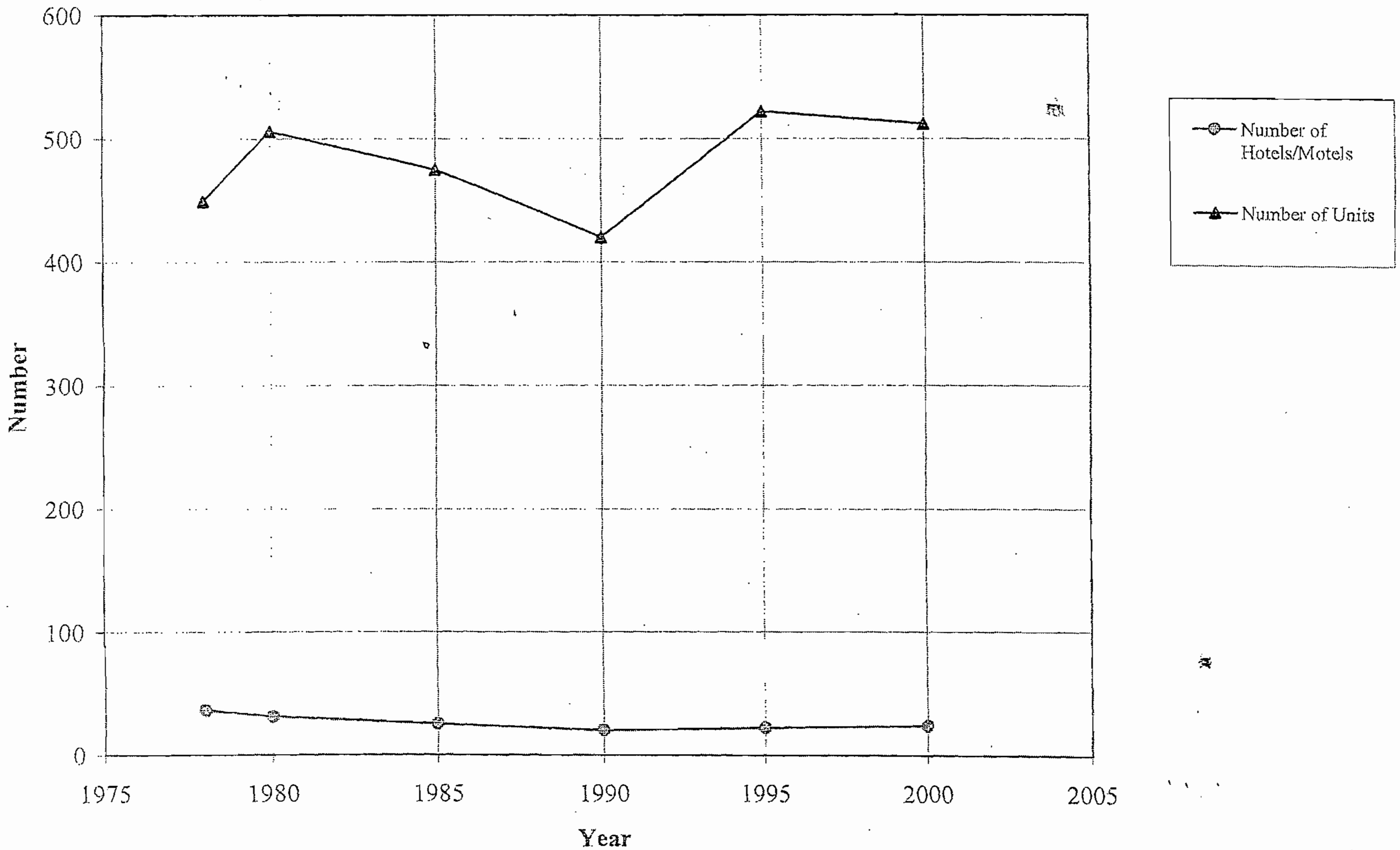


Figure 1-3. Labor Force Trend in Putnam County



12 (10b)

Figure 1-4. Hotel and Motel Trend in Putnam County



This industry comprises establishments primarily engaged in marketing and promoting communities and facilities to businesses and leisure travelers through a range of activities, such as assisting organizations in locating meeting and convention sites; providing travel information on area attractions, lodging accommodations, restaurants; providing maps; and organizing group tours of local historical, recreational, and cultural attractions.

Between 1978 and 2000, there was a decrease of 12 percent in the number of hotels and motels, and an increase of 14 percent in the number of units at those establishments in the county.

1.2.3.4 Transportation

As an indicator of transportation growth, the trend in the number of vehicle miles traveled (VMT) by motor vehicles on major roadways in Putnam County is presented in Figure 1-5. The county's main roadways are U.S. Route 17 and SR 100.

Between 1977 and 2001, there was an increase of about 1,560,000 VMT, or 113 percent, on major roadways in the county.

1.2.3.5 Growth Associated with the Operation of the Project

The existing commercial and transportation infrastructure should be adequate to provide any support services that might be required during construction and operation of the project. The workforce needed to operate the proposed project represents a small fraction of the labor force present in the immediate and surrounding areas.

1.2.4 INDUSTRIAL GROWTH

1.2.4.1 Manufacturing and Agricultural Industries

As an indicator of industrial growth, the trend in the number of employees in the manufacturing industry in Putnam County since 1977 is shown in Figure 1-6. As shown, the manufacturing industry experienced a slight decrease in employees from 1977 through 2000.

As another indicator of industrial growth, the trend in the number of employees reported in the agricultural industry in Putnam County since 1977 is also shown in Figure 1-6. As shown, the agricultural industry experienced an increase of about 400 employees from 1977 through 2000.

Figure 1-5. Vehicle Miles Traveled (VMT) Estimates for Motor Vehicles for Putnam County

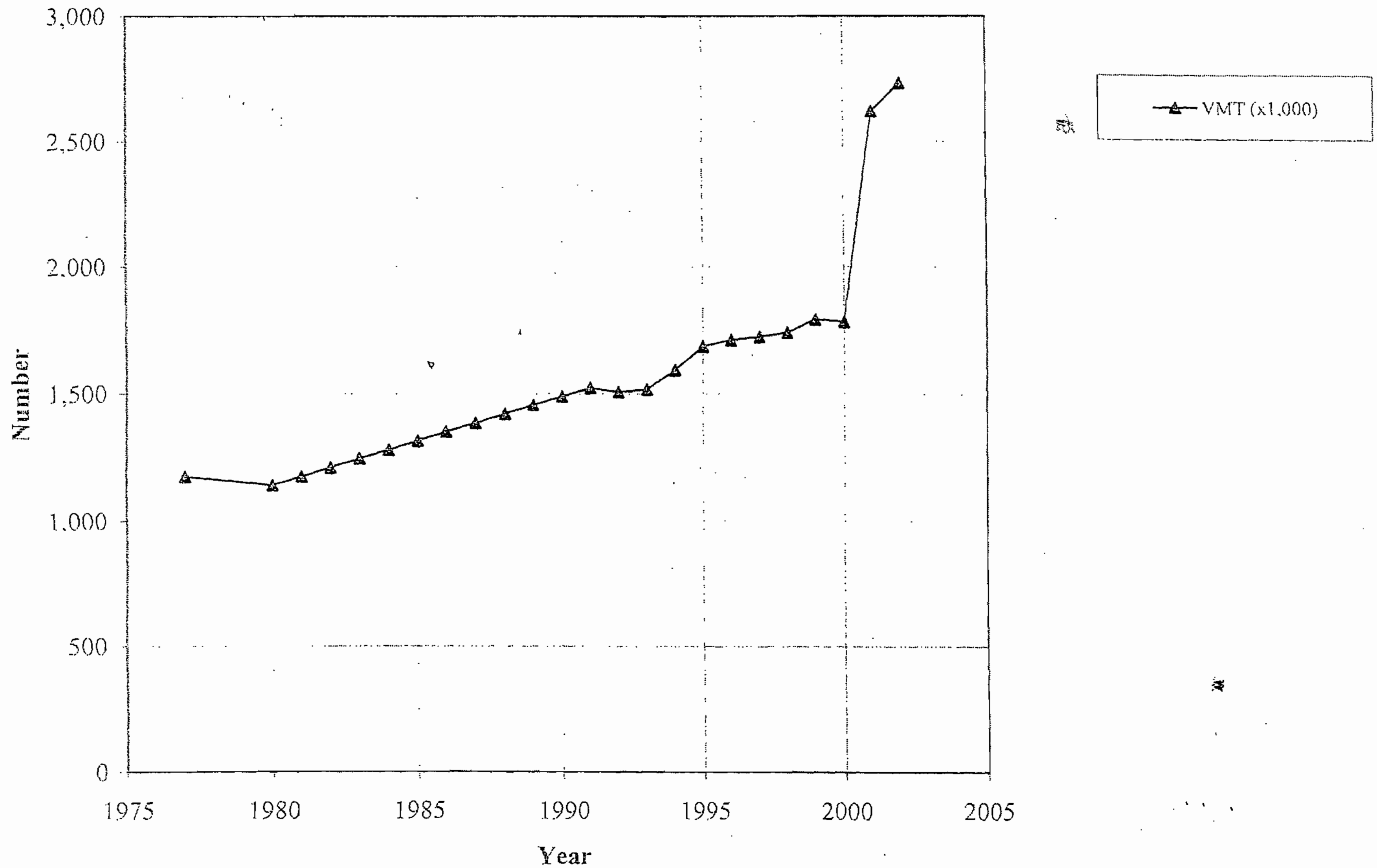


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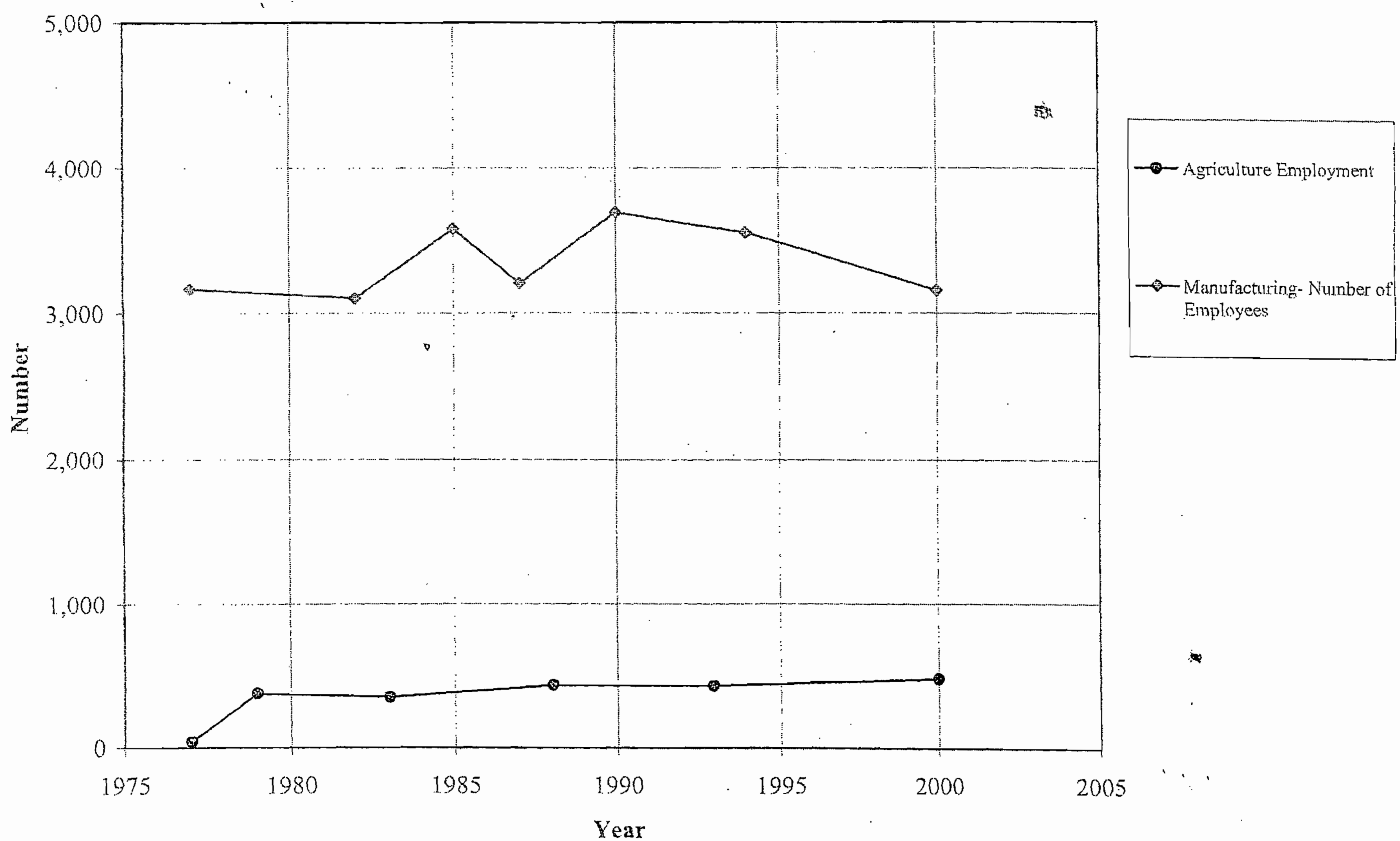
Figure 1-6. Manufacturing and Agriculture Trends in Putnam County



1.2.4.2 Utilities

Existing power plants in Putnam County include the following:

- Florida Power & Light's Putnam Plant;
- Seminole Electric Cooperative, Inc.'s Seminole Power Plant; and
- Georgia-Pacific Corporation's Palatka Operations.

Together, these power plants have an electrical nameplate generating capacity of over 1,800 megawatts (MW).

As an indicator of electrical utility growth, the electrical nameplate generating capacity in Putnam County since 1977 is shown in Figure 1-7. As shown, the electrical nameplate generating capacity has increased by 1,585 MW, or 521 percent since 1977.

1.2.4.3 Growth Associated with the Operation of the Project

Since the PSD baseline date of August 7, 1977, there has been only one major facility built within a 35-km radius of the GP Palatka Mill site. This was the Seminole Electric Power Plant. There are a limited number of facilities located throughout the 35-km radius area surrounding the site. Based on the locations of nearby air emission sources, there has not been a concentration of industrial and commercial growth in the vicinity of the GP Palatka Mill site.

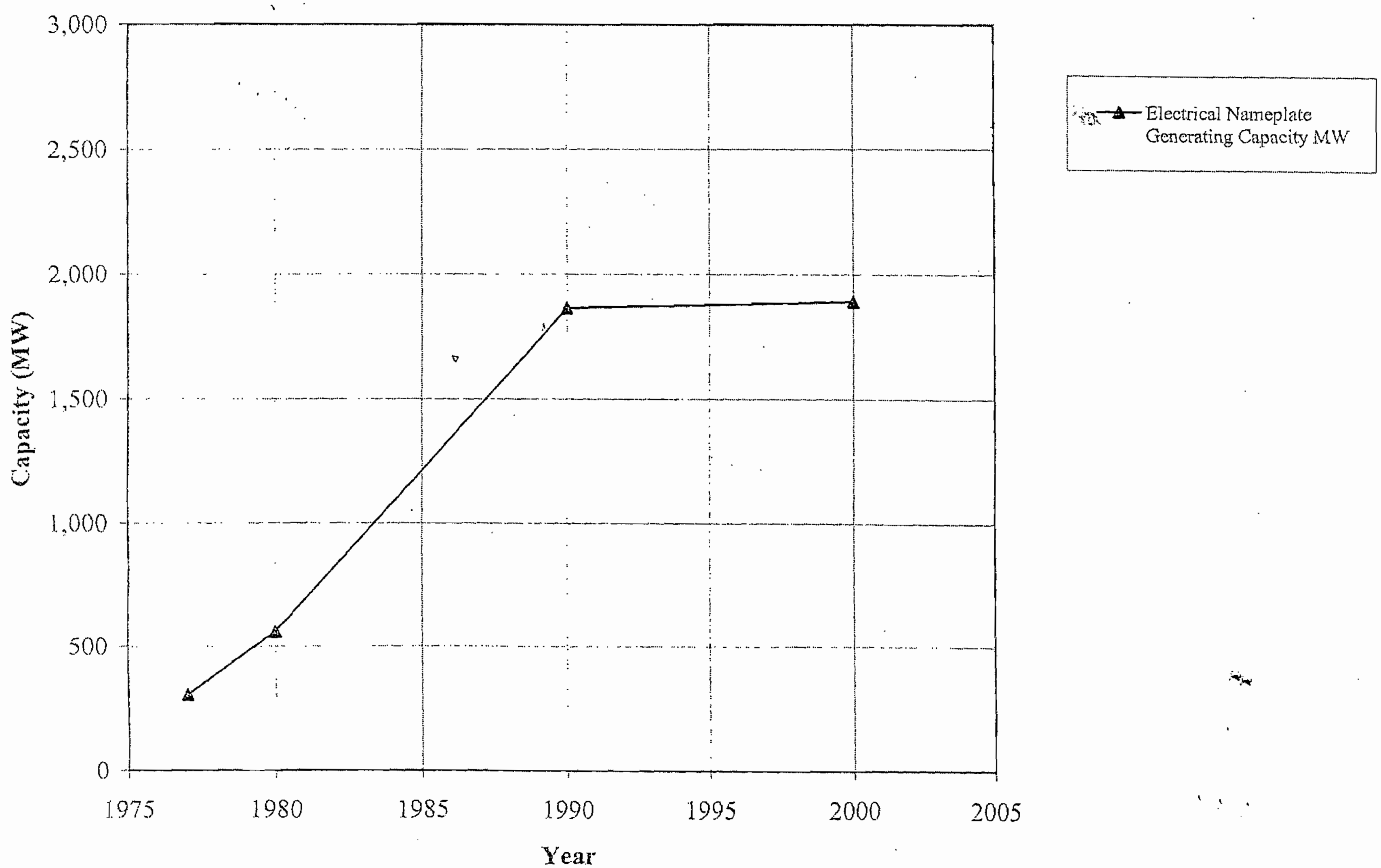
1.2.5 AIR QUALITY DISCUSSION

1.2.5.1 Air Emissions of Major Facilities

Based on actual emissions reported for 1999 (latest year of available data) by EPA on its AIRSdata website, total emissions from stationary sources in the county are as follows:

SO_2:	43,000 TPY
PM_{10}:	1,700 TPY
NO_x:	28,900 TPY
CO:	4,640 TPY
VOC:	800 TPY

Figure 1-7. Electrical Power Generation Capacity in Putnam County



1.2.5.2 Air Emissions from Mobile Sources

The trends in the air emissions of CO, VOC, and NO_x from mobile sources in Putnam County are presented in Figure 1-8. Between 1977 and 2002, there were significant decreases in CO and VOC emissions, and there was only a slight increase in NO_x emissions during that same time period. The decrease in CO and VOC emissions were about 41 and 5 tons per day, respectively, which represent decreases from 1977 emissions of 48 and 42 percent, respectively. The increase in NO_x emissions was less than one half of a ton per day, which represents an increase of about 5 percent since 1977.

1.2.5.3 Air Monitoring Data

Since 1977, Putnam County has been classified as attainment for all criteria pollutants. Air quality monitoring data have been collected in Putnam County, primarily in the central portion of the county in and around the city of Palatka. For this evaluation, the air quality monitoring data collected at the monitoring station nearest to the GP Palatka Mill were used to assess air quality trends since 1977. Air quality monitoring data were based on the following monitoring stations:

- SO_2 and PM_{10} concentrations – Palatka,
- NO_2 concentrations – Palatka and Jacksonville,
- CO concentrations – Jacksonville, and
- O_3 concentrations – Gainesville and Jacksonville.

Data collected from these stations are considered to be generally representative of air quality in Putnam County. Because the monitoring stations in Jacksonville (NO_2, CO, and O_3) are located in more urbanized areas than the GP Palatka Mill, the reported concentrations for those stations are likely to be higher than that experienced at the site.

The air monitoring data indicate that the maximum air quality concentrations currently measured in the region comply with and are well below the applicable AAQS. These monitoring stations are located in areas where the highest concentrations of a measured pollutant are expected due to the combined effect of emissions from stationary and mobile sources, as well as the effects of meteorology. Therefore, the ambient concentrations in areas not monitored should have pollutant concentrations less than the monitored concentrations from these sites.

In addition, since 1988, PM in the form of PM_{10} has been collected at the air monitoring stations due to the promulgation of the PM_{10} AAQS. Prior to 1989, the AAQS for PM was in the form of total suspended particulates (TSP) concentrations, and this form was measured at the stations.

1.2.5.4 SO_2 Concentrations

The trends in the 3-hour, 24-hour, and annual average SO_2 concentrations measured in Putnam County since 1977 are presented in Figures 1-9 through 1-11, respectively. As shown in these figures, measured SO_2 concentrations have been and continue to be well below the AAQS.

1.2.5.5 PM_{10}/TSP Concentrations

The trends in the 24-hour and annual average PM_{10} and TSP concentrations since 1977 are presented in Figures 1-12 and 1-13, respectively. TSP concentrations are presented through 1988 since the AAQS was based on TSP concentrations through that year. In 1988, the TSP AAQS was revoked and the PM standard was revised to PM_{10}.

As shown in these figures, measured TSP concentrations were generally below the TSP AAQS. Since 1988 when PM_{10} concentrations have been measured, the PM_{10} concentrations have been and continue to be below the AAQS.

1.2.5.6 NO_2 Concentrations

The trends in the annual average NO_2 concentrations measured at the nearest monitors to the GP Palatka Mill are presented in Figure 1-14. As shown in this figure, measured NO_2 concentrations have been well below the AAQS.

1.2.5.7 CO Concentrations

The trends in the 1-hour and 8-hour average CO concentrations measured since 1977 in Jacksonville are presented in Figures 1-15 and 1-16, respectively. As shown in these figures, measured CO concentrations have been well below the AAQS for the past several years.

1.2.5.8 Ozone Concentrations

The trends in the 1-hour average O_3 concentrations since 1977 are presented in Figure 1-17. The trends in the 8-hour average O_3 concentrations since 1995 are presented in Figure 1-18. As shown in these figures, even in the more urbanized areas of Jacksonville and Gainesville, the measured O_3 concentrations have primarily been below the 1-hour average AAQS and the new 8-hour average AAQS.

1.2.5.9 Air Quality Associated with the Operation of the Project

The air quality data measured in the region of the GP Palatka Mill indicate that the maximum air quality concentrations are well below and comply with the AAQS. Also, based on the trends presented of these maximum concentrations, the air quality has generally improved in the region since the baseline date of August 7, 1977. Because the maximum concentrations for the proposed modification at the Mill are predicted to be below the significant impact levels except for SO_2, air quality concentrations in the region are expected to remain below and comply with the AAQS when the project becomes operational. For SO_2, the accompanying modeling report demonstrates compliance with AAQS.

Figure 1-8. Mobile Source Emissions (Tons per Day) of CO, VOC, and NO_x in Putnam County

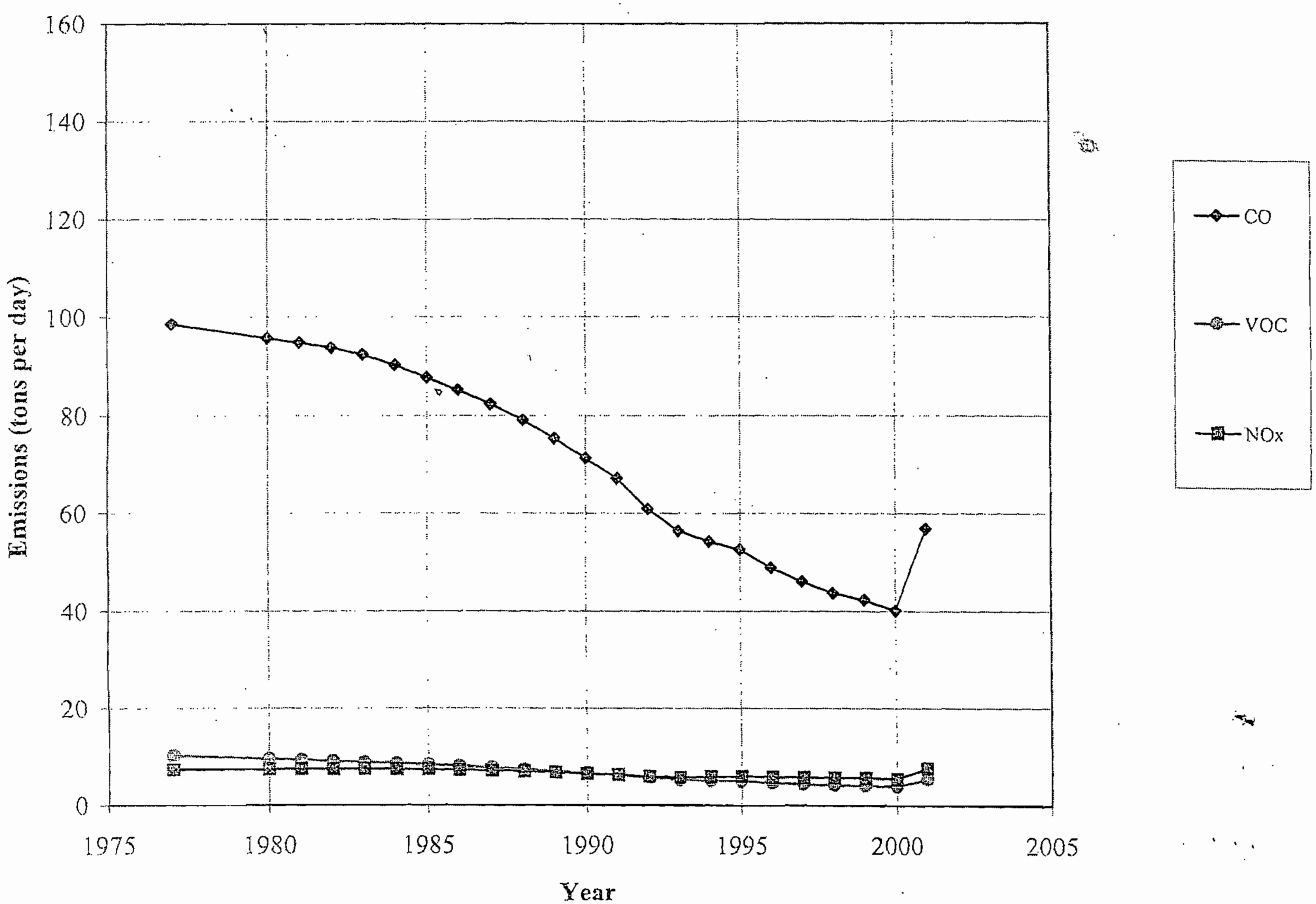


Figure 1-9. Measured 3-Hour Average Sulfur Dioxide Concentrations (2nd Highest Values) from 1984 to 2002- Putnam County

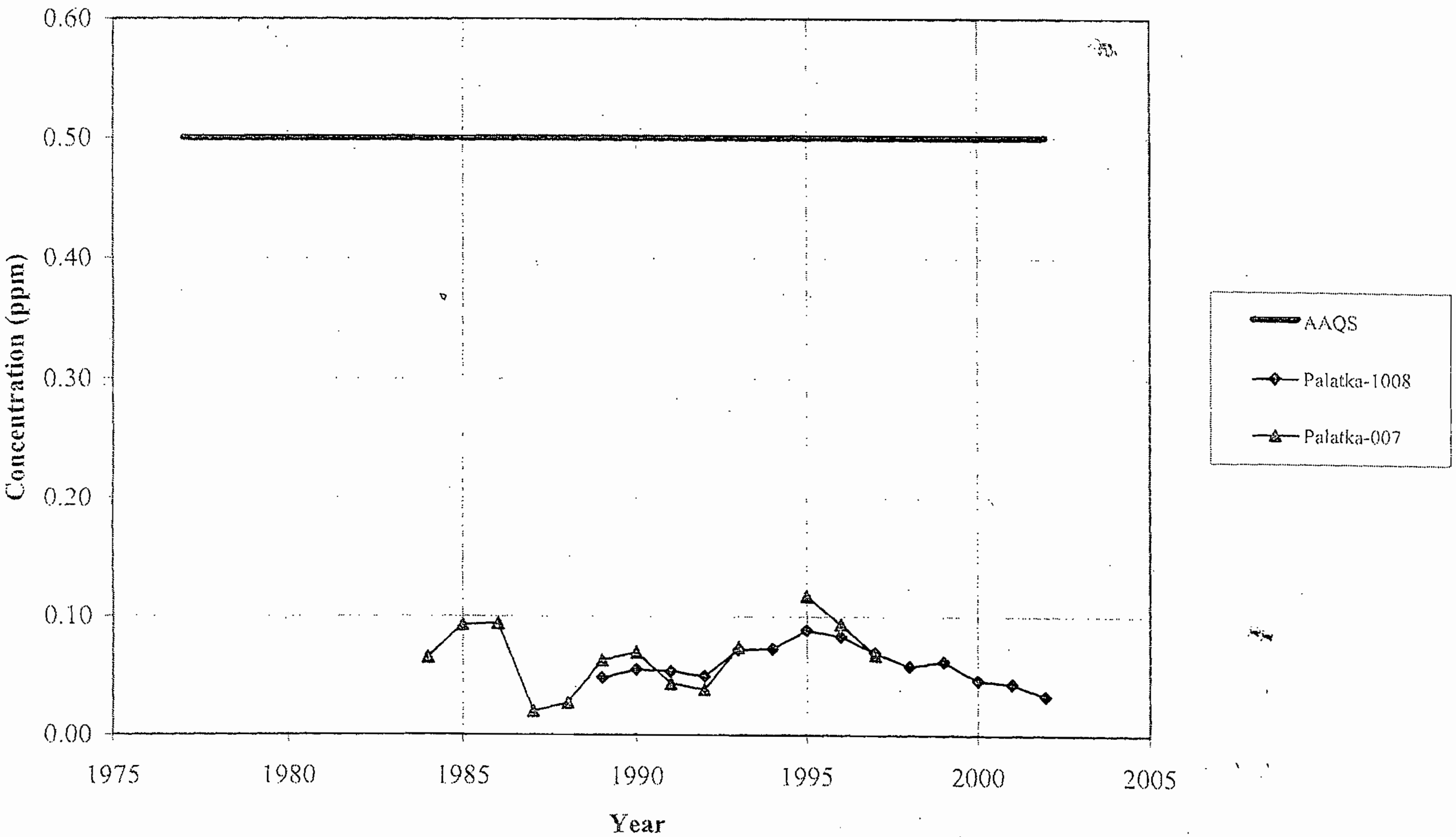


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Figure 1-10. Measured 24-Hour Average Sulfur Dioxide Concentrations (2nd Highest Values) from 1984 to 2002- PutnamCounty

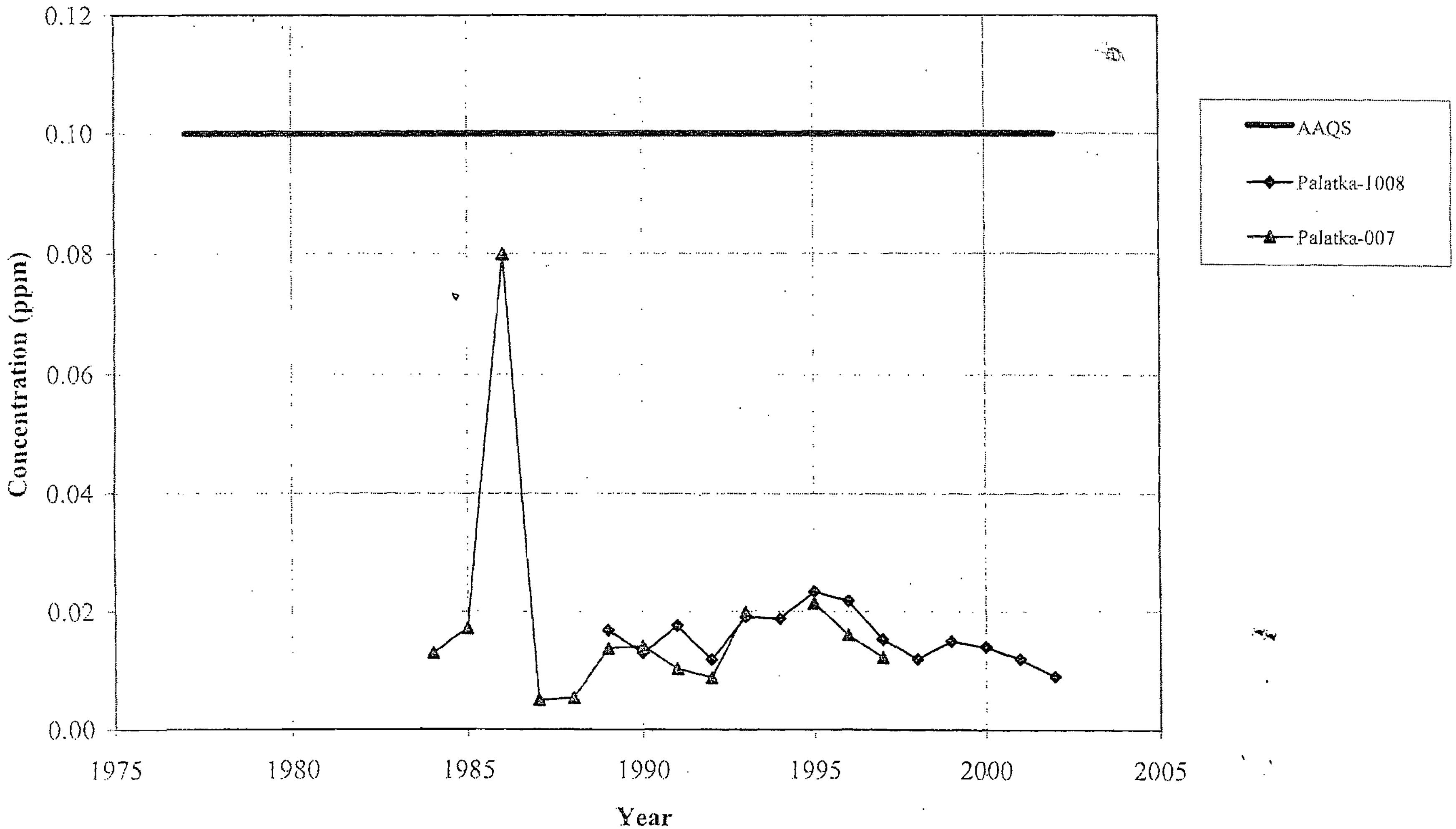

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Figure 1-11. Measured Annual Average Sulfur Dioxide Concentrations from 1984 to 2002- Putnam County

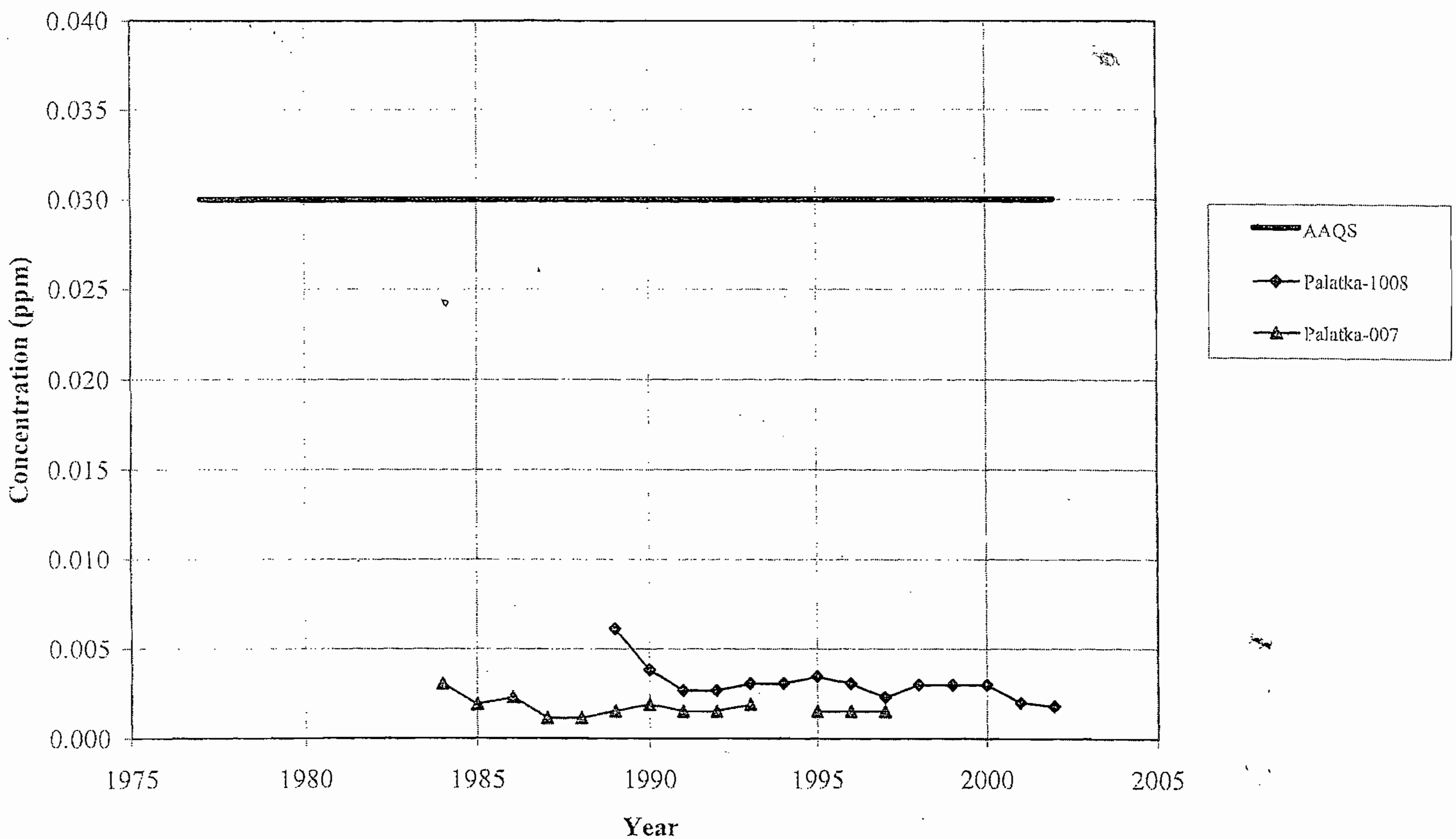

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Figure 1-12. Measured 24-Hour Average PM_{10} Concentrations (1988 to 2002) and Total Suspended Particulate Concentrations (1981 to 1987) (2nd Highest Values) - Putnam County

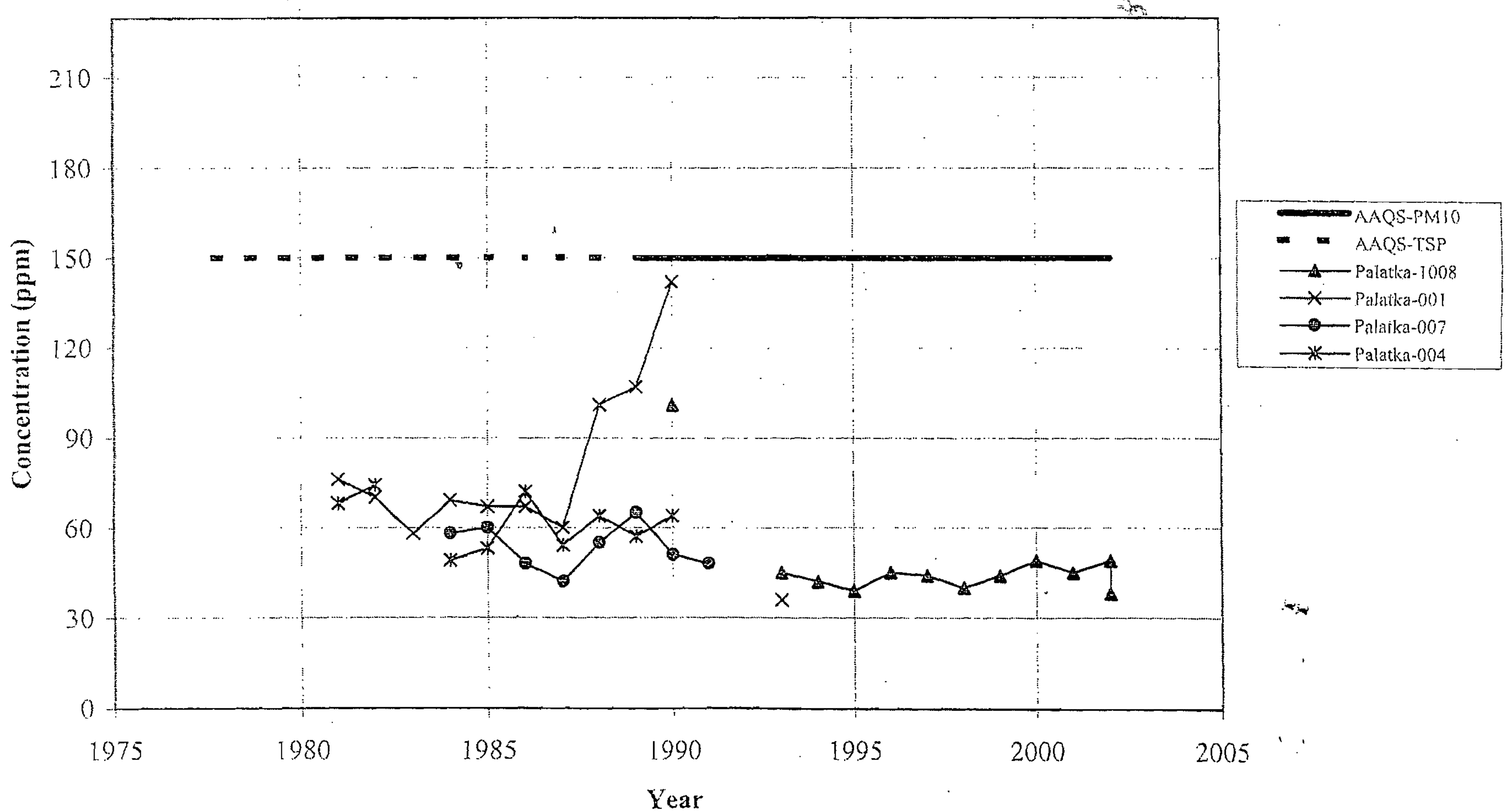

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Figure 1-13. Measured Annual Average PM_{10} Concentrations (1988 to 2002) and Total Suspended Particulate Concentrations (1981 to 1987) - Putnam County

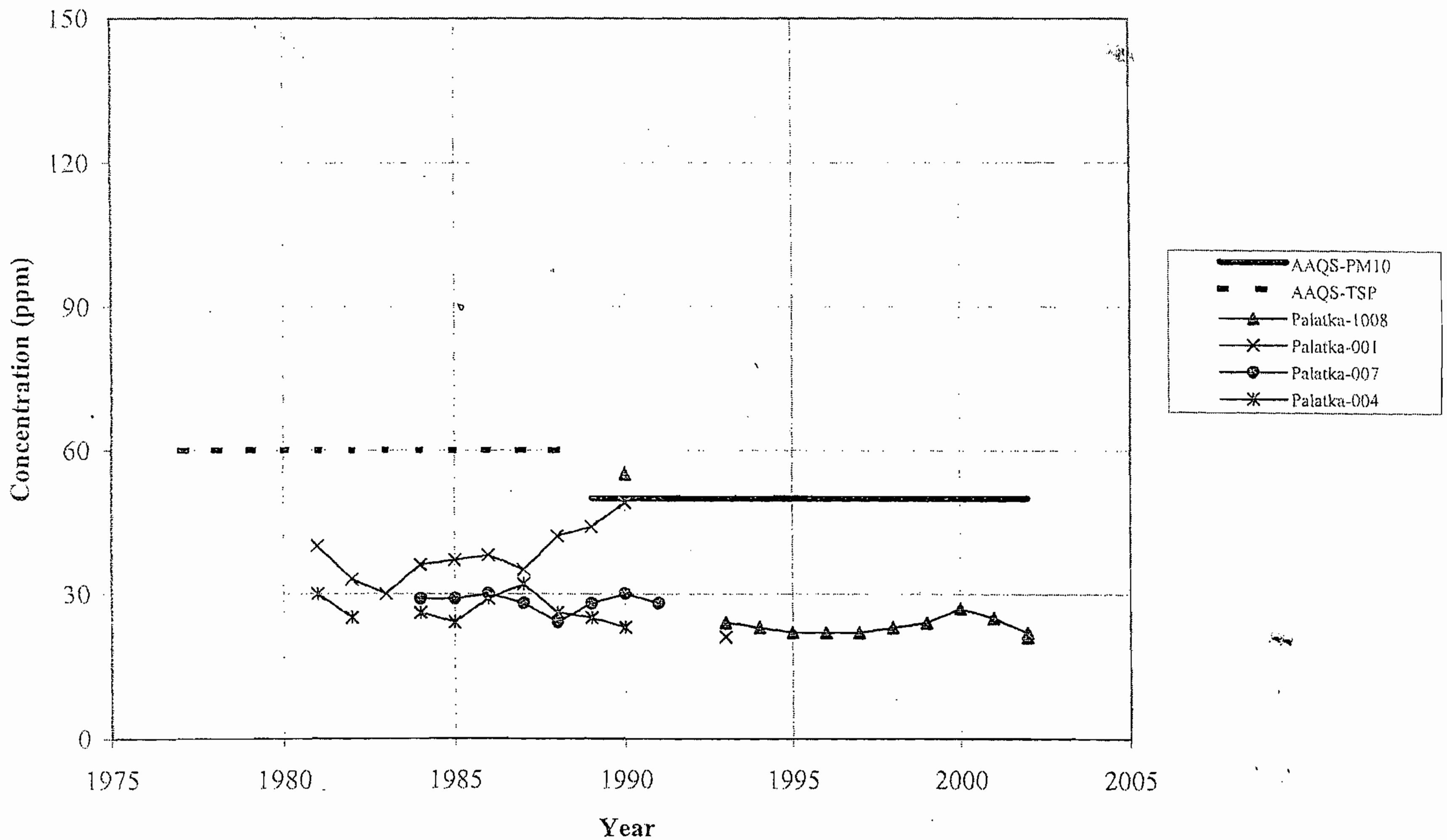

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Figure 1-14. Measured Annual Average Nitrogen Dioxide Concentrations from 1981 to 2002 - Putnam County

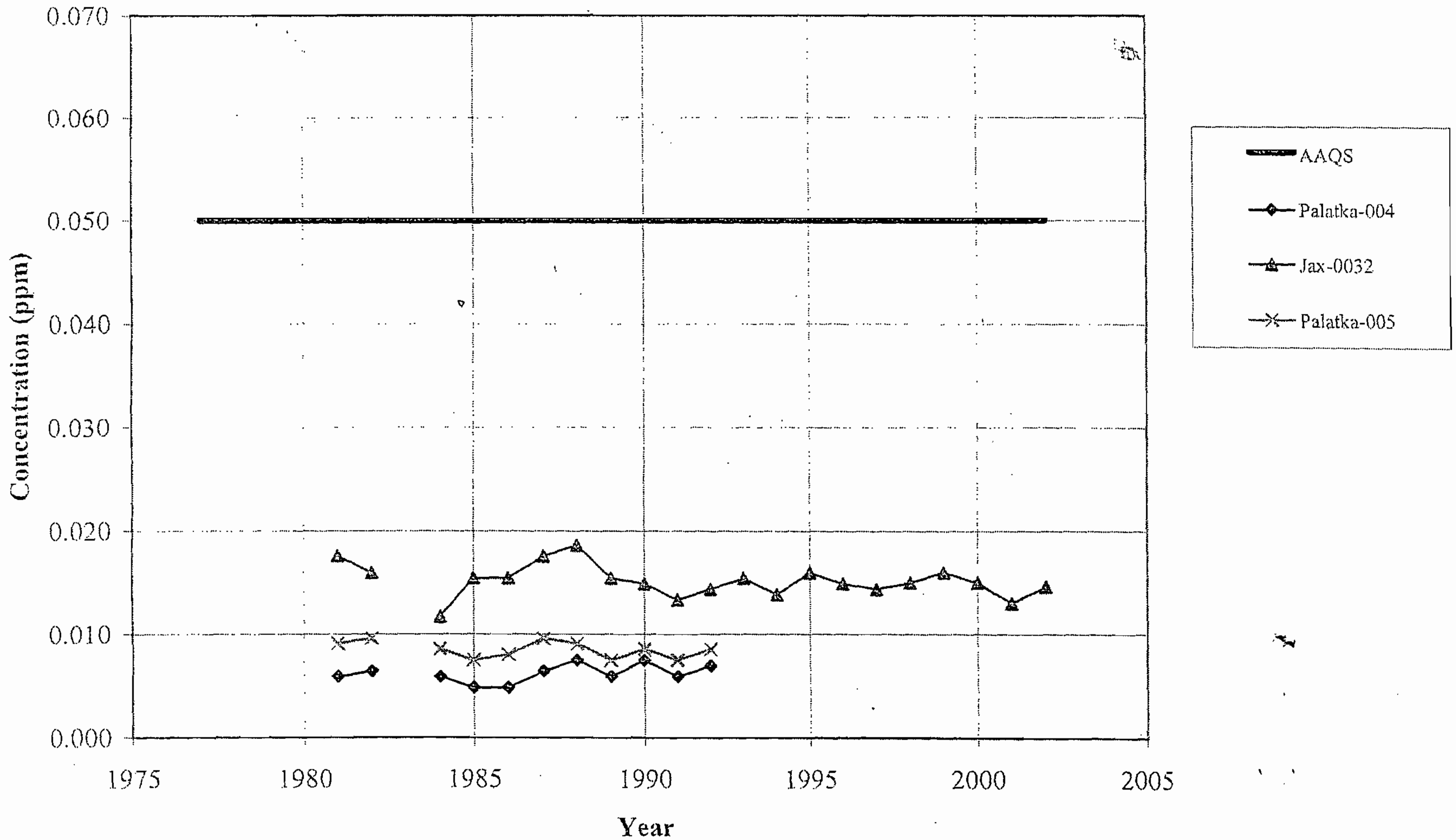

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Figure 1-15. Measured 1-Hour Average Carbon Monoxide Concentrations (2nd Highest Values) from 1981 to 2002 - Putnam County

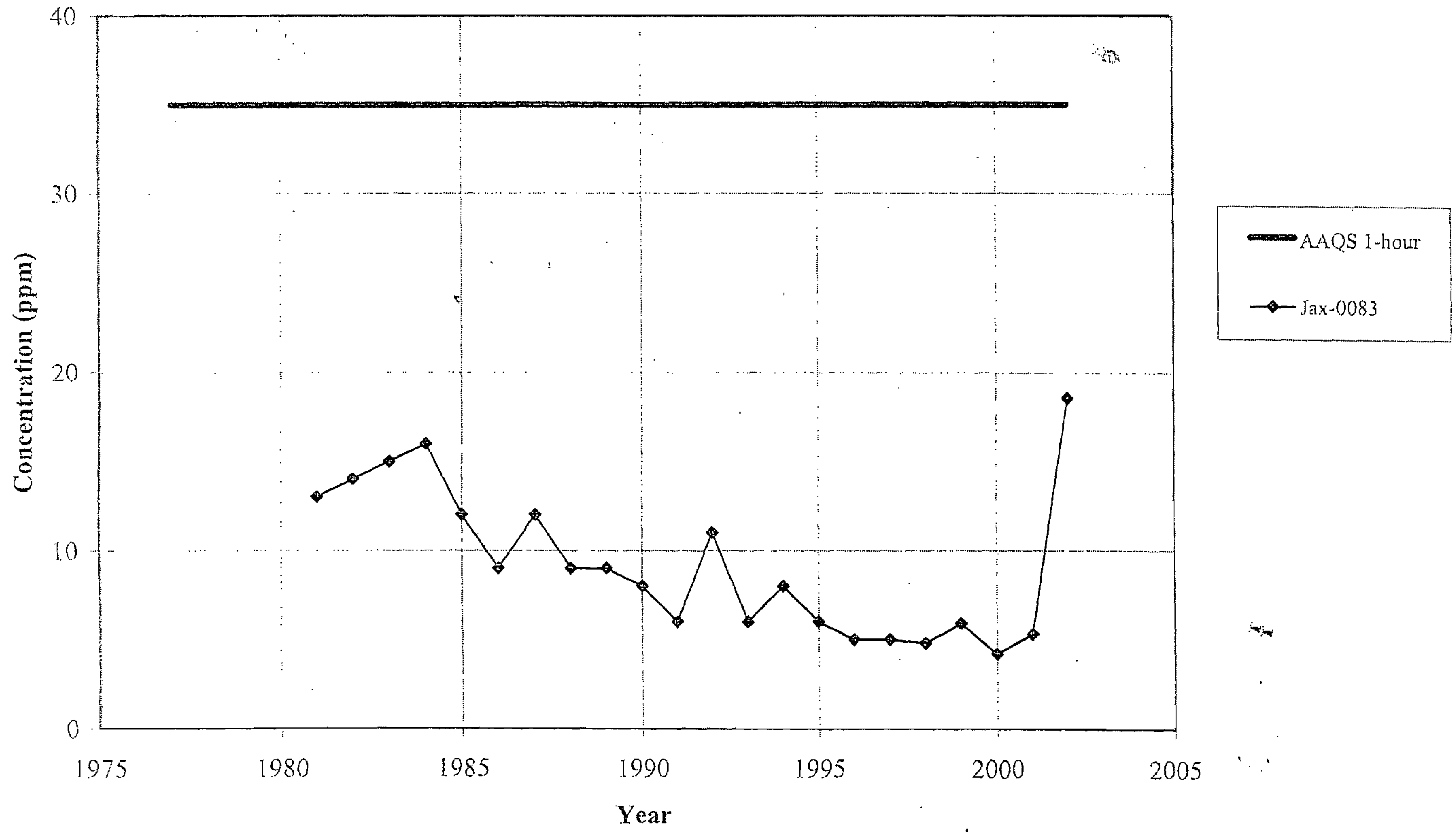

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Figure 1-16. Measured 8-Hour Average Carbon Monoxide Concentrations (2nd Highest Values) from 1981 to 2002 - Putnam County

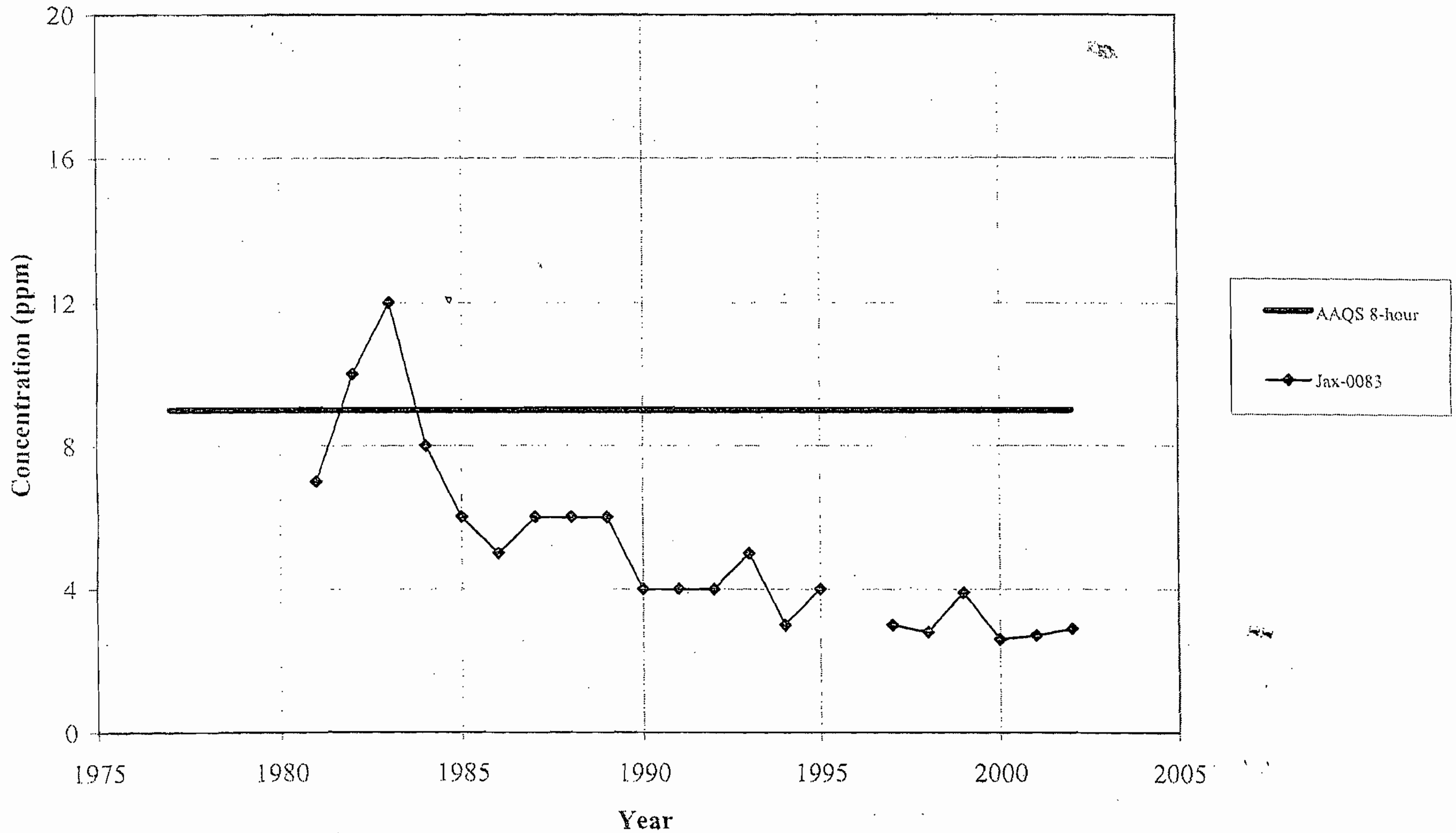


Figure 1-17. Measured 1-Hour Average Ozone Concentrations (2nd Highest Values) from 1981 to 2002 - Putnam County

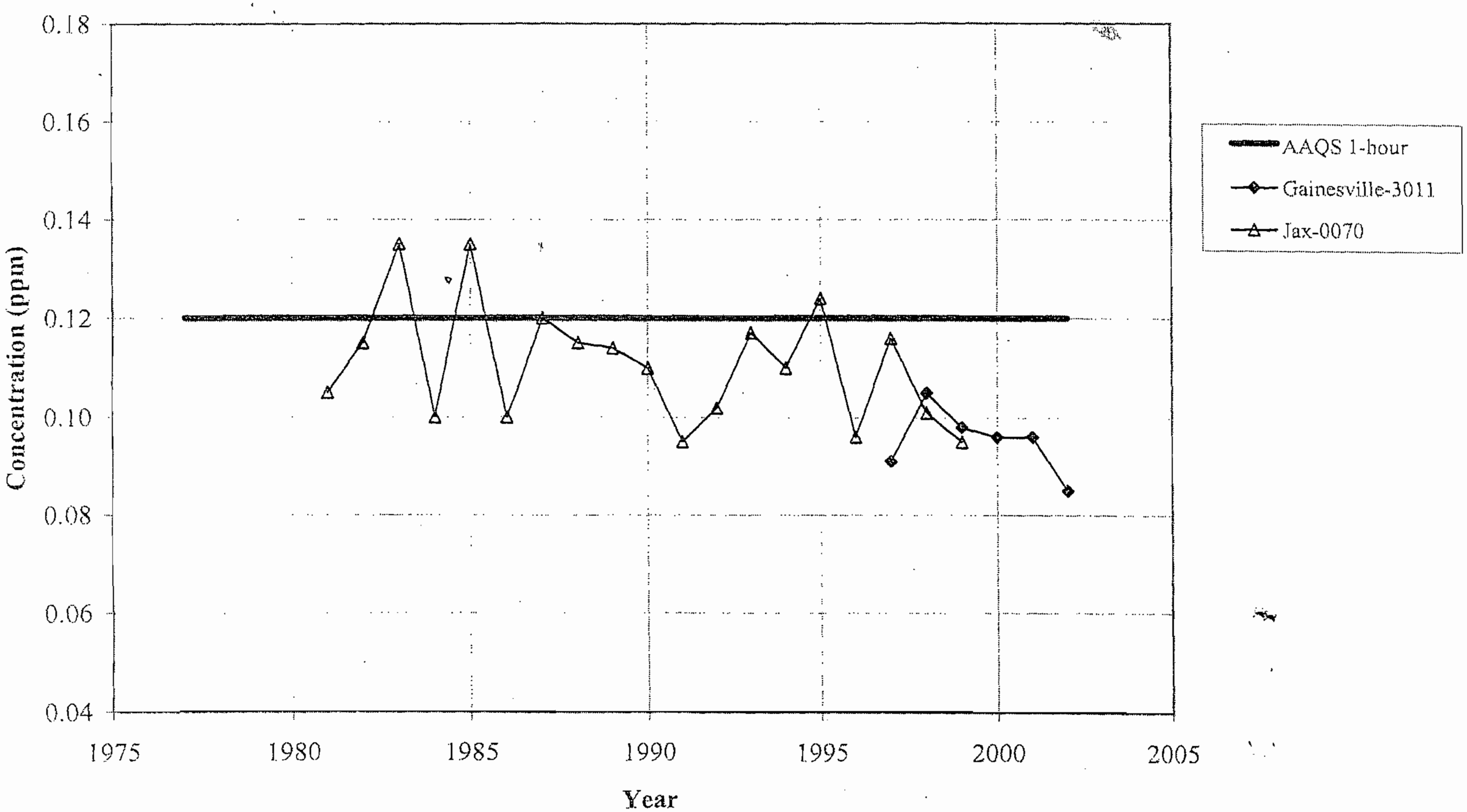
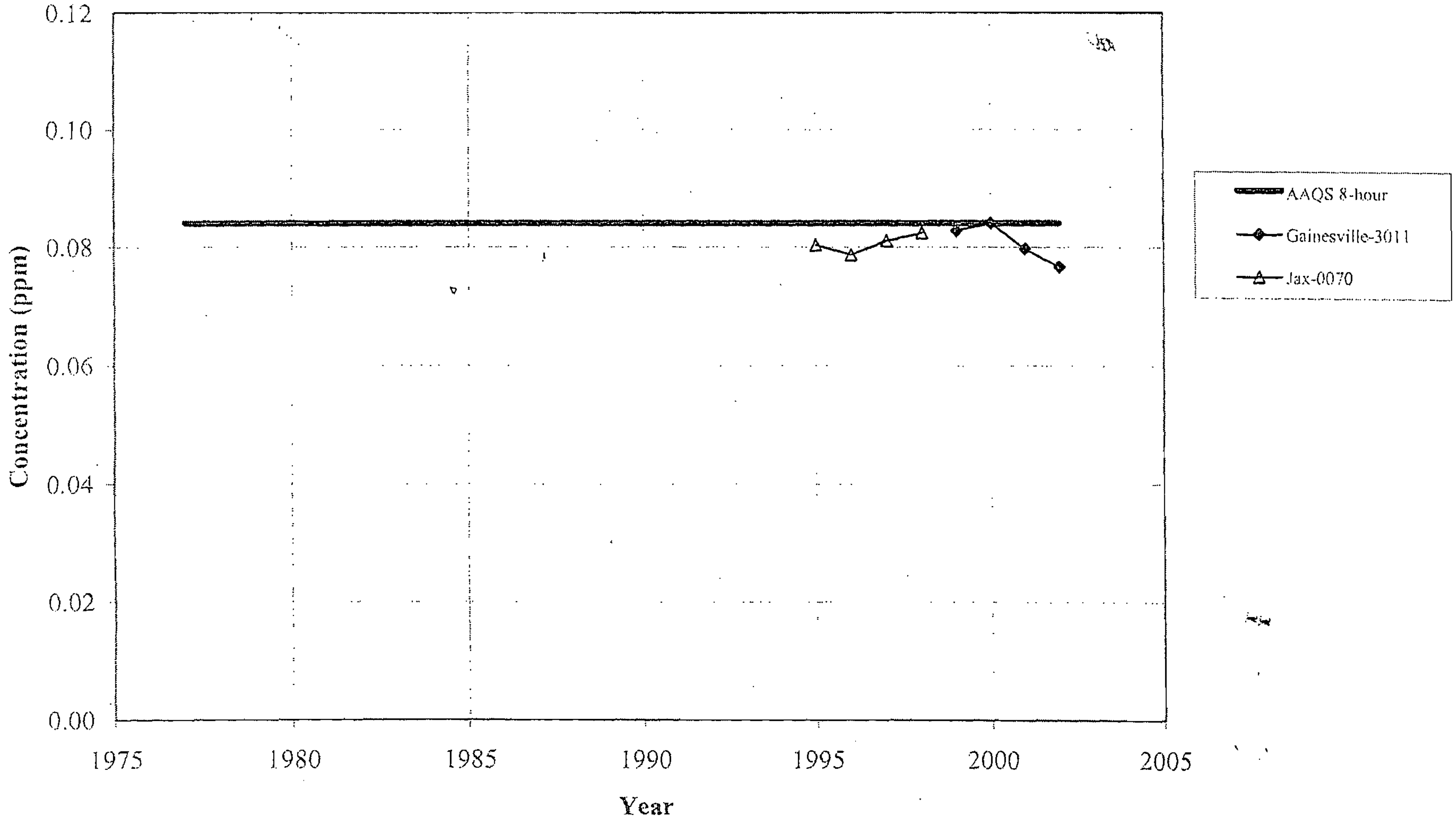


Figure 1-18. Measured 8-Hour Average Ozone Concentrations (3-Year Average of the 4th Highest Values) from 1995 to 2002 - Putnam County



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2.0 ADDITIONAL IMPACT ANALYSIS ON THE OFKEFENOKEE CLASS I AREA

2.1 INTRODUCTION

GP has proposed changes to its pulp mill located in Putnam County, near Palatka, Florida. The changes were described in Section 2.0. The facility is subject to the PSD new source review requirements for SO_2, NO_x, PM, PM_{10}, CO, VOC, and SAM. The Class I area analysis addresses these pollutants.

The analysis addresses the potential impacts on vegetation, soils, and wildlife of the Okefenokee NWA Class I area due to the proposed project. In addition, potential impacts upon visibility resulting from the proposed project are assessed. The Okefenokee NWA Class I area is located approximately 108 km north of the GP Palatka Mill. Although the Wolf Island NWA Class I area is located approximately 186 km north of the GP Palatka Mill, only the Okefenokee NWA Class I area was evaluated since it is much closer to the Mill than Wolf Island, and both have similar AQRVs.

The analysis demonstrates that the increase in impacts due to the proposed project is extremely low. Regardless of the existing conditions in the vicinity of the Class I area, the proposed project will not cause any significant adverse effects due to the predicted low impacts upon that area.

2.2 SOILS, VEGETATION, AND AQRV ANALYSIS METHODOLOGY

This analysis uses the maximum air quality impacts predicted to occur in the Class I area due to the proposed increase in emissions. These impacts are summarized in Attachment C of the PSD permit application.

The analysis involved predicting worst-case maximum short- and long-term concentrations of pollutants in the Class I area and comparing the maximum predicted concentrations to lowest observed effect levels for AQRVs or analogous organisms. In conducting the assessment, several assumptions were made as to how pollutants interact with the different matrices, *i.e.*, vegetation, soils, wildlife, and aquatic environment.

A screening approach was used to evaluate potential effects by comparison of the maximum predicted ambient concentrations with effect threshold limits for the pollutants of concern, for both vegetation and wildlife, as reported in the scientific literature. A literature search was conducted which specifically addressed the effects of air contaminants on plant species reported to occur in the vicinity of the plant and the Class I area. It is recognized that effects threshold information is not available for all species found in the Okefenokee NWA, although studies have been performed on other similar species that may be used as models.

2.3 IDENTIFICATION OF AQRVS AND METHODOLOGY

An AQRV analysis was conducted to assess the potential risk to AQRVs of the Okefenokee NWA due to the proposed GP project. The U.S. Department of the Interior in 1978 administratively defined AQRVs to be:

> *All those values possessed by an area except those that are not affected by changes in air quality and include all those assets of an area whose vitality, significance, or integrity is dependent in some way upon the air environment. These values include visibility and those scenic, cultural, biological, and recreational resources of an area that are affected by air quality.*
>
> *Important attributes of an area are those values or assets that make an area significant as a national monument, preserve, or primitive area. They are the assets that are to be preserved if the area is to achieve the purposes for which it was set aside (Federal Register 1978).*

Except for visibility, AQRVs were not specifically defined. However, odor, soil, flora, fauna, cultural resources, geological features, water, and climate generally have been identified by land managers as AQRVs. Since specific AQRVs have not been identified for the Okefenokee NWA, this AQRV analysis evaluates the effects of air quality on general vegetation types and wildlife found in the Class I area.

Vegetation type AQRVs and their representative species types have been defined as:

- Freshwater Marsh - sawgrass, pickerelweed, and sand cordgrass
- Marsh Islands - cabbage palm and eastern red cedar
- Estuarine Habitat - black needlerush, salt marsh cordgrass, and wax myrtle
- Hardwood Swamp - red maple, red bay, sweet bay, and cabbage palm
- Upland Forests - live oak, scrub oak, longleaf pine, slash pine, wax myrtle, and saw palmetto

Wildlife AQRVs have been identified as endangered species, waterfowl, wading birds, shorebirds, reptiles, and mammals.

The maximum pollutant concentrations predicted for the project in the Okefenokee NWA are presented in the 2004 Lime Kiln PSD application. These results were compared with effect threshold limits for both vegetation and wildlife as reported in the scientific literature. While the literature search focused on such species as cabbage palm, eastern red cedar, lichens, and species of the hardwood swamplands and mangrove forest, no specific citations that addressed these species were found. 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.

2.4 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 soils of the Okefenokee NWA are generally classified as histosols. Histosols (peat soils) are organic and have extremely high buffering capacities based on their CEC, base saturation, and bulk density. Therefore, they would be relatively insensitive 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 for the Okefenokee NWA precludes any significant impact on soils.

2.5 IMPACTS TO VEGETATION

In general, the effects of air pollutants on vegetation occur primarily from SO_2, NO_2, O_3, and PM_{10}. Effects from minor air contaminants such as fluoride, chlorine, hydrogen chloride, ethylene, ammonia, hydrogen sulfide, CO, and pesticides have also been reported in the literature. The effects of air pollutants are dependent both on the concentration of the contaminant and the duration of the exposure. The term "injury," as opposed to damage, is commonly used to describe all plant responses to air contaminants and will be used in the context of this analysis. Air contaminants are thought to interact primarily with plant foliage, which is considered to be the major pathway of exposure.

Injury to vegetation from exposure to various levels or air contaminants can be termed acute, physiological, or chronic. Acute injury occurs as a result of a short-term exposure to a high contaminant concentration and is typically manifested by visible injury symptoms ranging from chlorosis (discoloration) to necrosis (dead areas). Physiological or latent injury occurs as the result of a long-term exposure to contaminant concentrations below that which results in acute injury symptoms. Chronic injury results from repeated exposure to low concentrations over extended periods of time, often without any visible symptoms, but with some effect on the overall growth and productivity of the plant. In this assessment, 100 percent of the particular air pollutant in the ambient air was assumed to interact with the vegetation. This is a conservative approach.

The response of vegetation and wildlife to atmospheric pollutants is influenced by the concentration of the pollutant, duration of exposure, and frequency of exposures. The pattern of pollutant exposure expected from the facility is that of a few episodes of relatively high ground-level concentration which occur during certain meteorological conditions interspersed with long periods of extremely low ground-level concentrations. If there are any effects of stack emissions on plants or animals, they will likely arise from the short-term, higher doses. A dose is the product of the concentration of the pollutant and duration of the exposure.

2.5.1 NITROGEN DIOXIDE

NO_2 can injure plant tissue with symptoms usually appearing as irregular white to brown collapsed lesions between the leaf veins and near the margins. Conversely, non-injurious levels of NO_2 can be absorbed by plants, enzymatically transformed into ammonia, and incorporated into plant constituents such as amino acids (Matsumaru *et al.*, 1979).

Plant damage can occur through either acute (short-term, high concentration) or chronic (long-term, relatively low concentration) exposure. For plants that have been determined to be more sensitive to NO_2 exposure than others, acute (1-, 4-, and 8-hour) exposure caused 5 percent predicted foliar injury at concentrations ranging from 3,800 to 15,000 $\mu g/m^3$ (Heck and Tingey, 1979). Chronic exposure of selected plants (some considered NO_2-sensitive) to NO_2 concentrations of 2,000 to 4,000 $\mu g/m^3$ for 213 to 1,900 hours caused reductions in yield of up to 37 percent and some chlorosis (Zahn, 1975).

The maximum 8-hour average NO_2 concentration due to the increase in emissions resulting from the proposed project in the Okefenokee Class I area is predicted to be less of the levels that cause foliage injury in acute exposure scenarios. By comparison of published toxicity values for NO_2 exposure to long-term (annual averaging time) modeled concentrations, the possibility of plant damage in the Class I areas can be examined for chronic exposure situations. For a chronic exposure, the maximum annual average NO_2 concentration due to the proposed project in the Okefenokee NWA Class I area is less than 0.01 $\mu g/m^3$.

2.5.2 SULFUR DIOXIDE

Sulfur is an essential plant nutrient usually taken up as sulfate ions by the roots from the soil solution. When sulfur dioxide in the atmosphere enters the foliage through pores in the leaves, it reacts with water in the leaf interior to form sulfite ions. Sulfite ions are highly toxic. They interact with enzymes, compete with normal metabolites, and interfere with a variety of cellular functions (Horsman and Wellburn, 1976). However, within the leaf, sulfite is oxidized to sulfate ions, which can then be used by the plant as a nutrient. Small amounts of sulfite may be oxidized before they prove harmful.

SO_2 gas at elevated levels has long been known to cause injury to plants. Acute SO_2 injury usually develops within a few hours or days of exposure, and symptoms include marginal, flecked, and/or intercoastal necrotic areas that appear water-soaked and dullish green initially. This injury generally occurs to younger leaves. Chronic injury usually is evident by signs of chlorosis, bronzing, premature senescence, reduced growth, and possible tissue necrosis (EPA, 1982). Observed SO_2 effect levels for several plant species and plant sensitivity groupings are presented in Tables 1-2 and 1-3, respectively.

Many studies have been conducted to determine the effects of high-concentration, short-term SO_2 exposure on natural community vegetation. Sensitive plants include ragweed, legumes, blackberry, southern pine, and red and black oak. These species are injured by exposure to 3-hour average SO_2

concentrations of 790 to 1,570 μg/m^3. Intermediate plants include locust and sweetgum. These species are injured by exposure to 3-hour average SO_2 concentrations of 1,570 to 2,100 μg/m^3. Resistant species (injured at concentrations above 2,100 μg/m^3 for 3 hours) include white oak and dogwood (EPA, 1982).

A study of native Floridian species (Woltz and Howe, 1981) demonstrated that cypress, slash pine, live oak, and mangrove exposed to 1,300 μg/m^3 SO_2 for 8 hours were not visibly damaged. This finding supports the levels cited by other researchers on the effects of SO_2 on vegetation. A corroborative study (McLaughlin and Lee, 1974) demonstrated that approximately 20 percent of a cross-section of plants ranging from sensitive to tolerant was visibly injured at 3-hour average SO_2 concentrations of 920 μg/m^3. Jack pine seedlings exposed to SO_2 concentrations of 470 to 520 μg/m^3 for 24 hours demonstrated inhibition of foliar lipid synthesis; however, this inhibition was reversible (Malhotra and Kahn, 1978). Black oak exposed to 1,310 μg/m^3 SO_2 for 24 hours a day for 1 week demonstrated a 48 percent reduction in photosynthesis (Carlson, 1979). Two species of lichens exhibited signs of SO_2 damage in the form of decreased biomass gain and photosynthetic rate as well as membrane leakage when exposed to concentrations of 200 to 400 μg/m^3 for 6 hours/week for 10 weeks (Hart *et al.*, 1988).

The maximum 24-hour average SO_2 concentration due to the increase in emissions resulting from the proposed project at the Okefenokee NWA Class I area is presented in the 2004 Lime Kiln PSD application. The maximum 24-hour average SO_2 concentration is predicted for the project at the Class I area is less than 1 percent of those that caused damage to the most sensitive lichens. The modeled annual incremental increase in SO_2 adds slightly to background levels of this gas and poses only a minimal threat to area vegetation.

2.5.3 PARTICULATE MATTER (PM_{10})

Although information pertaining to the effects of PM on plants is scarce, some threshold concentrations are available. Mandoli and Dubey (1998) exposed ten species of native Indian plants to levels of PM ranging from 210 to 366 μg/m^3 for an 8-hour averaging period. Damage in the form of a higher leaf area/dry weight ratio was observed at varying degrees for most plants tested. Concentrations of PM lower than 163 μg/m^3 did not appear to be injurious to the tested plants.

By comparison of these published toxicity values for PM exposure (*i.e.*, concentrations for an 8-hour averaging time), the possibility of plant damage in the Okefenokee NWA can be determined. The maximum predicted short term PM_{10} concentration due to the increase in emissions resulting from the proposed project at the Class I area is presented in the 2004 Lime Kiln PSD applicaiton. These concentrations are less than 1 percent of the lower threshold value that reportedly affects plant foliage. As a result, no effects to vegetative AQRVs are expected from the project's emissions.

2.5.4 CARBON MONOXIDE

As with PM_{10}, information pertaining to the effects of CO on plants is scarce. The main effect of high concentrations of CO is the inhibition of cytochrome *c* oxidase, the terminal oxidase in the mitochondrial electron transfer chain. Inhibition of cytochrome *c* oxidase depletes the supply of adenosine triphosphate (ATP), the principal donor of free energy required for cell functions. However, this inhibition only occurs at extremely high concentrations of CO. Pollok *et al.* (1989) reported that exposure to $CO:O_2$ ratio of 25 (equivalent to an ambient CO concentration of 6.85×10^6 $\mu g/m^3$) resulted in stomatal closure in the leaves of the sunflower (*Helianthus annuus*). Naik *et al.* (1992) reported cytochrome *c* oxidase inhibition in corn, sorghum, millet, and Guinea grass at $CO:O_2$ ratios of 2.5 (equivalent to an ambient CO concentration of 6.85×10^5 $\mu g/m^3$). These plants were considered the species most sensitive to CO-induced inhibition of cytochrome *c* oxidase. GP estimates that the predicted impact of CO to be much less than 685,000 $\mu g/m^3$.

2.5.5 SULFURIC ACID MIST

Acidic precipitation or acid rain is coupled to SO_2 emissions mainly formed during the burning of fossil fuels. This pollutant is oxidized in the atmosphere and dissolves in rain forming SAM, which falls as acidic precipitation (Ravera, 1989). Although concentration data are not available, SAM has been reported to yield necrotic spotting on the upper surfaces of leaves (Middleton *et al.*, 1950).

No significant adverse effects on vegetation are expected from the project's emissions because SO_2 concentrations, which lead directly to the formation of SAM concentrations, are predicted to be well below levels which have been documented as negatively affecting vegetation. During the last decade, much attention has been focused on acid rain. Acidic deposition is an ecosystem-level problem that affects vegetation because of some alterations of soil conditions such as increased leaching of essential base cations or elevated concentrations of aluminum in the soil water (Goldstein *et al.*, 1985). Although effects of acid rain in eastern North America have been well published and publicized, detrimental effects of acid rain on Florida vegetation are lacking documentation.

2.5.6 VOC EMISSIONS AND IMPACTS ON OZONE

It is difficult to predict what effect the proposed increase in emissions of VOC will have on ambient O_3 concentrations on a regional scale. VOC and NO_x emissions are precursors to the formation of O_3. O_3 is not directly emitted from fuel combustion, but is formed down-wind from emission sources when VOC and NO_x emissions react in the presence of sunlight. Natural (without man-made sources) ambient concentrations of O_3 are normally in the range of 20 to 39 $\mu g/m^3$ (0.01 to 0.02 ppm) (Heath, 1975).

The nearest monitors to the GP Palatka Mill that measure O_3 concentrations are located in Gainesville (AIRS No. 12-001-0025 and 12-001-3011). These stations measure concentrations according to EPA procedures. Based on the O_3 monitoring concentrations measured over the last several years in Gainesville , the region is in attainment of the existing 1-hour O_3 AAQS as well as the new 8-hour O_3 AAQS.

O_3 can cause various damage to broad-leaved plants including: tissue collapse, interveinal necrosis and markings on the upper surface leaves know as stippling (pigmented yellow, light tan, red brown, dark brown, red, or purple), flecking (silver or bleached straw white), mottling, chlorosis or bronzing, and bleaching. O_3 can also stunt plant growth and bud formation. On certain plants such as citrus, grape, and tobacco, it is common for leaves to wither and drop early.

As described in Section 1.3.1, the VOC emissions due to the proposed GP project represents less than a 1-percent increase in regional VOC emissions. Therefore, the effects of O_3, as a result of VOC emissions from the project, are expected to be insignificant.

2.5.7 SUMMARY

In summary, 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.

2.6 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.*, Los Angeles Basin. 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.

For impacts on wildlife, the lowest threshold values of NO_2, PM_{10}, and SO_2 that are reported to cause physiological changes discussed above. These values are up to orders of magnitude larger than maximum concentrations predicted due to the GP project in the Okefenokee NWA Class I area. No effects on wildlife AQRVs from SO_2, NO_2, and particulates are expected. 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 very 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 extremely unlikely.

2.7 IMPACTS ON VISIBILITY

2.7.1 GENERAL

The CAA Amendments of 1977 provide for implementation of guidelines to prevent visibility impairment in mandatory Class I area. The guidelines are intended to protect the aesthetic quality of these pristine areas from reduction in visual range and atmospheric discoloration due to various pollutants. Sources of air pollution can cause visible plumes if emissions of PM_{10} and NO_x are sufficiently large. A plume will be visible if its constituents scatter or absorb sufficient light so that the plume is brighter or darker than its viewing background (e.g., the sky or a terrain feature, such as a mountain). PSD Class I areas, such as national parks and wilderness areas, are afforded special visibility protection designed to prevent plume visual impacts to observers within a Class I area.

Visibility is an AQRV for the Okefenokee NWA. Visibility can take the form of plume blight for nearby areas, or regional haze for long distances (e.g., distances beyond 50 km). Because the Okefenokee NWA lies more than 50 km from the GP Palatka Mill, the change in visibility is analyzed as regional haze.

Currently, there are several air quality modeling approaches recommended by the Interagency Workgroup on Air Quality Models (IWAQM) to perform these analyses. The IWAQM consists of EPA and Federal Land Managers (FLM) of Class I areas responsible for ensuring that AQRVs are not adversely impacted by new and existing sources. These recommendations have been summarized in two documents:

- *Interagency Workgroup on Air Quality Models (IWAQM), Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts* (EPA, 1998), referred to as the IWAQM Phase 2 report.
- *Federal Land Managers' Air Quality Related Values Workgroup (FLAG), Phase I Report;* U.S. Forestry Service (USFS), National Park Service (NPS), and U.S. Fish and Wildlife Service (USFWS) (December 2000); referred to as the FLAG document.

The methods and assumptions recommended in these documents were used to assess visibility impairment due to the project.

2.7.2 METHODOLOGY

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:

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

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.

Processing of visibility impairment for this study was performed with the CALPUFF model (see Appendix C) 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. For the Okefenokee NWA, the hygroscopic and non-hygroscopic components are 0.9 and 8.5 inverse megameter (Mm^{-1}). CALPOST then calculates the percent extinction change for each day of the year.

2.7.3 RESULTS

As discussed in the 2004 Lime Kiln PSD application, the project's maximum visibility impairment is predicted at Okefenokee NWA to be below the FLM's screening criteria of 5 percent change. As a result, since the proposed project's regional haze maximum impacts are below the FLM's screening criteria at the PSD Class I area, it is expected the proposed project would not have an adverse impact on the existing regional haze at the PSD Class I area of the Okefenokee NWA.

2.8 <u>NITROGEN AND SULFUR DEPOSITION</u>

2.8.1 GENERAL METHODS

As part of the AQRV analyses, total nitrogen (N) and sulfur (S) deposition rates were predicted for the proposed project at the Okefenokee NWA. The deposition analysis criterion is based on the annual averaging period. The total N and S deposition is estimated in units of kilogram per hectare per year (kg/ha/yr). The CALPUFF model is used to predict wet and dry deposition fluxes of various oxides of these elements.

For N deposition, the species include:

- Particulate ammonium nitrate (from species NO_3), wet and dry deposition;
- Nitric acid (species HNO_3), wet and dry deposition;
- NO_x dry deposition; and
- Ammonium sulfate (species SO_4), wet and dry deposition.

For S deposition, the species include:

- SO_2 wet and dry deposition, and
- SO_4 wet and dry deposition.

The CALPUFF model produces results in units of micrograms per square meter per second ($\mu g/m^2/s$). The modeled deposition rates are then converted to N and S deposition in kilograms per hectare, respectively, by using a multiplier equal to the ratio of the molecular weights of the substances (refer to the IWAQM Phase 2 report, Section 3.3).

The deposition analysis threshold (DAT) for N of 0.01 kg/ha/yr was provided by the USFWS (January 2002). A DAT is the additional amount of N or 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 GP project is, therefore, compared to these DAT or significant impact levels.

2.8.2 RESULTS

The maximum predicted N and S depositions predicted for the project in the PSD Class I area of the Okefenokee NWA are summarized in the 2004 Lime Kiln PSD Application. The maximum N and S deposition rates for the project are predicted to below the DAT of 0.01 kg/ha/yr.

In addition, although the project's impacts are predicted to be above the DAT for S deposition at the Class I area, the soils and vegetation are not sensitive to the very low deposition rates predicted for the project. As discussed above, the dominant soil of the Okefenokee NWA is the organic histosols with extremely high buffering capacities. This soil is resistant to acidic atmospheric inputs. The average buffering capacity of histosols is 765,000 equivalence per hectare (eq/ha) [Florida Acid Deposition Study (FADS), 1986]. As acid inputs (*e.g.*, HNO_3^{-1} and $H_2SO_4^{-2}$), the maximum predicted N and S deposition rates are extremely small compared to the buffering capacity of the soils in the Okefenokee NWA. These deposition rates are also small compared to the observed N and S deposition obtained from the FADS. Measurements taken at a rural site in Jefferson County, about 120 miles west-southwest of the Okefenokee NWA, found total (*i.e.*, wet and dry) N and S deposition rates of 304 and 474 eq/ha/yr, respectively, over a 3-year period (FADS, 1986).

The relatively low sensitivity of the soils to acid inputs coupled with the extremely low ground level concentrations of contaminants projected for the Okefenokee NWA from the project emissions precludes any significant impact on soils. Similarly, the total annual N and S deposition rates at the Okefenokee NWA as a result of the project are not expected to alter soil and/or groundwater pH that may result in adverse effects on vegetation.

3.0 ADDITIONAL IMPACT ANALYSIS ON THE CHASSAHOWITZKA NWA CLASS I AREA

3.1 INTRODUCTION

As discussed above, the GP Palatka Mill is subject to the PSD new source review requirements for SO_2, NO_x, PM, PM_{10}, CO, VOC, and SAM. The analysis presented in this section addresses the potential impacts on vegetation, soils, and wildlife of the Chassahowitzka NWA Class I area due to the proposed GP Palatka Mill project. The Chassahowitzka NWA is located approximately 137 km southwest of the GP Palatka Mill. In addition, potential impacts upon visibility resulting from the proposal modification are assessed.

The analysis demonstrates that the increase in impacts due to the proposed project is extremely low. Regardless of the existing conditions in the vicinity of the Class I area, the proposed project will not cause any significant adverse effects due to the predicted low impacts upon these areas.

3.2 SOIL, VEGETATION, AND AQRV ANALYSIS METHODOLOGY

This analysis uses the maximum air quality impacts predicted to occur in the Chassahowitzka NWA Class I area due to the increase in the proposed project's emissions. These impacts are summarized in the 2004 Lime Kiln PSD application

The analysis involved predicting worst-case maximum short- and long-term concentrations of pollutants in the Class I area and comparing the maximum predicted concentrations to lowest observed effect levels for AQRVs or analogous organisms. In conducting the assessment, several assumptions were made as to how pollutants interact with the different matrices, *i.e.*, vegetation, soils, wildlife, and aquatic environment.

A screening approach was used to evaluate potential effects by comparison of the maximum predicted ambient concentrations with effect threshold limits for the pollutant of concern, for vegetation and wildlife, as reported in the scientific literature. A literature search was conducted which specifically addressed the effects of air contaminants on plant species reported to occur in the Class I area. It was recognized that effects threshold information is not available for all species found in the Chassahowitzka NWA, although studies have been performed on a few of the common species and on other similar species, which can be used as models.

3.3 IDENTIFICATION OF AQRVS AND METHODOLOGY

An AQRV analysis was conducted to assess the potential risk to AQRVs of the Chassahowitzka NWA due to the proposed emissions from the GP project. The U.S. Department of the Interior in 1978 administratively defined AQRVs to be:

> *All those values possessed by an area except those that are not affected by changes in air quality and include all those assets of an area whose vitality, significance, or integrity is dependent in some way upon the air environment. These values include visibility and those scenic, cultural, biological, and recreational resources of an area that are affected by air quality.*
>
> *Important attributes of an area are those values or assets that make an area significant as a national monument, preserve, or primitive area. They are the assets that are to be preserved if the area is to achieve the purposes for which it was set aside (Federal Register, 1978).*

Except for visibility, AQRVs were not specifically defined. However, odor, soil, flora, fauna, cultural resources, geological features, water, and climate generally have been identified by land managers as AQRVs. Since specific AQRVs have not been identified for the Chassahowitzka NWA, this AQRV analysis evaluates the effects of air quality on general vegetation types and wildlife found in the Chassahowitzka NWA.

Vegetation type AQRVs and their representative species types have been defined by the USFWS as:

- Marshlands - black needlerush, saw grass, salt grass, and salt marsh cordgrass
- Marsh Islands - cabbage palm and eastern red cedar
- Estuarine Habitat - black needlerush, salt marsh cordgrass, and wax myrtle
- Hardwood Swamp - red maple, red bay, sweet bay, and cabbage palm
- Upland Forests - live oak, scrub oak, longleaf pine, slash pine, wax myrtle, and saw palmetto
- Mangrove Swamp - red, white, and black mangrove

Wildlife AQRVs have been identified as endangered species, waterfowl, marsh and waterbirds, shorebirds, reptiles, and mammals.

The maximum pollutant concentrations predicted for the project in the Chassahowitzka NWA are presented in Table 9-1. These results were compared with effect threshold limits for both vegetation and wildlife as reported in the scientific literature. A literature search was conducted that specifically addressed the effects of air contaminants on plant species reported to occur in the Chassahowitzka NWA. While the literature search focused on such species as cabbage palm, eastern red cedar, lichens, and species of the hardwood swamplands and mangrove forest, no specific citations that addressed these species were found. It is recognized that effect threshold information is not available for all species found in the Chassahowitzka NWA, 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.

3.4 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 soils of the Chassahowitzka NWA are generally classified as histosols. According to the U.S. Department of Agriculture (USDA) Soil Surveys of Citrus and Hernando Counties, nine soil complexes are found in the Chassahowitzka NWA. These include Aripeka fine sand, Aripeka-Okeelanta-Lauderhill, Hallendale-Rock outcrop, Homosassa mucky fine sandy loam, Lacooche, Okeelanta mucks, Okeelanta-Lauderdale-Terra Ceia mucks, Rock outcrop-Homosassa-Lacoochee, and Weekiwachee-Durbin mucks (Porter, 1996). The majority of the soil complexes found in the Chassahowitzka NWA are inundated by tidal waters, contain a relatively high organic matter content, and have high buffering capacities based on their CEC, base saturation, and bulk density. The regular flooding of these soils by the Gulf of Mexico regulates the pH and any change in acidity in the soil would be buffered by this activity. Therefore, they would be relatively insensitive to atmospheric inputs. However, Terra Ceia, Okeelanta, and Lauderdale freshwater mucks are present along the eastern border of the Chassahowitzka NWA, and may be more sensitive to atmospheric sulfur deposition (Porter, 1996). Although not tidally influenced, these freshwater mucks are highly organic and, therefore, have a relatively high intrinsic buffering capacity.

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

3.5 IMPACTS TO VEGETATION

In general, the effects of air pollutants on vegetation occur primarily from SO_2, NO_2, O_3, and PM. Effects from minor air contaminants, such as fluoride (F), chlorine, hydrogen chloride, ethylene, ammonia, hydrogen sulfide, CO, and pesticides, have also been reported in the literature. The effects of air pollutants are dependent both on the concentration of the contaminant and the duration of the exposure. The term "injury," as opposed to damage, is commonly used to describe all plant responses to air contaminants and will be used in the context of this analysis. Air contaminants are thought to interact primarily with plant foliage, which is considered to be the major pathway of exposure. For purposes of this analysis, it was assumed that 100 percent of each air contaminant of concern is accessible to the plants.

Injury to vegetation from exposure to various levels or air contaminants can be termed acute, physiological, or chronic. Acute injury occurs as a result of a short-term exposure to a high contaminant concentration and is typically manifested by visible injury symptoms ranging from chlorosis (discoloration) to necrosis (dead areas). Physiological or latent injury occurs as the result of a long-term exposure to contaminant concentrations below that which results in acute injury symptoms. Chronic injury results from repeated exposure to low concentrations over extended periods of time, often without any visible symptoms, but with some effect on the overall growth and productivity of the plant. In this assessment, 100 percent of the particular air pollutant in the ambient air was assumed to interact with the vegetation. This is a conservative approach.

The concentrations of the pollutants, duration of exposure and frequency of exposures influence the response of vegetation and wildlife to atmospheric pollutants. The pattern of pollutant exposure expected from the facility is that of a few episodes of relatively high ground-level concentrations, which occur during certain meteorological conditions interspersed with long periods of extremely low ground-level concentrations. If there are any effects of stack emissions on plants and animals they will be from the short-term, higher doses. A dose is the product of the concentration of the pollutant and duration of the exposure.

3.5.1 NITROGEN DIOXIDE

NO_2 can injure plant tissue with symptoms usually appearing as irregular white to brown collapsed lesions between the leaf veins and near the margins. Conversely, non-injurious levels of NO_2 can be absorbed by plants, enzymatically transformed into ammonia, and incorporated into plant constituents such as amino acids (Matsumaru *et al.*, 1979).

Plant damage can occur through either acute (short-term, high concentration) or chronic (long-term, relatively low concentration) exposure. For plants that have been determined to be more sensitive to NO_2 exposure than others, acute (1, 4, 8 hours) exposure caused 5 percent predicted foliar injury at concentrations ranging from 3,800 to 15,000 $\mu g/m^3$ (Heck and Tingey, 1979). Chronic exposure of selected plants (some considered NO_2-sensitive) to NO_2 concentrations of 2,000 to 4,000 $\mu g/m^3$ for 213 to 1,900 hours caused reductions in yield of up to 37 percent and some chlorosis (Zahn, 1975).

The maximum NO_2 concentration due to the increase in emissions from the GP project is predicted to be less than 0.1 percent of the levels that cause foliar injury in acute exposure scenarios. By comparison of published toxicity values for NO_2 exposure to long-term (annual averaging time) modeled concentrations, the possibility of plant damage in the Chassahowitzka NWA Class I area can be examined for chronic exposure situations. For a chronic exposure, the maximum annual average NO_2 concentration due to the project in the Chassahowitzka NWA Class I area is less than 0.01 percent of the levels that caused minimal yield loss and chlorosis in plant tissue. Average and maximum background 24-hour average concentrations of NO_2 reported in the Chassahowitzka NWA are 0.006 and 0.104 $\mu g/m^3$, respectively.

Although it has been shown that simultaneous exposure to SO_2 and NO_2 results in synergistic plant injury (Ashenden and Williams, 1980), the magnitude of this response is generally only 3 to 4 times greater than either gas alone and usually occurs at unnaturally high levels of each gas. Therefore, the concentrations within the Chassahowitzka NWA are still far below the levels that potentially cause plant injury for either acute or chronic exposure.

3.5.2 SULFUR DIOXIDE

Sulfur is an essential plant nutrient usually taken up as sulfate ions by the roots from the soil solution. When sulfur dioxide in the atmosphere enters the foliage through pores in the leaves, it reacts with water in the leaf interior to form sulfite ions. Sulfite ions are highly toxic. They interact with enzymes, compete with normal metabolites, and interfere with a variety of cellular functions (Horsman and Wellburn, 1976). However, within the leaf, sulfite is oxidized to sulfate ions, which can then be used by the plant as a nutrient. Small amounts of sulfite may be oxidized before they prove harmful.

SO_2 gas at sufficiently elevated levels has long been known to cause injury to plants. Acute SO_2 injury usually develops within a few hours or days of exposure, and symptoms include marginal, flecked, and/or intercoastal necrotic areas that appear water-soaked and dullish green initially. This injury generally occurs to younger leaves. Chronic injury usually is evident by signs of chlorosis, bronzing, premature senescence, reduced growth, and possible tissue necrosis (EPA, 1982). Background levels of SO_2 in the Chassahowitzka NWA average 1.3 $\mu g/m^3$, with a maximum 24-hour average concentration of 14.5 $\mu g/m^3$ (IMPROVE, 2002). Observed SO_2 effect levels for several plant species and plant sensitivity groupings are presented in Tables 1-2 and 1-3, respectively.

Many studies have been conducted to determine the effects of high-concentration, short-term SO_2 exposure on natural community vegetation. Sensitive plants include ragweed, legumes, blackberry, southern pine, and red and black oak. These species are injured by exposure to 3-hour average SO_2 concentrations of 790 to 1,570 $\mu g/m^3$. Intermediate plants include locust and sweetgum. These species are injured by exposure to 3-hour average SO_2 concentrations of 1,570 to 2,100 $\mu g/m^3$. Resistant species (injured at concentrations above 2,100 $\mu g/m^3$ for 3 hours) include white oak and dogwood (EPA, 1982).

A study of native Floridian species (Woltz and Howe, 1981) demonstrated that cypress, slash pine, live oak, and mangrove exposed to 1,300 $\mu g/m^3$ SO_2 for 8 hours were not visibly damaged. This finding supports the levels cited by other researchers on the effects of SO_2 on vegetation. A corroborative study (McLaughlin and Lee, 1974) demonstrated that approximately 20 percent of a cross-section of plants ranging from sensitive to tolerant was visibly injured at 3-hour average SO_2 concentrations of 920 $\mu g/m^3$.

Jack pine seedlings exposed to SO_2 concentrations of 470 to 520 μg/m^3 for 24 hours demonstrated inhibition of foliar lipid synthesis; however, this inhibition was reversible (Malhotra and Kahn, 1978). Black oak exposed to 1,310 μg/m^3 SO_2 for 24 hours a day for 1 week demonstrated a 48 percent reduction in photosynthesis (Carlson, 1979).

Two lichen species indigenous to Florida exhibited signs of SO_2 damage in the form of decreased biomass gain and photosynthetic rate as well as membrane leakage when exposed to concentrations of 200 to 400 μg/m^3 for 6 hours/week for 10 weeks (Hart *et al.*, 1988).

The maximum 24-hour average SO_2 concentration increase that is predicted for the proposed project at the Chassahowitzka NWA Class I area is less than 1 μg/m^3. When added to the maximum 24-hour average background concentration of 14.5 μg/m^3 at the Chassahowitzka NWA, the maximum worst-case total SO_2 concentration is less than 15 μg/m^3, which is much lower than those known to cause damage to test species. The modeled annual incremental increase in SO_2 adds slightly to background levels of this gas and poses only a minimal threat to area vegetation.

3.5.3 PARTICULATE MATTER (PM_{10})

Although information pertaining to the effects of PM on plants is scarce, some threshold concentrations are available. Mandoli and Dubey (1998) exposed ten species of native Indian plants to levels of PM ranging from 210 to 366 μg/m^3 for an 8-hour averaging period. Damage in the form of a higher leaf area/dry weight ratio was observed at varying degrees for most plants tested. Concentrations of PM lower than 163 μg/m^3 did not appear to be injurious to the tested plants.

By comparison of these published toxicity values for PM exposure (*i.e.*, concentrations for an 8-hour averaging time), the possibility of plant damage in the Chassahowitzka NWA can be determined. The maximum predicted short term PM_{10} concentration due to the increase in emissions resulting from the proposed project at the Chassahowitzka NWA Class I area is less than 0.1 μg/m^3. This concentration is less than 1 percent of the lower threshold value that reportedly affects plant foliage. As a result, no effects to vegetative AQRVs are expected from the project's emissions.

3.5.4 CARBON MONOXIDE

As with PM_{10}, information pertaining to the effects of CO on plants is scarce. The main effect of high concentrations of CO is the inhibition of cytochrome *c* oxidase, the terminal oxidase in the mitochondrial electron transfer chain. Inhibition of cytochrome *c* oxidase depletes the supply of

ATP, the principal donor of free energy required for cell functions. However, this inhibition only occurs at extremely high concentrations of CO. Pollok *et al.* (1989) reported that exposure to $CO:O_2$ ratio of 25 (equivalent to an ambient CO concentration of 6.85 x 10^6 $\mu g/m^3$) resulted in stomatal closure in the leaves of the sunflower (*Helianthus annuus*). Naik *et al.* (1992) reported cytochrome *c* oxidase inhibition in corn, sorghum, millet, and Guinea grass at $CO:O_2$ ratios of 2.5 (equivalent to an ambient CO concentration of 6.85 x 10^5 $\mu g/m^3$). These plants were considered the species most sensitive to CO-induced inhibition of cytochrome *c* oxidase.

By comparison of published effect values for CO exposure, the possibility of plant damage in the Class I area can be determined. The maximum 1-hour (most conservative) estimated CO concentration due to the increase in emissions resulting from the proposed project in the Chassahowitzka NWA Class I area is less than 1 $\mu g/m^3$. This concentration is less than 0.01 percent of the value that caused inhibition in laboratory studies. The amount of damage sustained at this level (if any) for 1 hour would have negligible effects over an entire growing season. The predicted maximum annual CO concentration is less than 0.001 percent of the value that caused cytochrome *c* oxidase inhibition.

3.5.5 SULFURIC ACID MIST

Acidic precipitation or acid rain is coupled to SO_2 emissions mainly formed during the burning of fossil fuels. This pollutant is oxidized in the atmosphere and dissolves in rain forming SAM, which falls as acidic precipitation (Ravera, 1989). Although concentration data are not available, SAM has been reported to yield necrotic spotting on the upper surfaces of leaves (Middleton *et al.*, 1950).

No significant adverse effects on vegetation are expected from the project's emissions because SO_2 concentrations, which lead directly to the formation of SAM concentrations, are predicted to be well below levels that have been documented as negatively affecting vegetation. During the last decade, much attention has been focused on acid rain. Acidic deposition is an ecosystem-level problem that affects vegetation because of some alterations of soil conditions such as increased leaching of essential base cations or elevated concentrations of aluminum in the soil water (Goldstein *et al.*, 1985). Although effects of acid rain in eastern North America have been well published and publicized, detrimental effects of acid rain on Florida vegetation are lacking documentation.

3.5.6 VOC EMISSIONS AND IMPACTS ON OZONE

It is difficult to predict what effect the proposed increase in emissions of VOC will have on ambient O_3 concentrations on a regional scale. VOC and NO_x emissions are precursors to the formation of O_3. O_3 is not directly emitted from fuel combustion, but is formed down-wind from emission sources when VOC and NO_x emissions react in the presence of sunlight. Natural (without man-made sources) ambient concentrations of O_3 are normally in the range of 20 to 39 $\mu g/m^3$ (0.01 to 0.02 ppm) (Heath, 1975).

The nearest monitors to the GP Palatka Mill that measure O_3 concentrations are located in Gainesville (AIRS No. 12-001-0025 and 12-001-3011). These stations measure concentrations according to EPA procedures. Based on the O_3 monitoring concentrations measured over the last several years in Gainesville (see Table 4-1), the region is in attainment of the existing 1-hour O_3 AAQS as well as the new 8-hour O_3 AAQS.

O_3 can cause various damage to broad-leaved plants including: tissue collapse, interveinal necrosis and markings on the upper surface leaves know as stippling (pigmented yellow, light tan, red brown, dark brown, red, or purple), flecking (silver or bleached straw white), mottling, chlorosis or bronzing, and bleaching. O_3 can also stunt plant growth and bud formation. On certain plants such as citrus, grape, and tobacco, it is common for leaves to wither and drop early.

As described in above, the VOC emissions due to the proposed GP project represent less than 1-percent increase in regional VOC emissions. Therefore, the effects of O_3, as a result of VOC emissions from the project, are expected to be insignificant.

3.5.7 SUMMARY

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

3.6 IMPACTS TO WILDLIFE

The major air quality risk to wildlife in the United States is from continuous exposure to pollutants above the NAAQS. This occurs in non-attainment areas, *e.g.*, Los Angeles Basin. 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.

For impacts on wildlife, the lowest threshold values of SO_2, NO_2, and particulates that are reported to cause physiological changes are shown in Table 2-2. These values are orders of magnitude larger than maximum concentrations predicted for the GP project at the Chassahowitzka NWA Class I area. No effects on wildlife AQRVs from SO_2, NO_2, and particulates are expected. The proposed project's contribution to cumulative impacts is expected to be negligible.

3.7 IMPACTS ON VISIBILITY

3.7.1 INTRODUCTION

The CAA Amendments of 1977 provide for implementation of guidelines to prevent visibility impairment in mandatory Class I areas. The guidelines are intended to protect the aesthetic quality of these pristine areas from reduction in visual range and atmospheric discoloration due to various pollutants. Sources of air pollution can cause visible plumes if emissions of PM_{10} and NO_x are sufficiently large. A plume will be visible if its constituents scatter or absorb sufficient light so that the plume is brighter or darker than its viewing background (e.g., the sky or a terrain feature, such as a mountain). PSD Class I areas, such as national parks and wilderness areas, are afforded special visibility protection designed to prevent plume visual impacts to observers within a Class I area.

Visibility is an AQRV for the Chassahowitzka NWA. Visibility can take the form of plume blight for nearby areas or regional haze for long distances (e.g., distances beyond 50 km). Because the Chassahowitzka NWA is more than 50 km from the GP Palatka Mill, the potential change in visibility is analyzed as regional haze.

Currently, there are several air quality modeling approaches recommended by the Interagency Workgroup on Air Quality Models (IWAQM) to perform these analyses. The IWAQM consists of EPA and FLM of Class I areas who are responsible for ensuring that AQRVs are not adversely impacted by new and existing sources. These recommendations have been summarized in two documents:

- *Interagency Workgroup on Air Quality Models (IWAQM), Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts* (EPA, 1998), referred to as the IWAQM Phase 2 report; and
- *Federal Land Managers' Air Quality Related Values Workgroup (FLAG), Phase I Report,* USFS, NPS, USFWS (December 2000), referred to as the FLAG document.

The methods and assumptions recommended in these documents were used to assess visibility impairment due to the project.

3.7.2 METHODOLOGY

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:

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

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.

Processing of visibility impairment for this study was performed with the CALPUFF model (see Appendix D) and the CALPUFF post-processing programs POSTUTIL and 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 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. For the Chassahowitzka NWA Class I area evaluated, the hygroscopic and non-hygroscopic components are 0.9 and 8.5 inverse mega meter (Mm^{-1}). CALPOST then predicts the percent extinction change for each day of the year.

3.7.3 RESULTS

The results of the refined analysis for regional haze are presented in the 2004 Lime Kiln PSD permit application. As shown in this table, the project's maximum visibility impairment is predicted at Chassahowitzka NWA, to be less than the FLM's screening criteria of 5 percent change. As a result, since the proposed project's regional haze maximum impacts are below the FLM's screening criteria at the PSD Class I area, it is expected the proposed project would not have an adverse impact on the existing regional haze at the PSD Class I area of the Chassahowitzka NWA.

3.8 NITROGEN AND SULFUR DEPOSITION

3.8.1 GENERAL METHODS

As part of the AQRV analyses, total nitrogen (N) and total sulfur (S) deposition rates were predicted at the Chassahowitzka NWA Class I area. The deposition analysis threshold is based on the annual averaging period. The total nitrogen and sulfur deposition is estimated in units of kilogram per hectare per year (kg/ha/yr). The CALPUFF model is used to predict wet and dry deposition fluxes of various oxides of these elements.

For N deposition, the species include:

- Particulate ammonium nitrate (from species NO_3), wet and dry deposition;
- Nitric acid (species HNO_3), wet and dry deposition;
- NO_x, dry deposition; and
- Ammonium sulfate (species SO_4), wet and dry deposition.

For S deposition, the species include:

- SO_2, wet and dry deposition; and
- SO_4, wet and dry deposition.

The CALPUFF model produces results in units of μg/m²/s. The modeled deposition rates are then converted to N and S deposition in kg/ha, respectively, by using a multiplier equal to the ratio of the molecular weights of the substances (refer to IWAQM Phase 2 report, Section 3.3).

The DAT for nitrogen of 0.01 kg/ha/yr was provided by the USFWS (January 2002). A DAT is the additional amount of N or 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 GP project is, therefore, compared to these DAT or significant impact levels.

3.8.2 RESULTS

The maximum predicted N and S depositions predicted for the Project in the PSD Class I area of the Chassahowitzka NWA are summarized in the 2004 Lime Kiln PSD application. The maximum N and S deposition rates for the project are predicted to be below the DAT of 0.01 kg/ha/yr. Although the project's impacts are predicted to be above the DAT for S deposition at the Class I area, the soils and vegetation are not sensitive to the very low deposition rates predicted for the project.

As discussed in above, the dominant soil of Chassahowitzka NWA is the organic histosols with extremely high buffering capacities. This soil is resistant to acidic atmospheric inputs. The average buffering capacity of histosols is 765,000 eq/ha (FADS, 1986). The predicted deposition rates are extremely small compared to the buffering capacity of the soils in the Chassahowitzka NWA. These deposition rates are also small compared to the observed N and S deposition obtained from the FADS. Measurements taken at a rural site in Pasco County, about 60 miles southeast of the Chassahowitzka NWA, found total (*i.e.*, wet and dry) N and S deposition rates of 366 and 491eq/ha/yr, respectively, over a 3-year period (FADS, 1986). The relatively low sensitivity of the soils to acid inputs coupled with the extremely low ground-level concentrations of contaminants projected for the Chassahowitzka NWA from the project emissions precludes any significant impact on soils. Similarly, the total annual N and S deposition rates as a result of the project at the Chassahowitzka NWA are not expected to alter soil and/or groundwater pH that may result in adverse effects on vegetation.

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ATTACHMENT B

Request 2:

In Section 3.2.10 (Source Impact Analysis Results) maximum annual and 24-hour PM10 NAAQS results and 24-hr PM10 PSD Class II increment results show predicted violations of the respective NAAQS and increments at receptors located on or near GP's Sawmill Mill. However, in this same section, the maximum project impacts are shown to be less than significant at the receptors showing violations. Do the modeled impacts of all the PM10 sources and the Georgia-Pacific Palatka facility result in violations of the applicable PM10 NAAQS or increment at any increment at any of these receptors entirely on their own?

GP Response:

GP performed additional modeling analyses of the predicted violations. For all predicted violations, the proposed No.4 Lime Kiln project does not contribute a significant impact. The following tables present the impact from all of paper mill emissions at the predicted violations using the EVENT model. The tables show that the total paper mill emissions do not cause a violation of any standard on their own.

Table 1. Summary of Predicted Impacts - Contribution Analysis, Class II Increment 24 Hour Average

	Maximum 24 Hr Impact (ug/m3) at All Predicted Violation Receptors (Excluding Sawmill property) By Source Group		
Year	All Sources	ALL Paper Mill	Kiln 4 Project
1984	62.1	3.2	2.3
1985	65.8	4.5	2.4
1986	43.9	2.3	2.3
1987	80.3	3.6	2.8
1988	59.9	0.9	2.1

Note:
Refer to ISCST3 output set PMCL2X.O* for reported Kiln 4 project impacts.
Refer to ISCSTEV output set PMCL2E*.LST for GPMILL group impacts.

Table 2. Summary of Predicted Impacts - Contribution Analysis, NAAQS 24 Hr Average

	Maximum 24 Hr Impact (ug/m3) at All Predicted Violation Receptors (Excluding Sawmill property) By Source Group		
Period	All Sources	ALL Paper Mill	Kiln 4 Project
1984-1988	146.1	12.1	3

Note:
Refer to ISCST3 output set PMAQS24X.O* for reported Kiln 4 project impacts.
Refer to ISCSTEV output set 24AQS5YRGP.LST for GPMILL group impacts.

Table 3. Summary of Predicted Impacts - Contribution Analysis, NAAQS Annual Average

	Maximum Annual Impact (ug/m3) at All Predicted Violation Receptors (Excluding Sawmill property) By Source Group		
Year	All Sources	ALL Paper Mill	Kiln 4 Project
1984	61.3	1.35	0.27
1985	63.5	1.51	0.27
1986	60.44	1.7	0.28
1987	69	1.4	0.24
1988	63.8	1.2	0.24

Note:
Refer to ISCST3 output set PMAQSANX.O* for reported Kiln 4 project impacts.
Refer to ISCSTEV output set ANAQS*.LST for GPMILL group impacts.

FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Department of Environmental Protection

Jeb Bush
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Colleen M. Castille
Secretary

May 13, 2005

CERTIFIED MAIL – Return Receipt Requested

Mr. Theodore D. Kennedy
Vice President – Palatka Operations
Georgia-Pacific
Palatka Mill
P.O. Box 919
Palatka, Florida 32178-0919

RE: Request to Replace the Lime Kiln Shell and Associated Tube Coolers
Project No.: 1070005-030-AC/PSD-FL-345

Dear Mr. Kennedy:

On September 4, 2004, the Department received a request to replace a portion of the lime kiln shell and all of the associated tube coolers. On April 15, 2005, the Department received an updated response to its Request for Information (RAI) letters dated October 1, 2004 and April 5, 2005. Based on our review of the proposed project and this response, we have determined that the following additional information is needed in order to continue processing this application package. We have determined that the following additional information is needed in order to continue processing this application package. Please provide all assumptions, calculations, and reference material(s), that are used or reflected in any of your responses to the following issues:

1. Rule 62-212.400(5)(h)5, F.A.C requires the applicant to provide information relating to the air quality impact of, and the nature and extent of, all general commercial, residential, industrial and other growth which has occurred since August 7, 1977, in the area the facility or modification would affect. Please provide this information. The additional impacts section in the updated response, Section 3.5, does not adequately address this requirement.

2. In Section 3.2.10 (Source Impact Analysis Results) maximum annual and 24-hour PM_{10} NAAQS results and 24-hour PM_{10} PSD Class II increment results show predicted violations of the respective NAAQS and increments at receptors located on or near GP's Sawmill Mill. However, in this same section, the maximum project impacts are shown to be less than significant at the receptors showing violations. Do the modeled impacts of the all of the PM_{10} sources at the Georgia Pacific Palatka facility result in violations of the applicable PM_{10} NAAQS or increment at any of these receptors entirely on their own?

The Department will resume processing this application after receipt of the requested information. If you have any questions regarding this matter, please call Bruce Mitchell at (850)413-9198 or Cleve Holladay at (850)921-8986.

Sincerely,

Jeffery J. Koerner

Jeff Koerner
Air Permitting North
Bureau of Air Regulation

JFK/ch

cc: Gregg Worley, U.S. EPA, Region 4
Dave McNeal, U.S. EPA, Region 4
Lee Page, U.S. EPA, Region 4
John Bunyak, NPS
Chris Kirts, NED
Myra J. Carpenter, G-PC
Mark J. Aguilar, P.E., G-PC

Department of Environmental Protection

Jeb Bush
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Colleen M. Castille
Secretary

January 7, 2005

CERTIFIED MAIL – Return Receipt Requested

Mr. Theodore D. Kennedy
Vice President – Palatka Operations
Georgia-Pacific
Palatka Mill
P.O. Box 919
Palatka, Florida 32178-0919

RE: Request to Replace the Lime Kiln Shell and Associated Tube Coolers
Project No.: 1070005-030-AC/PSD-FL-345

Dear Mr. Kennedy:

On September 4, 2004, the Department received a request to replace a portion of the lime kiln shell and all of the associated tube coolers. On December 8, 2004, the Department received a response to an RAI dated October 1, 2004. Based on our review of the proposed project and the RAI (Request for Additional Information) response, we have determined that the following additional information is needed in order to continue processing this application package. Please provide all assumptions, calculations, and reference material(s), that are used or reflected in any of your responses to the following issues:

1. In the October 1, 2004 RAI, a cost analysis of a new lime kiln with tube coolers of like-and-kind pursuant to the definition of an "affected facility" in accordance to 40 CFR 60, Subpart BB, was requested. The response just provided a total cost estimate with no itemized breakdown for a new lime kiln. Again, please provide a cost analysis of a new lime kiln with tube coolers of like-and-kind pursuant to the definition of an "affected facility" in accordance to 40 CFR 60, Subpart BB, and 40 CFR 63, Subpart MM. Please be sure to provide within the analysis the ability to distinguish the "capital costs" from other costs of a new lime kiln. If the proposed modified lime kiln becomes subject to either or both of these regulations, then the BACT determination's starting base emissions will be much lower than the original submission and the proposed BACT determination will have to be reevaluated and resubmitted.

2. Due to the age and physical deterioration of the existing lime kiln, the apparent reduction of actual production efficiency over the years of operation, the recent replacement of the ID fan (May 2004) and the upcoming replacement of the burner, this current request to replace the hot end of the lime kiln, including the associated tube coolers, does not appear to be routine maintenance. This project appears to be a physical modification of the existing lime kiln to improve reliability of lime (CaO) production, allowing for an increase in actual emissions and production and, therefore, be able to potentially increase actual emissions and production from upstream and downstream emissions unit operations to the lime kiln. Please explain why these collective changes should be considered routine maintenance.

3. Independent funding of various projects does not establish independence of the activity and remove the potential of a modification or new construction from being a Phased PSD Project or to be considered one. Hence, all contemporaneous emission changes that have occurred over the last five years shall be considered contemporaneous

with this proposed activity. Therefore, please establish the past contemporaneous emission changes and evaluate them in conjunction with the emission changes proposed for this project for significant impact analyses, increment consumption and ambient air quality impact analyses. Also, please include any future contemporaneous emission changes that will be associated with and affected by this proposed change from other emission unit operations, both upstream and downstream.

4. You did not provide an adequate response to the original request (#4) previously submitted in the RAI dated October 1, 2004. For PSD purposes, please provide the daily production rate of the lime kiln for the last two years (24-months) in order to determine the baseline production rate of the lime kiln; and, please include 2004 data.

5. You did not answer the question (#6) previously submitted in the RAI dated October 1, 2004. Even though the information is attempting to state that the Kiln shell portion and tube coolers that are being replaced are part of a maintenance project, will the proposed changes allow for an increase in production from its present configuration and operation? A yes or no is the preferred response.

6. You did not answer the question (#7) previously submitted in the RAI dated October 1, 2004. Will there be an increase in production from the baseline production rate (see No. 4, above) after the proposed changes are completed? A yes or no is the preferred response.

7. Was the new ID fan that was installed in March 2004, sanctioned under an air construction permit? If so, please provide the project number. Also, please provide the design calculations and vendor order for the latest ID fan.

8. Please provide all of the dates that the ID fan has been replaced since the existing lime kiln was built.

9. On all of the previous and new ID fans, please provide the design fan characteristics for each unit, including their rpms, pressure drops, curves, volumetric flow rates, etc. In addition and for the previous/last and new ID fans, please provide the volumetric flow rates established in the performance tests conducted on the lime kiln since 1998.

10. If any of this RAI's responses require any changes to the pollutant emissions and subsequent modeling issues, specifically significant impact analyses, increment consumption and ambient air quality impact analyses, then please make sure that these changes are addressed in the associated modeling and increment requirements and exercises per the regulations. Therefore, the previous RAI's #10 will be restated in case there is/are some emissions change in the response(s) to this RAI:

> Pursuant to Rule 62-212.400(5)(h)5., F.A.C., please provide the information relating to the air quality impacts of, and the nature and extent of, all general commercial, residential, industrial and other growth that has occurred since August 7, 1977, in the area the facility or modification would affect.

11. You did not answer the question (#11) previously submitted in the RAI dated October 1, 2004. For the potential applicability of 40 CFR 60, Subpart BB, please use Appendix C, 40 CFR 60, to determine if there is/are an emissions rate increase for the pollutants affected by this project.

The Department will resume processing this application after receipt of the requested information. If you have any questions regarding this matter, please call Bruce Mitchell at (850)413-9198 or Cleve Holladay at (850)921-8986.

Sincerely,

for Trina L. Vielhauer
Chief
Bureau of Air Regulation

TLV/bm

cc: Gregg Worley, U.S. EPA, Region 4
Dave McNeal, U.S. EPA, Region 4
Lee Page, U.S. EPA, Region 4
John Bunyak, NPS
Chris Kirts, NED
Myra J. Carpenter, G-PC
Mark J. Aguilar, P.E., G-PC

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1. Article Addressed to:

Mr. Theodore D. Kennedy
VP Palatak Operations
Georgia-Pacific Palatka Mill
P.O. Box 919
Palatka, FL 32178-0919

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C. Signature John Alexander ☐ Agent ☐ Addressee

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Palatka, FL 32178-0919

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Georgia-Pacific Corporation

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Telephone (404) 652-4000

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BUREAU OF AIR REGULATION

December 6, 2004

Ms. Trina Vielhauer
Chief, Bureau of Air Regulation
Florida Department of Environmental Protection
Division of Air Resource Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Re: Georgia-Pacific Palatka Mill
Title V Permit No. 1070005-023-AV
Request to Replace the Lime Kiln Shell and Associated Tube Coolers
Project No.: 1070005-030-AC/PSD-FL-345

Dear Ms. Vielhauer:

Please find enclosed Georgia-Pacific Corporation's response to the Request for Additional Information for the above-referenced project. Please contact me at (404) 652-4293 or Myra Carpenter at (386) 329-0918 if you have any additional concerns for this request. Georgia-Pacific Corporation greatly appreciates your assistance for this project.

Sincerely,

Mark A. Aguilar

PROFESSIONAL ENGINEER
MARK AGUILAR
CERTIFICATE NO. 52248
STATE OF FLORIDA

Mark Aguilar P.E.
Senior Environmental Engineer
Georgia-Pacific Corporation
P.E. 522248

Cc: Myra Carpenter, GP
ma/ma B. Mitchell
C. Holladay
C. Kirts
G. Worley, EPA
A. Bunyak, NPS

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Georgia-Pacific

Palatka Pulp and Paper Operations
Consumer Products Division

P.O. Box 919
Palatka, FL 32178-0919
(386) 325-2001

December 7, 2004

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BUREAU OF AIR REGULATION

Ms. Trina Vielhauer
Chief, Bureau of Air Regulation
Florida Department of Environmental Protection
Division of Air Resource Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Re: Georgia-Pacific Palatka Mill
Title V Permit No. 1070005-023-AV
Request to Replace the Lime Kiln Shell and Associated Tube Coolers
Project No.: 1070005-030-AC/PSD-FL-345

Dear Ms. Vielhauer:

Georgia-Pacific Corporation (GP) has received the Florida Department of Environmental Protection's (FDEP's) request for additional information (RAI), dated October 1, 2004. Responses to each of the Department's requests are provided in the remainder of this letter.

1. **Please provide the cost analysis for this project, which is the replacement of a portion of the existing lime kiln shell and the ten (10) tube coolers. Also, please provide the cost analysis of a new lime kiln with tube coolers of like-and-kind pursuant to the definition of an "affected facility" in accordance to 40 CFR 60, Subpart BB.**

As shown in the attached Cost Table, the approximate project cost is estimated at $1.7 million. According to Allis-Chalmers, the replacement cost for a new lime kiln system equivalent to the existing kiln is approximately $17-20 million.

2. **Will the replacement portion of the lime kiln shell be exactly the same size and diameter as the existing section that is being replaced?**

Yes. The new section will be exactly the same size and diameter as the existing section.

3. **Based on the write-up in the Executive Summary, you are claiming that the "existing coolers are causing excessive stress on the Kiln shell," therefore all of the coolers need to be replaced and the new bracket will relieve the stress on the new Kiln shell.**
   a. **With the knowledge that the coolers have caused the stress on the Kiln shell, then why are you going to replace the equipment with more of the same that could potentially cause damage to the new section being replaced? Please explain.**

Improvements have been made to the design of the mounting brackets and spout welds to reduce thermal stress and weld failures in the future.

Although the cooler brackets have caused some stress on the shell, the situation has been aggravated by the fact that the lime kiln is 30 years old (installed October 1974) and the shell is failing from fatigue. The coolers are also beyond their useful life.

   b. **Why can't the existing coolers be used and just replace their attachment bracket?**

See above.

   c. **What are the manufacturer's original design criteria for the existing tube coolers? For each existing tube cooler, please include the processing throughput rates, the inlet air temperature and the exit temperature, the diameter and length, and the volumetric flow rates.**

For each existing tube cooler the original design specifications are as follows:

Production throughput - 320 TPD lime (for cooler system)
Inlet temperature - 70°F (average)
Lime Exit temperature - 600°F
Diameter and length – 4 ft. diameter by 12 ft. long
Volumetric flow rate – 27,000 actual cubic feet per minute, acfm (for cooler system) Note: Only a portion of the total volumetric air flow passes through the coolers.

   d. **For the new tube coolers, what are the manufacturer's design criteria? For each new tube cooler, please include the processing throughput rates, the inlet air temperature and the exit temperature, the diameter and length, and the volumetric flow rates.**

Plans are to fabricate and use similar metallurgy to match the design described in the response to 3.c. above.

4. **For PSD purposes, please provide the daily production rate of the lime kiln for the last two years (24-months) in order to determine the baseline production rate of the lime kiln; and, please include 2004 data.**

A large volume of data would be required to satisfy this request (1035 individual days of information). The essential production facts are summarized as follows:

- The maximum daily production rate of 389 TPD (as CaO), as calculated by the stoichiometric conversion between lime mud and lime, 90% lime availability, and 20% recycle rate, occurred on April 18, 2004; it should be noted that this time period is outside of the baseline period that was used for this application.
- The maximum daily production rate for the lime kiln for the best month during this time period averaged 365 TPD (as CaO) during the month of February 2003.
- The maximum annual production for the Lime Kiln for the best year from 1999 to present was 124,950 tons (as CaO) produced in the year 2000.

5. **With the proposed activity of the lime kiln and its associated coolers, are there any other changes being made to the burner, the induced draft fan, the control device, or any other part of the lime kiln operation? If any, please provide a detailed description of the proposed changes.**

The project does not include any of these changes.

However, please note that we replaced the ID fan during the May 2004 annual outage. The design parameters for the replacement fan have been consistent with the original fan that was purchased in 1974. Note that the volumetric flow rates measured during stack tests before and after the fan change were not significantly different. (See Table in response to Question 8 below.) Although the original design capacity (at the time of initial construction) was 100,000 acfm at 36" static pressure, the optimum fan operation is significantly below this flow rate as evidenced by stack testing.

Additionally, plans are to replace the burner during a routine 12-hour maintenance outage this month. The manufacturer recommends replacement on a 10 to 15 year cycle. The burner alone is not a major component of the overall facility or the lime kiln; *i.e.*, the equipment cost is less than $100,000. The existing burner is scheduled to be replaced due to its condition and unavailability of acceptable replacement parts. While the new burner is of the same size and rating as the existing burner, it may allow for lower and more efficient fuel usage and will provide a greater margin of safety for the overall burner management system. Thus, air emissions would not be increased.

6. **Even though the presentation is attempting to state that the Kiln shell portion and tube coolers that are being replaced are part of a maintenance project, will the proposed changes allow for an increase in production from its present configuration and operation?**

We do not anticipate an increase in production as a result of this maintenance work. As stated in responses to 2 and 3.d above, the design for the new shell and coolers is the same as the original design, although less maintenance downtime is anticipated after this maintenance work is complete.

7. **Will there be an increased production from the baseline production rate (see No. 4, above) felt after the proposed changes are completed?**

No increase is expected as a result of these maintenance activities. Any incremental increase would be based on market conditions and would be totally unrelated. As stated above, and more completely in the application, the Mill considers this project to involve only activities needed to maintain existing equipment in working order. See response to Question No. 6.

8. **Please provide an explanation as to why the volumetric flow rate increased in the lime kiln between the years 1991 to 1995 to present years. Did the mill do anything to the control system, including changes to the induced draft fan system? What was the manufacturer's design flow rate? Please provide the specifications from the original vendor on the design flow rate.**

This issue was addressed in detail in Section 4 of our application. That information is repeated here in response to this question for your convenience.

The design flow rate for the Lime Kiln was presented as 24,200 dscfm at 4% oxygen (O_2) in the 1991 PSD permit application. The calculation of the corrected design flow rate, based on this value, is as follows:

$$24{,}200\ (21\text{-}4.0)/\ (21\text{-}10) = 37{,}400 \text{ dscfm @ } 10\%\ O_2$$

This corrected flow rate was the basis of the mass emission limits that were established in the 1991 PSD permit (Permit No. AC54-192551/PSD-FL-171). In preparing the 1995 PSD permit application; stack test data for prior years was reviewed to determine if the Lime Kiln design flow rate was still representative. These data are presented in the following table:

Lime Kiln Stack Flow Rate Data (1992 – 1994)

Stack Test Date	Stack Flow Rate (dscfm)	Corrected Stack Flow Rate @ 10% O_2
1994	33,700 @ 6.4 % O_2	44,700
1993	32,000 @ 5.7 % O_2	44,500
1992	29,500 @ 6.4 % O_2	39,200

This review concluded that the previous design flow of 37,400 dscfm @ 10% O_2 was no longer appropriate. Therefore, the 1995 PSD application presented updated maximum flow rates of 56,000 actual cubic feet per minute (acfm) and 32,000 dscfm (both uncorrected) in the Lime Kiln emission unit information section of the application form. Although not specified on the application form, the 1993 stack test was the basis of the flow rate that was provided in the application forms for the Lime Kiln. As shown in the table above, the associated oxygen content was 5.7%. The uncorrected flow rate of 32,000 dscfm (from the 1995 application) corresponds to the following rate when corrected to 10% O_2:

$$32{,}000\ (21-5.7)/(21-10) = 44{,}500 \text{ dscfm @ } 10\%\ O_2$$

Even though this issue was brought forward in the 1995 PSD application, GP elected to retain the same allowable mass emission limits for the Lime Kiln as contained in the previous 1991 PSD permit. Therefore, the basis of the allowable emissions was still shown as 37,400 dscfm @ 10% O_2, even though this flow rate was no longer appropriate (permit No. AC54-266676/ PSD-FL-226). In other words, the mill was willing to accept the same mass emission limits that were previously in place, although the stack flow rate had increased.

The emission calculations associated with the application at hand utilize the 44,500 dscfm flow rate. In order to demonstrate that this flow rate is still representative, the following table presents the actual measured stack flow rates for the period 1992 through 2004 based on past compliance test data. As shown, including the recent 2004 stack test information, the corrected, average flow rates range from 33,100 to 54,200 dscfm @ 10% O_2. As part of the analysis of these flow rate data values, a student-t test was conducted to compare the average flow rates from 1992 to 1998 to the average flow rates from 1999 to 2004. The result of the t-test is that there is not a statistically significant difference between the 1992/1998 flow rates compared to the 1999/2004 flow rates. It is GP's intent to update the permit application in order to document the most recent flow rate values from 2004.

Average Flow Rates for Testing Performed 1992-2004

Year Tested	Test Description	Average Flow Rate (dscfm @ 10% Oxygen)	LIME Throughput Tons/hr
1992	PM	39,200	39.0
1993	PM	44,500	40.1
1994	PM	44,700	39.8
1995	PM	42,300	37.0
1996	PM	40,300	36.7
1997	PM	39,500	36.0
1998	CO, NO_x, SO_2, VOC	33,100	37.2
	PM	35,600	38.0
1999	CO, NO_x, SO_2, VOC	37,000	34.4
	PM	38,500	34.4
2000	CO, NO_x, SO_2, VOC, PM	42,600	36.5
2001	PM	43,300	39.8
2002	CO, NO_x, SO_2, VOC, PM	38,300	36.6
2003	CO, NO_x, SO_2, VOC, PM	42,800	38.8
2004 (Feb 04)	CO, NO_x, SO_2, VOC, PM	49,900	39.3
	TRS	54,200	40.3
2004 (Aug 04)	PM	51,300	38.2

The control system was replaced in 1998 during the lime kiln's routine annual outage because replacement parts were unavailable for the pre-existing control system. The control system is not a major component of the overall facility or the lime kiln

For a discussion on the ID fan and the manufacturer's design flow rate see response to question 5 above.

9. **Due to our awareness of the proposed upcoming applications for the Combination Boiler No. 4 and the No. 4 Recovery Boiler, we consider them to be contemporaneous with this project as a Phased PSD project. We also consider the changes made to the mill for the last five years to be contemporaneous to this project. Therefore, for significant impact analyses, increment consumption and ambient air quality impact analyses; please combine these projects with this project for these evaluations.**

This project is being performed as part of regular mill maintenance activities, not as part of some multi-phase project designed to achieve an overall production expansion. There is no relationship between this activity and the other projects described above other than their proximity in time. Over the years, EPA has developed criteria that may be used by regulatory agencies in determining if projects are related, and should therefore be aggregated for PSD applicability purposes. These criteria include, but are not limited to, (1) filing of more than one minor source permit application associated with emissions increases at a single plant within a short time period, (2) application of funding (*e.g.,* viability of projects in the absence of the other projects), (3) reports regarding consumer demand and production levels, and (4) statements of authorized representatives of the source regarding plans for operation.

All of the projects described by FDEP either have, or will, go through PSD permitting. As such, it is clear that GP has not attempted to separate projects in order to avoid major permit review. Furthermore, these projects are all under separate funding mechanisms. Finally, the Company has not represented this project as a component of some overall mill expansion project. The ONLY common element between these projects is their proximity in time, and that alone is not a sufficient basis to conclude that projects are related and should be addressed in a single permit application.

It is true that this project will improve the reliability of lime kiln operations, and hence the reliability of overall mill production. But the same could be said for every other maintenance project at every other manufacturing facility. The function of maintenance is exactly that; to maintain manufacturing assets so that breakdowns and malfunctions can be minimized and the safe continuity of production assured as best as possible within resource constraints. Every successful manufacturing facility has an active preventive maintenance program with multiple independent projects competing for funding, and the fact that multiple independent projects in fact receive funding approval does not mean that the projects are interdependent or integrally related and should therefore be lumped together for permitting review. In fact, most such projects are not interdependent and routinely go forward on their own. The same is true for this lime kiln shell project and the other projects mentioned; the fact that they may each have an effect on overall reliability does not mean that they are part of the same project.

With specific regard to the No.4 Combination Boiler and No. 4 Recovery Boiler projects, those are projects for which the Mill has not even completed its internal evaluation and permitting analysis, let alone completed the applications. It is therefore not appropriate to include information for such unrelated future projects in current permitting activities.

10. Pursuant to Rule 62-212.400(5)(h)5., F.A.C., please provide the information relating to the air quality impacts of, and the nature and extent of, all general commercial, residential, industrial and other growth that has occurred since August 7, 1977, in the area the facility or modification would affect.

Response to this question is provided in Appendix A as an attachment to this letter.

11. For the potential applicability of 40 CFR 60, Subpart BB, please use Appendix C, 40 CFR 60, to determine if there is/are an emissions rate increase for the pollutants affected by this project.

In the General Provisions to the NSPS, at 40 CFR 60.14(b)(1), it is stated that, "The Administrator shall use the following to determine emission rate...Emission factors as specified in the latest issue of "Compilation of Air Pollutant Emission Factors, " EPA Publication No. AP-42, or other emission factors determined by the Administrator to be superior to AP-42 emission factors, in cases where utilization of emission factors demonstrate that the emission level resulting from the physical or operational change will either clearly increase or clearly not increase." In a subsequent paragraph (40 CFR 60.14(b)(2), the regulation goes on to state, "Material balances, continuous monitor date, or manual emission tests..." may be used "...in cases where utilization of emission factors as referenced in paragraph (b)(1) of this section does not demonstrate to the Administrator's satisfaction whether the emission level resulting from the physical or operational change will either clearly increase, or clearly not increase..." This same section goes on to state that Appendix C will be followed in cases where manual emission tests are required by the Administrator.

As described in detail in our application, and as detailed above, this is a maintenance project that involves the replacement of a portion of the shell and the coolers with equipment of the same size and design. The only change noted (see 3.a above) is an improvement in the design of the mounting brackets and spout welds for the coolers in order to reduce thermal stress and weld failures in the future.

The detailed testing required by Appendix C is both costly and time consuming. GP feels that the information provided in the application, and discussed in greater detail in this letter, should be sufficient to demonstrate to FDEP that there will not be an increase in the maximum hourly emission rates of the kiln following completion of this maintenance activity. As such, we respectively request that, in light of this additional information, that FDEP withdraw this request.

If you have any questions please call Myra Carpenter at (386) 329-0918.

Sincerely,

R. R. Vanniman For TDK
Operations Manager

Theodore D. Kennedy
Vice President

mjc

cc: T.D. Kennedy, W.M. Jernigan, S.D. Matchett, T. Wyles

Cost Table

Description	Cost
Materials	**($000)**
New 61-ft. long section, 10 cooler spouts, Brick retainer, Tire, Shipping	**$291.3**
Refractory, Castable	**$265.0**
Coolers	**$302.3**
Miscellaneous	**$51.4**
Labor	**$820**
Total	**$1,730**

APPENDIX A – LK SHELL RAI
PROJECT NO.: 1070005-030-AC/PSD-FL-345

1.0 ADDITIONAL IMPACT ANALYSIS FOR THE VICINITY OF THE GP PALATKA MILL

1.1 IMPACTS TO SOILS, VEGETATION, AND VISIBILITY IN THE VICINITY OF THE GP PALATKA MILL

1.1.1 PREDICTED AIR QUALITY IMPACTS

The results of the ambient air quality modeling for the proposed GP modification, in the vicinity of the plant, are presented in Table 1-1. The predicted maximum increase in pollutant concentrations due to the proposed project are presented for the annual, 24-hour, 8-hour, 3-hour, and 1-hour averaging times.

Table 1-1. Summary of Maximum Pollutant Concentrations Predicted for the Lime Kiln Project to Address Impacts to Soils and Vegetation in the GP Mill Vicinity

Pollutant and Averaging Time	Emission Rate [a] (g/s)	Concentration [b] ($\mu g/m^3$)	Receptor Location [c] x (m)	Receptor Location [c] y (m)	Time Period [d] YYMMDDHH
SO_2					
Annual	0.85	0.1	800	-600	--------
24-hour	0.85	1.5	500	-400	86082424
8-hour	0.85	3.8	500	-500	87071416
3-hour	0.85	5.9	500	-300	86060212
1-hour	0.85	9.6	500	-800	86062110
PM_{10}					
Annual	2.84	0.340	800	-600	--------
24-hour	2.84	4.97	500	-400	86082424
NO_2					
Annual	8.14	0.97	800	-600	--------
24-hour	8.14	14.2	500	-400	86082424
8-hour	8.14	36.0	500	-500	87071416
3-hour	8.14	56.9	500	-300	86060212
1-hour	8.14	91.7	500	-800	86062110
CO					
Annual	1.52	0.2	800	-600	--------
24-hour	1.52	2.7	500	-400	86082424
8-hour	1.52	6.8	500	-500	87071416

Table 1-1. Summary of Maximum Pollutant Concentrations Predicted for the Lime Kiln Project to Address Impacts to Soils and Vegetation in the GP Mill Vicinity

Pollutant and Averaging Time	Emission Rate [a] (g/s)	Concentration [b] ($\mu g/m^3$)	Receptor Location [c] x (m)	Receptor Location [c] y (m)	Time Period [d] YYMMDDHH
3-hour	1.52	10.7	500	-300	86060212
1-hour	1.52	17.2	500	-800	86062110
SAM					
Annual	0.043	0.005	800	-600	--------
24-hour	0.043	0.076	500	-400	86082424
8-hour	0.043	0.191	500	-500	87071416
3-hour	0.043	0.302	500	-300	86060212
1-hour	0.043	0.486	500	-800	86062110

[b] Based on the highest concentrations predicted from the generic modeling analysis (modeled using 10 g/s emissions)

[c] Relative to the old TRS Incinerator stack.

[d] YY = Year; MM = Month; DD = Day; HH = Hour ending.

1.1.2 IMPACTS TO SOILS

Air contaminants can affect soils through fumigation by gaseous forms, accumulation of compounds transformed from the gaseous state, or by the direct deposition of PM or PM to which certain contaminants are absorbed. According to the Putnam County Soil Survey (1990), the soils in the vicinity of the GP Palatka Mill are dominated by Terra Ceia muck, with Cassia fine sand and Pamona fine sand also present. The Terra Ceia muck, Cassia fine sand, and Pomona fine sand series are described in the Putnam County Soil Survey as follows:

Terra Ceia muck, frequently flooded – This soil is nearly level and very poorly drained, found on broad to narrow plains along the St. Johns River and its tributaries. Typically the upper part of this organic soil is dark reddish brown muck approximately 28 inches thick, while the lower portion to a depth of approximately 80 inches is black muck. This soil has a high water table at the surface except during extended dry periods. The available water capacity is very high, permeability is rapid, and natural fertility is moderate. Typical vegetation includes wetlands forested with sweetgum, red maple, cypress, bay, and cabbage palm. The soil reaction for Terra Ceia muck is classified as slightly acid within the top 28 inches, and mildly alkaline between 28 and 80 inches below the surface.

Pomona fine sand – This soil is nearly level and poorly drained, found in broad flatwoods areas. Typically this soil has a surface layer of black fine sand approximately 6 inches thick underlain by a subsurface layer of gray and light gray fine sand to a depth of 20 inches. In most years this soil has a high water table at a depth of less than 12 inches for 1 to 3 months. The available water capacity is very low, permeability is rapid, and natural fertility is low. Typical vegetation is pine flatwoods. The soil reaction for Pomona fine sand is classified as extremely acid within the top 6 inches, very strongly acidic between 6 to 10 inches, and strongly acidic between 10 and 20 inches below the surface.

Cassia fine sand – This soil is nearly level and somewhat poorly drained, found on small knolls within flatwoods and in low positions on uplands. Typically, this soil has a surface layer of gray fine sand approximately 4 inches thick, and a subsurface layer of light gray fine sand to a depth of 28 inches. In most years, this soil has a water table at a depth of 15 to 40 inches for about 6 months. The available water capacity is very low, permeability is rapid, and natural fertility is low. Natural vegetation includes pine flatwoods and oak. Cassia fine sand is classified as extremely acid within the top 4 inches, very strongly acidic between 4 to 9 inches, and strongly acidic between 9 and 24 inches below the surface.

The dominant soil in the vicinity of the GP facility, Terra Ceia muck, is a highly organic wetland soil and has an extremely high buffering capacity based on the cation exchange capacity, base saturation, and bulk density. Therefore, this soil would be relatively insensitive to atmospheric inputs. The maximum predicted concentrations for all pollutants in the vicinity of the site as a result of the proposed project are below the significant impact levels. Further, the maximum predicted SO_2 concentrations in the vicinity of the site are below the AAQS. Since the AAQS are designed to protect the public welfare, including effects on soils and vegetation, no detrimental effects on soils should occur in the vicinity of the GP Palatka Mill due to the proposed project.

1.1.3 IMPACTS TO VEGETATION

1.1.3.1 Vegetation Analysis

In general, the effects of air pollutants on vegetation occur primarily from SO_2, NO_2, O_3, and PM. Effects from minor air contaminants such as fluoride, chlorine, hydrogen chloride, ethylene, ammonia, hydrogen sulfide, CO, and pesticides have also been reported in the literature. The effects of air pollutants are dependent both on the concentration of the contaminant and the duration of the exposure. The term "injury," as opposed to damage, is commonly used to describe all plant responses to air contaminants and will be used in the context of this analysis. Air contaminants are thought to interact primarily with plant foliage which is considered to be the major pathway of exposure. For purposes of this analysis, it was assumed that 100 percent of each air contaminant of concern is accessible to the plants.

Injury to vegetation from exposure to various levels or air contaminants can be termed acute, physiological, or chronic. Acute injury occurs as a result of a short-term exposure to a high contaminant concentration and is typically manifested by visible injury symptoms ranging from chlorosis (discoloration) to necrosis (dead areas). Physiological or latent injury occurs as the result of a long-term exposure to contaminant concentrations below that which results in acute injury symptoms. Chronic injury results from repeated exposure to low concentrations over extended periods of time, often without any visible symptoms, but with some effect on the overall growth and productivity of the plant. In this assessment, 100 percent of the particular air pollutant in the ambient air was assumed to interact with the vegetation. This is a conservative approach.

Sulfur Dioxide

Sulfur is an essential plant nutrient usually taken up as sulfate ions by the roots from the soil solution. When SO_2 in the atmosphere enters the foliage through pores in the leaves, it reacts with water in the leaf interior to form sulfite ions. Sulfite ions are highly toxic. They interact with enzymes, compete with normal metabolites, and interfere with a variety of cellular functions (Horsman and Wellburn, 1976). However, within the leaf, sulfite is oxidized to sulfate ions, which can then be used by the plant as a nutrient. Small amounts of sulfite may be oxidized before they prove harmful.

SO_2 gas at elevated levels has long been known to cause injury to plants. Acute SO_2 injury usually develops within a few hours or days of exposure, and symptoms include marginal, flecked, and/or intercoastal necrotic areas that appear water-soaked and dullish green initially. This injury generally occurs to younger leaves. Chronic injury usually is evident by signs of chlorosis, bronzing, premature senescence, reduced growth, and possible tissue necrosis (EPA, 1982). Observed SO_2 effect levels for several plant species and plant sensitivity groupings are presented in Tables 1-2 and 1-3, respectively.

Table 1-2. SO_2 Effects Levels for Various Plant Species

Plant Species	Observed Effect Level ($\mu g/m^3$)	Exposure (Time)	Reference
Sensitive to tolerant	920 (20 percent displayed visible injury)	3 hours	McLaughlin and Lee, 1974
Lichens	200-400	6 hr/wk for 10 weeks	Hart *et al.*, 1988
Cypress, slash pine, live oak, mangrove	1,300	8 hours	Woltz and Howe, 1981
Jack pine seedlings	470-520	24 hours	Malhotra and Kahn, 1978
Black oak	1,310	Continuously for 1 week	Carlson, 1979

Table 1-3. Sensitivity Groupings of Vegetation Based on Visible Injury at Different SO_2 Exposures[a]

Sensitivity Grouping	SO_2 Concentration		Plants
	1-Hour	3-Hour	
Sensitive	1,310 - 2,620 $\mu g/m^3$ (0.5 - 1.0 ppm)	790 - 1,570 $\mu g/m^3$ (0.3 - 0.6 ppm)	Ragweeds, Legumes Blackberry , Southern pines Red and black oaks White ash Sumacs
Intermediate	2,620 - 5,240 $\mu g/m^3$ (1.0 - 2.0 ppm)	1,570 - 2,100 $\mu g/m^3$ (0.6 - 0.8 ppm)	Maples, Locust Sweetgum, Cherry Elms, Tuliptree Many crop and garden species.
Resistant	>5,240 $\mu g/m^3$ (>2.0 ppm)	>2,100 $\mu g/m^3$ (>0.8 ppm)	White oaks, Potato Upland cotton, Corn Dogwood, Peach

[a] Based on observations over a 20-year period of visible injury occurring on over 120 species growing in the vicinities of coal-fired power plants in the southeastern United States.

Source: EPA, 1982a.

Many studies have been conducted to determine the effects of high-concentration, short-term SO_2 exposure on natural community vegetation. Sensitive plants include ragweed, legumes, blackberry, southern pine, and red and black oak. These species are injured by exposure to 3-hour average SO_2 concentrations of 790 to 1,570 $\mu g/m^3$. Intermediate plants include locust and sweetgum. These species are injured by exposure to 3-hour average SO_2 concentrations of 1,570 to 2,100 $\mu g/m^3$. Resistant species (injured at concentrations above 2,100 $\mu g/m^3$ for 3 hours) include white oak and dogwood (EPA, 1982).

A study of native Floridian species (Woltz and Howe, 1981) demonstrated that cypress, slash pine, live oak, and mangrove exposed to 1,300 $\mu g/m^3$ SO_2 for 8 hours were not visibly damaged. This finding supports the levels cited by other researchers on the effects of SO_2 on vegetation. A corroborative study (McLaughlin and Lee, 1974) demonstrated that approximately 20 percent of a cross-section of plants ranging from sensitive to tolerant was visibly injured at 3-hour average SO_2 concentrations of 920 $\mu g/m^3$.

Jack pine seedlings exposed to SO_2 concentrations of 470 to 520 $\mu g/m^3$ for 24 hours demonstrated inhibition of foliar lipid synthesis; however, this inhibition was reversible (Malhotra and Kahn, 1978). Black oak exposed to 1,310 $\mu g/m^3$ SO_2 for 24 hours a day for 1 week demonstrated a 48 percent reduction in photosynthesis (Carlson, 1979).

Two lichen species indigenous to Florida exhibited signs of SO_2 damage in the form of decreased biomass gain and photosynthetic rate as well as membrane leakage when exposed to concentrations of 200 to 400 $\mu g/m^3$ for 6 hours/week for 10 weeks (Hart et al., 1988).

The predicted maximum 3- and 24-hour average SO_2 concentrations due to the proposed project are 31.4 and 10.1 $\Phi g/m^3$, respectively, which are well below the injury threshold of sensitive species of vegetation.

Nitrogen Dioxide

A review of the literature indicates great variability in NO_2 dose-response relationship in vegetation. Acute NO_2 injury symptoms are manifested as water-soaked lesions, which first appear on the upper surface, followed by rapid tissue collapse. Low-concentration, long-term exposures as frequently encountered in polluted atmospheres often do not induce the lesions associated with acute exposures but may still result in some growth suppression. Citrus trees exposed to 470 $\Phi g/m^3$ of NO_2 for

290 days showed injury (Thompson *et al.*, 1970). Sphagnum exposed for 18 months at an average concentration of 11.7 Φg/m^3 showed reduced growth (Press *et al.*, 1986)

The maximum increase in ground-level 1-hour and annual average NO_2 concentrations predicted to occur in the vicinity of the plant during the operation of the proposed project are 3.3 and 0.10 Φg/m^3, respectively (see Table 1-1). These maximum predicted concentrations are well below reported effects levels.

Carbon Monoxide

Concentrations of CO even in polluted atmospheres are not detrimental to vegetation (EPA, 1976). CO has not been found to produce detrimental effects on plants at concentrations below 100 ppm (114,500 Φg/m^3) for exposures from 1 to 3 weeks (EPA, 1976). The predicted maximum concentrations shown in Table 1-1 are well below levels reported to cause detrimental effects.

Particulate Matter (PM_{10})

Although information pertaining to the effects of particulate matter on plants is scarce, some threshold concentrations are available. Mandoli and Dubey (1998) exposed ten species of native Indian plants to levels of particulate matter ranging from 210 to 366 μg/m^3 for an 8-hour averaging period. Damage in the form of a higher leaf area/dry weight ratio was observed at varying degrees for most plants tested. Concentrations of particulate matter lower than 163 μg/m^3 did not appear to be injurious to the tested plants. The maximum predicted 24-hour and annual average PM_{10} concentrations due to the proposed project of 4.86 and 0.50 μg/m^3, respectively, are well below the injury thresholds reported in the literature.

VOC Emissions and Impacts on Ozone

It is difficult to predict what effect the proposed project's emissions of VOC will have on ambient O_3 concentrations from either a local or regional scale. VOC and NO_x emissions are precursors to the formation of O_3. O_3 is formed down-wind from emission sources when VOC, and NO_x emissions from the facility react in the presence of sunlight. Background (without man-made sources) ambient concentrations of O_3 are normally in the range of 20 to 39 μg/m^3 (0.01 to 0.02 ppm) (Heath, 1975).

O_3 can cause various damage to broad-leaved plants including: tissue collapse, interveinal necrosis and markings on the upper surface of leaves known as stippling (pigmented yellow, light tan, red brown, dark brown, red, or purple), flecking (silver or bleached straw white), mottling, chlorosis or bronzing, and bleaching. O_3 can also stunt plant growth and bud formation. On certain plants such as citrus, grape, and tobacco, it is common for leaves to wither and drop early. A literature review suggests that exposure for 4 hours at levels of 0.04 to 11.0 ppm of O_3 will result in plant injury for sensitive plants. The extent of the injury depends on the plant species and environmental conditions prior to and during exposure.

Given that the O_3 measurements in the region comply with the AAQS (see Sections 4.0 and 7.2.5) and the increase in VOC emissions for the project represents less than a 1-percent change in regional VOC emissions, no adverse effects on vegetation due to the project's VOC emissions are expected.

Sulfuric Acid Mist

Acidic precipitation or acid rain is coupled to SO_2 emissions mainly formed during the burning of fossil fuels. This pollutant is oxidized in the atmosphere and dissolves in rain forming SAM, which falls as acidic precipitation (Ravera, 1989). Although concentration data are not available, SAM has been reported to yield necrotic spotting on the upper surfaces of leaves (Middleton *et al.*, 1950).

No significant adverse effects on vegetation are expected from the project's emissions because SO_2 concentrations, which lead directly to the formation of SAM concentrations, are predicted to be well below levels that have been documented as negatively affecting vegetation.

1.1.4 IMPACTS UPON VISIBILITY

All air emission sources affected by the proposed modification are existing sources. No increase in permitted emissions is requested, although actual emissions are predicted to increase. All these sources are in compliance with opacity regulations and should remain in compliance after the modification. As a result, no adverse impacts upon visibility are expected.

1.2 <u>IMPACTS DUE TO ASSOCIATED DIRECT GROWTH</u>

1.2.1 INTRODUCTION

Rule 62-212.400(3)(h)(5), F.A.C., states that an application must include information relating to the air quality impacts of, and the nature and extent of all general, residential, commercial, industrial and other growth which has occurred since August 7, 1977, in the area the facility or modification would affect. This growth analysis considers air quality impacts due to emissions resulting from the industrial, commercial, and residential growth associated with the proposed expansion at the GP Palatka Mill. This information is consistent with the EPA Guidance related to this requirement in the *Draft New Source Review Workshop Manual* (EPA, 1990).

In general, there has been minimal growth in the GP Palatka Mill area since 1977. Putnam County is surrounded by Marion County to the south and west, Alachua County to the west, Clay County to the north, St. John's County to the north and east, Flagler County to the east, and Volusia County to the south. Putnam County encompasses an 827-square mile area including 733-square miles of land area.

The Lime Kiln Shell is being repaired to replace coolers and mounting brackets. As the kiln has developed cracks form thermal stress, the proposed project will improve the reliability of the kiln and maintain a safe operation. Additional growth as a direct result of the proposed modification is not expected.

The project will not require any additional operational workers once the project is completed.

There are also expected to be no air quality impacts due to associated commercial and industrial growth given the location of the existing GP Palatka Mill. The existing commercial and industrial infrastructure should be adequate to provide any support services that the project might require and would not increase with the operation of the project.

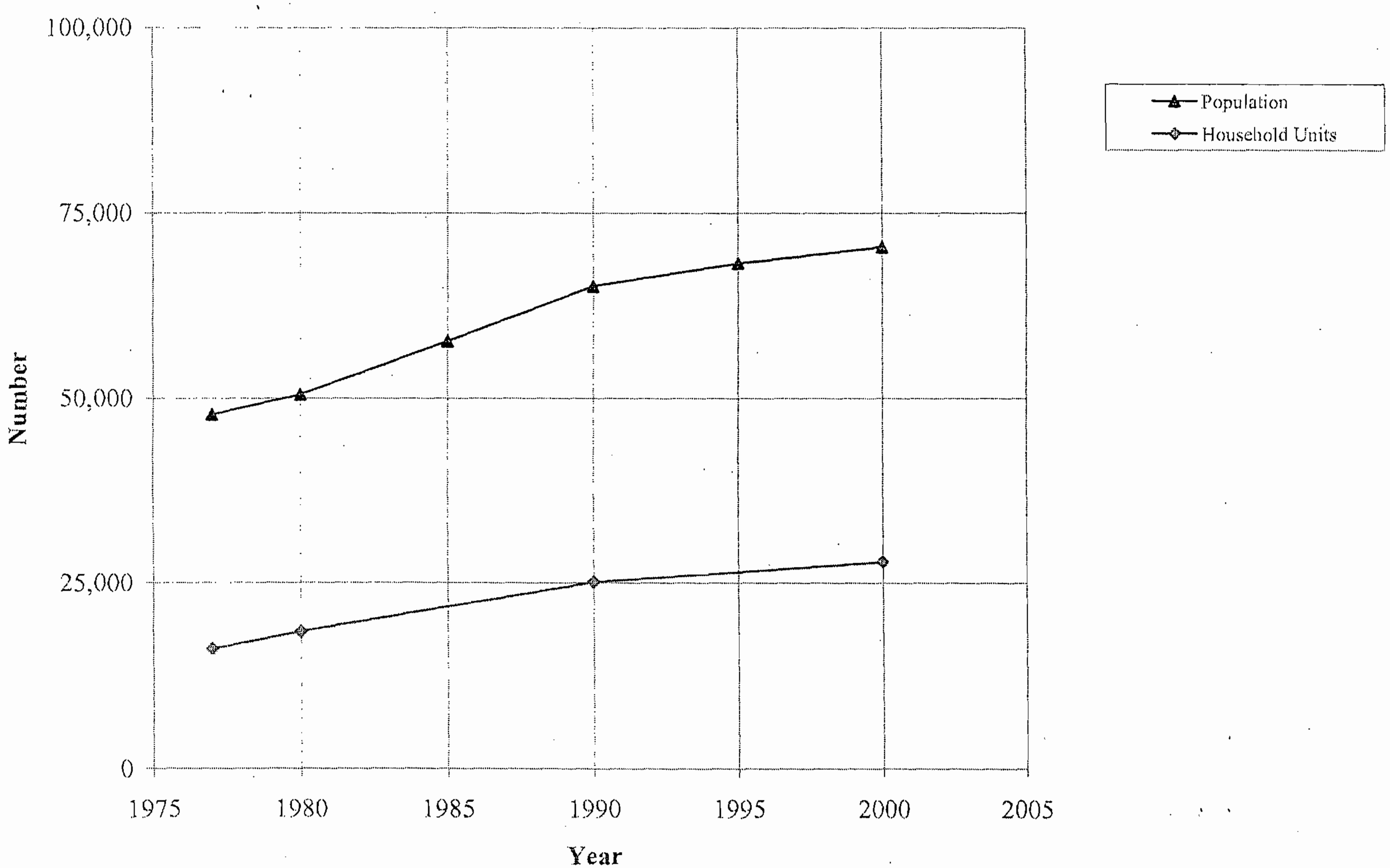
The following discussion presents general trends in residential, commercial, industrial, and other growth that has occurred since August 7, 1977, in Putnam County. As such, the information presents information available from a variety of sources (*i.e.*, Florida Statistical Abstract, FDEP, etc.) that characterize Putnam County as a whole.

1.2.2 RESIDENTIAL GROWTH

1.2.2.1 Population and Household Trends

As an indicator of residential growth, the trend in the population and number of household units in Putnam County since 1977 are shown in Figure 1-1. The county experienced a 47-percent increase in population for the years 1977 through 2000. During this period, there was an increase in population of about 22,600. Similarly, the number of households in the county increased by about 12,000, or 73 percent, since 1977.

Figure 1-1. Population and Household Unit Trends in Putnam County



9a.

1.2.2.2 Growth Associated with the Operation of the Project

Because there will be no additional workers needed to operate the project, there will be no residential growth due to the project.

1.2.3 COMMERCIAL GROWTH

1.2.3.1 Retail Trade and Wholesale Trade

As an indicator of commercial growth in Putnam County, the trends in the number of commercial facilities and employees involved in retail and wholesale trade are presented in Figure 1-2. The retail trade sector comprises establishments engaged in retailing merchandise. The retailing process is the final step in the distribution of merchandise. Retailers are, therefore, organized to sell merchandise in small quantities to the general public. The wholesale trade sector comprises establishments engaged in wholesaling merchandise. This sector includes merchant wholesalers who buy and own the goods they sell; manufacturers' sales branches and offices that sell products manufactured domestically by their own company; and agents and brokers who collect a commission or fee for arranging the sale of merchandise owned by others.

Since 1977, retail trade has increased by about 14 establishments and 2,000 employees or 6 and 118 percent, respectively. For the same period, wholesale trade has increased by 28 establishments and 346 employees, or 82 and 126 percent, respectively.

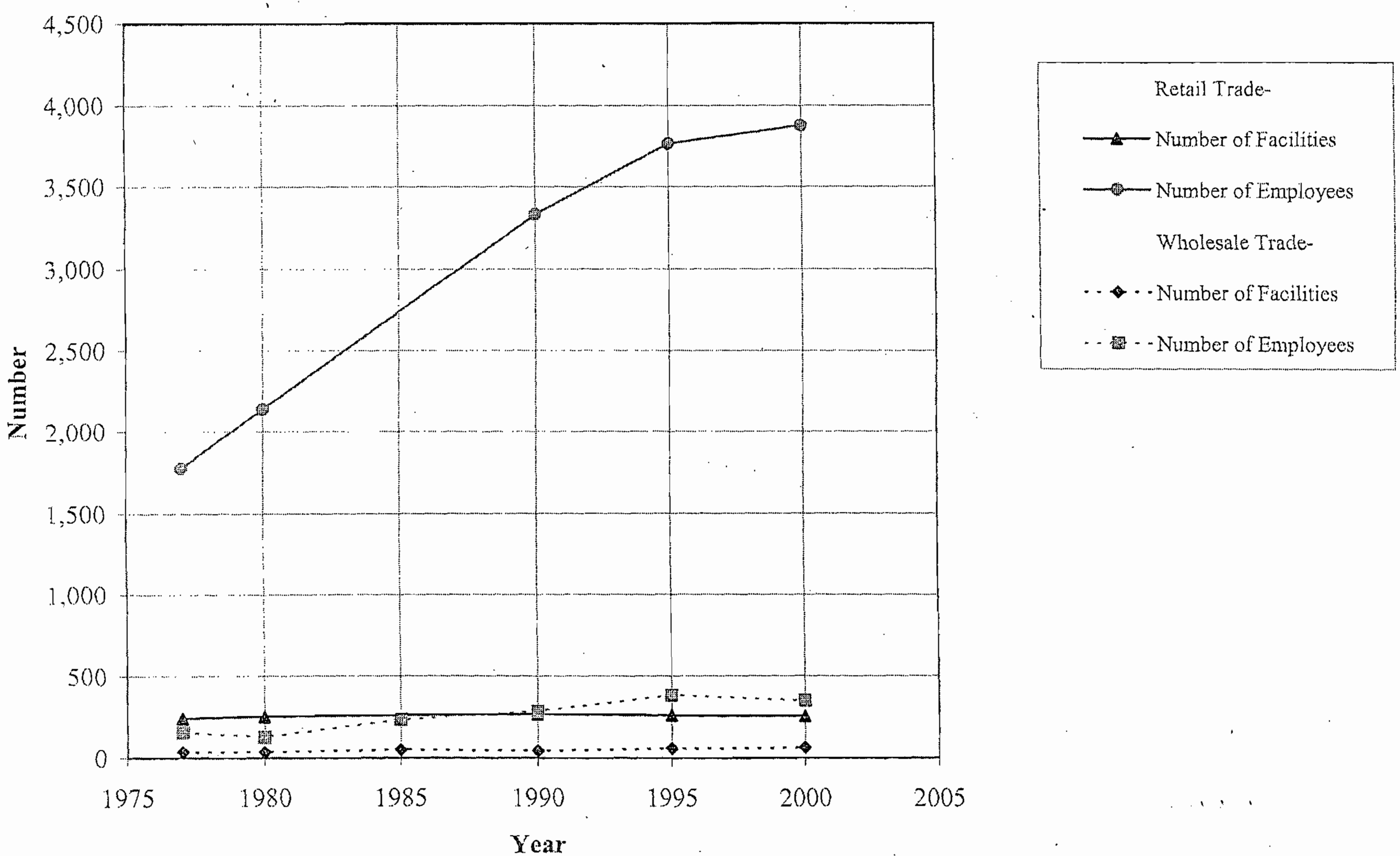
1.2.3.2 Labor Force

The trend in the labor force in Putnam County since 1977 is shown in Figure 1-3. The greatest number of persons employed in Putnam County has been in the manufacturing, government, and retail trade sectors. Between 1977 and 1999, approximately 5,000 persons were added to the available work force, for an increase of 34 percent.

1.2.3.3 Tourism

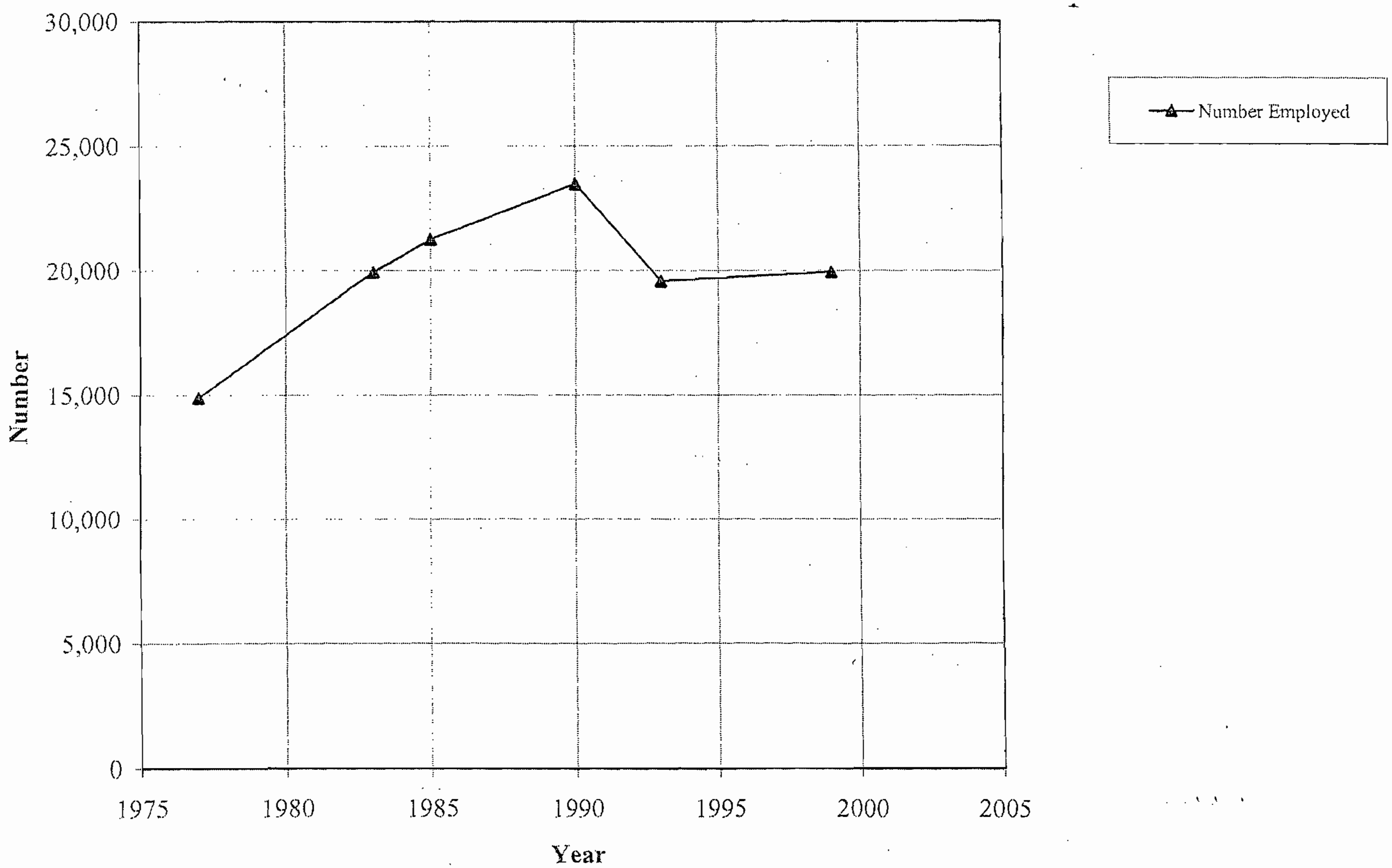
Another indicator of commercial growth in Putnam County is the tourism industry. As an indicator of tourism growth in the county, the trend in the number of hotels and motels and the number of units at the hotels and motels are presented in Figure 1-4.

Figure 1-2. Retail and Wholesale Trade Trends in Putnam County



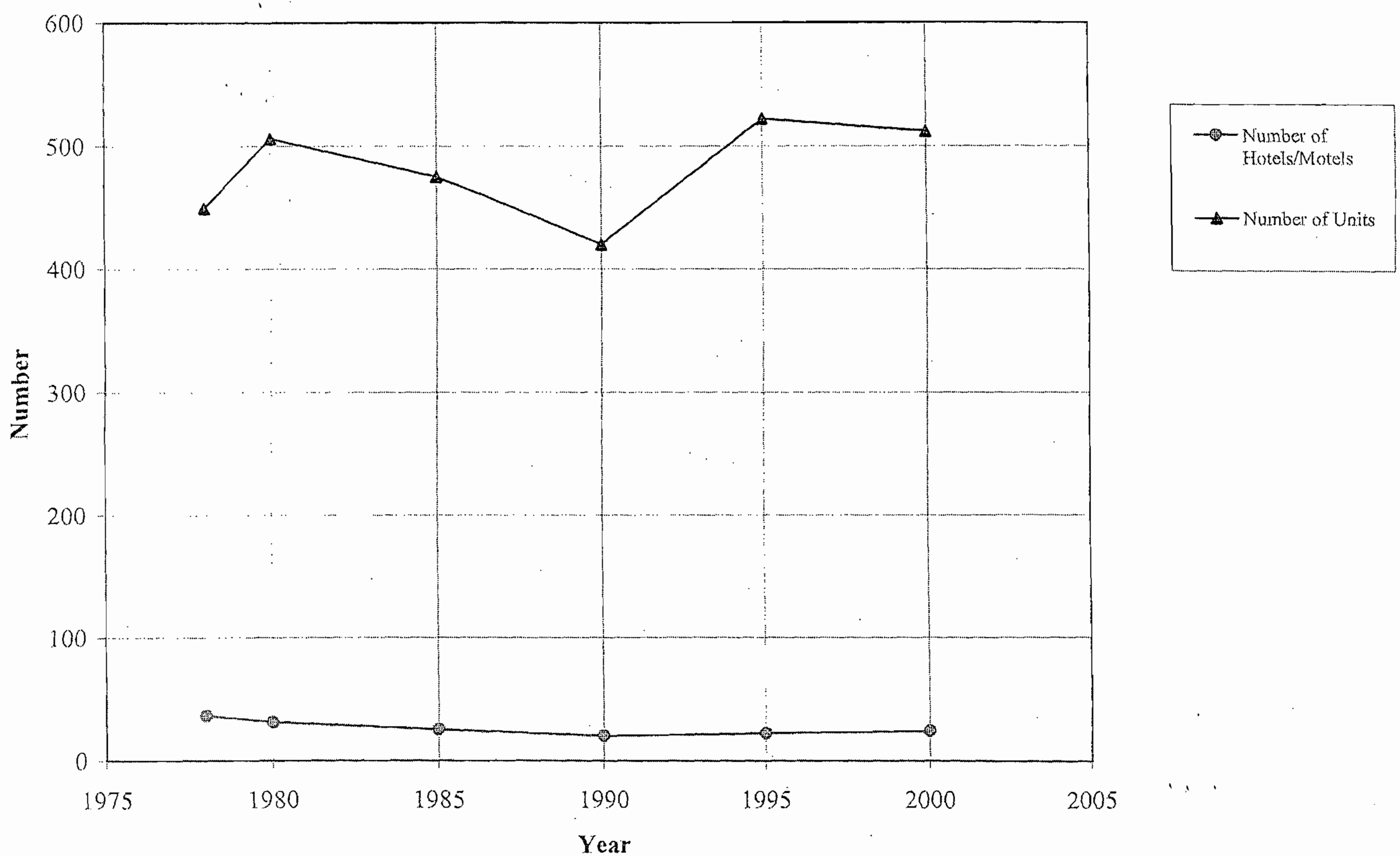
(16a) 11

Figure 1-3. Labor Force Trend in Putnam County



12 (106)

Figure 1-4. Hotel and Motel Trend in Putnam County



13
(10c)

This industry comprises establishments primarily engaged in marketing and promoting communities and facilities to businesses and leisure travelers through a range of activities, such as assisting organizations in locating meeting and convention sites; providing travel information on area attractions, lodging accommodations, restaurants; providing maps; and organizing group tours of local historical, recreational, and cultural attractions.

Between 1978 and 2000, there was a decrease of 12 percent in the number of hotels and motels, and an increase of 14 percent in the number of units at those establishments in the county.

1.2.3.4 Transportation

As an indicator of transportation growth, the trend in the number of vehicle miles traveled (VMT) by motor vehicles on major roadways in Putnam County is presented in Figure 1-5. The county's main roadways are U.S. Route 17 and SR 100.

Between 1977 and 2001, there was an increase of about 1,560,000 VMT, or 113 percent, on major roadways in the county.

1.2.3.5 Growth Associated with the Operation of the Project

The existing commercial and transportation infrastructure should be adequate to provide any support services that might be required during construction and operation of the project. The workforce needed to operate the proposed project represents a small fraction of the labor force present in the immediate and surrounding areas.

1.2.4 INDUSTRIAL GROWTH

1.2.4.1 Manufacturing and Agricultural Industries

As an indicator of industrial growth, the trend in the number of employees in the manufacturing industry in Putnam County since 1977 is shown in Figure 1-6. As shown, the manufacturing industry experienced a slight decrease in employees from 1977 through 2000.

As another indicator of industrial growth, the trend in the number of employees reported in the agricultural industry in Putnam County since 1977 is also shown in Figure 1-6. As shown, the agricultural industry experienced an increase of about 400 employees from 1977 through 2000.

Figure 1-5. Vehicle Miles Traveled (VMT) Estimates for Motor Vehicles for Putnam County

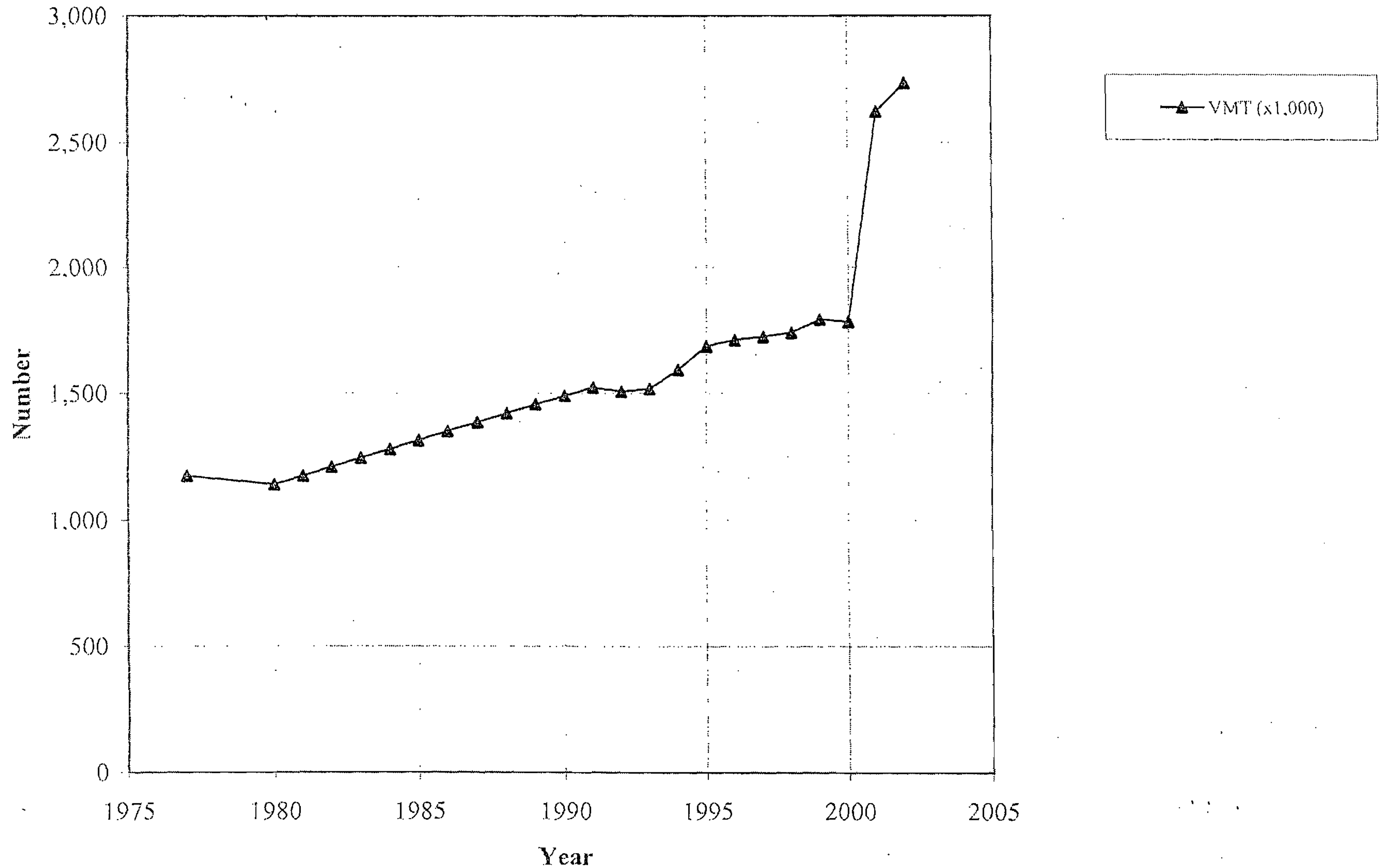
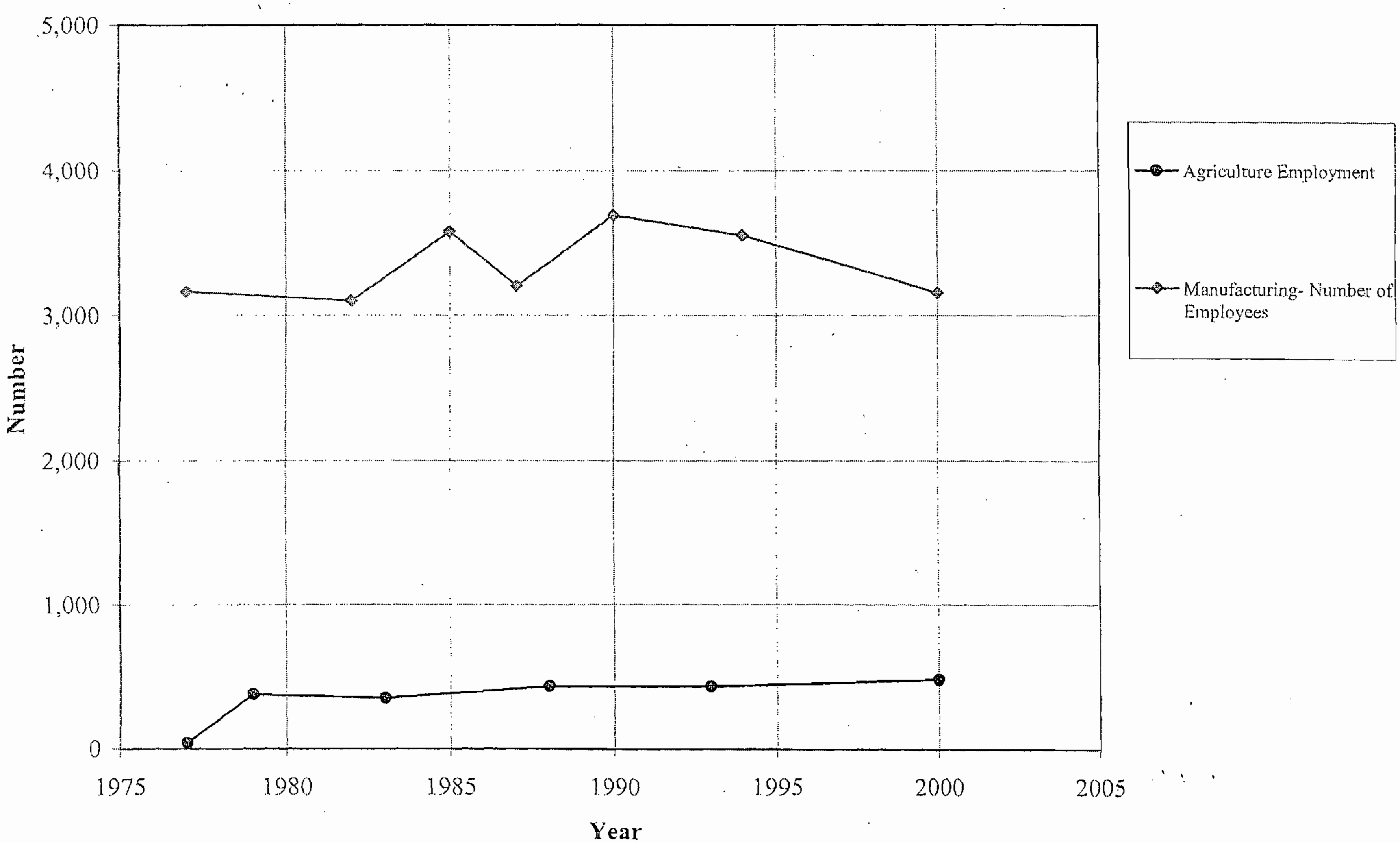


Figure 1-6. Manufacturing and Agriculture Trends in Putnam County



16.

1.2.4.2 Utilities

Existing power plants in Putnam County include the following:

- Florida Power & Light's Putnam Plant;
- Seminole Electric Cooperative, Inc.'s Seminole Power Plant; and
- Georgia-Pacific Corporation's Palatka Operations.

Together, these power plants have an electrical nameplate generating capacity of over 1,800 megawatts (MW).

As an indicator of electrical utility growth, the electrical nameplate generating capacity in Putnam County since 1977 is shown in Figure 1-7. As shown, the electrical nameplate generating capacity has increased by 1,585 MW, or 521 percent since 1977.

1.2.4.3 Growth Associated with the Operation of the Project

Since the PSD baseline date of August 7, 1977, there has been only one major facility built within a 35-km radius of the GP Palatka Mill site. This was the Seminole Electric Power Plant. There are a limited number of facilities located throughout the 35-km radius area surrounding the site. Based on the locations of nearby air emission sources, there has not been a concentration of industrial and commercial growth in the vicinity of the GP Palatka Mill site.

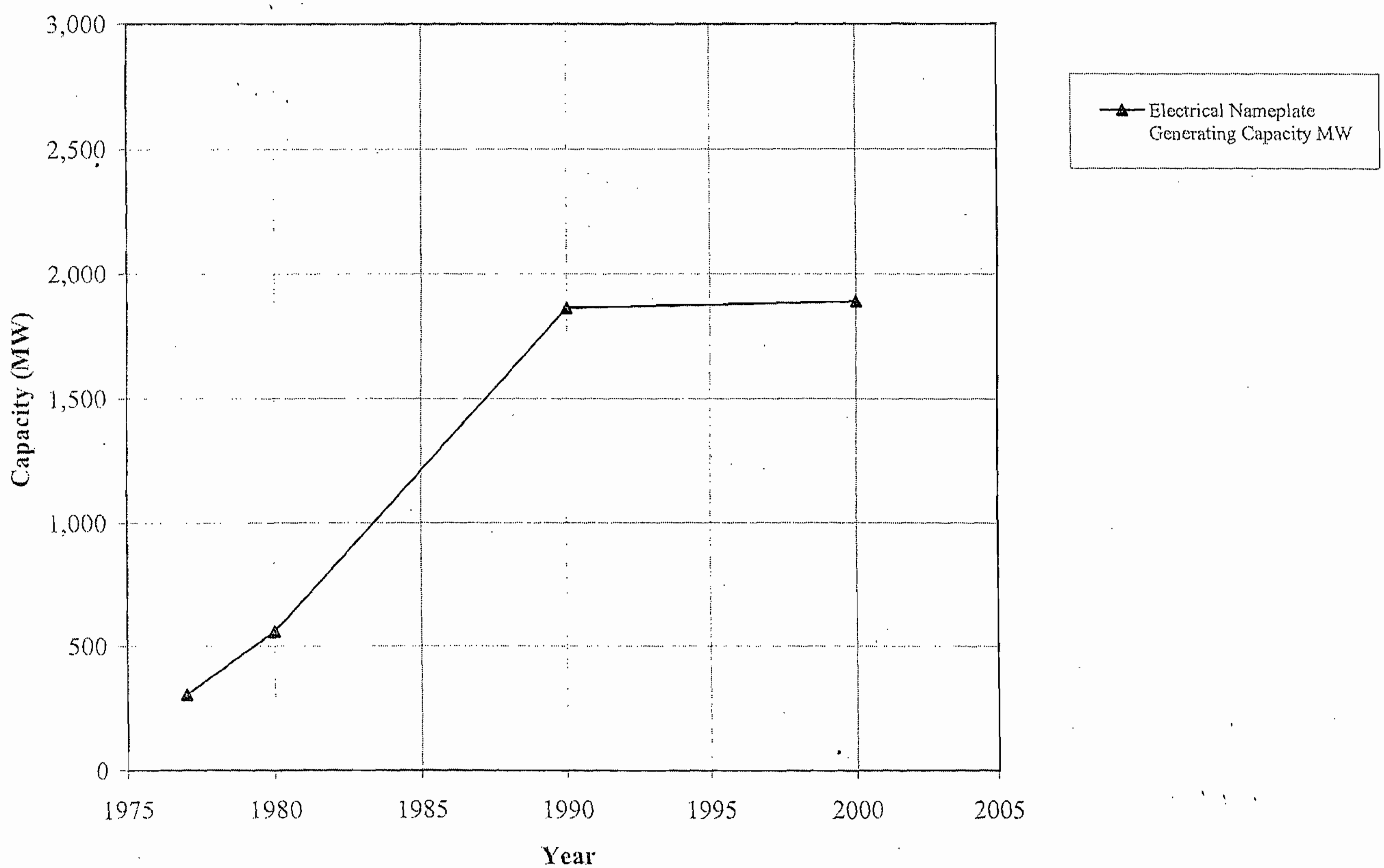
1.2.5 AIR QUALITY DISCUSSION

1.2.5.1 Air Emissions of Major Facilities

Based on actual emissions reported for 1999 (latest year of available data) by EPA on its AIRSdata website, total emissions from stationary sources in the county are as follows:

SO_2:	43,000 TPY
PM_{10}:	1,700 TPY
NO_x:	28,900 TPY
CO:	4,640 TPY
VOC:	800 TPY

Figure 1-7. Electrical Power Generation Capacity in Putnam County



1.2.5.2 Air Emissions from Mobile Sources

The trends in the air emissions of CO, VOC, and NO_x from mobile sources in Putnam County are presented in Figure 1-8. Between 1977 and 2002, there were significant decreases in CO and VOC emissions, and there was only a slight increase in NO_x emissions during that same time period. The decrease in CO and VOC emissions were about 41 and 5 tons per day, respectively, which represent decreases from 1977 emissions of 48 and 42 percent, respectively. The increase in NO_x emissions was less than one half of a ton per day, which represents an increase of about 5 percent since 1977.

1.2.5.3 Air Monitoring Data

Since 1977, Putnam County has been classified as attainment for all criteria pollutants. Air quality monitoring data have been collected in Putnam County, primarily in the central portion of the county in and around the city of Palatka. For this evaluation, the air quality monitoring data collected at the monitoring station nearest to the GP Palatka Mill were used to assess air quality trends since 1977. Air quality monitoring data were based on the following monitoring stations:

- SO_2 and PM_{10} concentrations – Palatka,
- NO_2 concentrations – Palatka and Jacksonville,
- CO concentrations – Jacksonville, and
- O_3 concentrations – Gainesville and Jacksonville.

Data collected from these stations are considered to be generally representative of air quality in Putnam County. Because the monitoring stations in Jacksonville (NO_2, CO, and O_3) are located in more urbanized areas than the GP Palatka Mill, the reported concentrations for those stations are likely to be higher than that experienced at the site.

The air monitoring data indicate that the maximum air quality concentrations currently measured in the region comply with and are well below the applicable AAQS. These monitoring stations are located in areas where the highest concentrations of a measured pollutant are expected due to the combined effect of emissions from stationary and mobile sources, as well as the effects of meteorology. Therefore, the ambient concentrations in areas not monitored should have pollutant concentrations less than the monitored concentrations from these sites.

In addition, since 1988, PM in the form of PM_{10} has been collected at the air monitoring stations due to the promulgation of the PM_{10} AAQS. Prior to 1989, the AAQS for PM was in the form of total suspended particulates (TSP) concentrations, and this form was measured at the stations.

1.2.5.4 SO$_2$ Concentrations

The trends in the 3-hour, 24-hour, and annual average SO_2 concentrations measured in Putnam County since 1977 are presented in Figures 1-9 through 1-11, respectively. As shown in these figures, measured SO_2 concentrations have been and continue to be well below the AAQS.

1.2.5.5 PM$_{10}$/TSP Concentrations

The trends in the 24-hour and annual average PM_{10} and TSP concentrations since 1977 are presented in Figures 1-12 and 1-13, respectively. TSP concentrations are presented through 1988 since the AAQS was based on TSP concentrations through that year. In 1988, the TSP AAQS was revoked and the PM standard was revised to PM_{10}.

As shown in these figures, measured TSP concentrations were generally below the TSP AAQS. Since 1988 when PM_{10} concentrations have been measured, the PM_{10} concentrations have been and continue to be below the AAQS.

1.2.5.6 NO$_2$ Concentrations

The trends in the annual average NO_2 concentrations measured at the nearest monitors to the GP Palatka Mill are presented in Figure 1-14. As shown in this figure, measured NO_2 concentrations have been well below the AAQS.

1.2.5.7 CO Concentrations

The trends in the 1-hour and 8-hour average CO concentrations measured since 1977 in Jacksonville are presented in Figures 1-15 and 1-16, respectively. As shown in these figures, measured CO concentrations have been well below the AAQS for the past several years.

1.2.5.8 Ozone Concentrations

The trends in the 1-hour average O_3 concentrations since 1977 are presented in Figure 1-17. The trends in the 8-hour average O_3 concentrations since 1995 are presented in Figure 1-18. As shown in these figures, even in the more urbanized areas of Jacksonville and Gainesville, the measured O_3 concentrations have primarily been below the 1-hour average AAQS and the new 8-hour average AAQS.

1.2.5.9 Air Quality Associated with the Operation of the Project

The air quality data measured in the region of the GP Palatka Mill indicate that the maximum air quality concentrations are well below and comply with the AAQS. Also, based on the trends presented of these maximum concentrations, the air quality has generally improved in the region since the baseline date of August 7, 1977. Because the maximum concentrations for the proposed modification at the Mill are predicted to be below the significant impact levels except for SO_2, air quality concentrations in the region are expected to remain below and comply with the AAQS when the project becomes operational. For SO_2, the accompanying modeling report demonstrates compliance with AAQS.

Figure 1-8. Mobile Source Emissions (Tons per Day) of CO, VOC, and NO_x in Putnam County

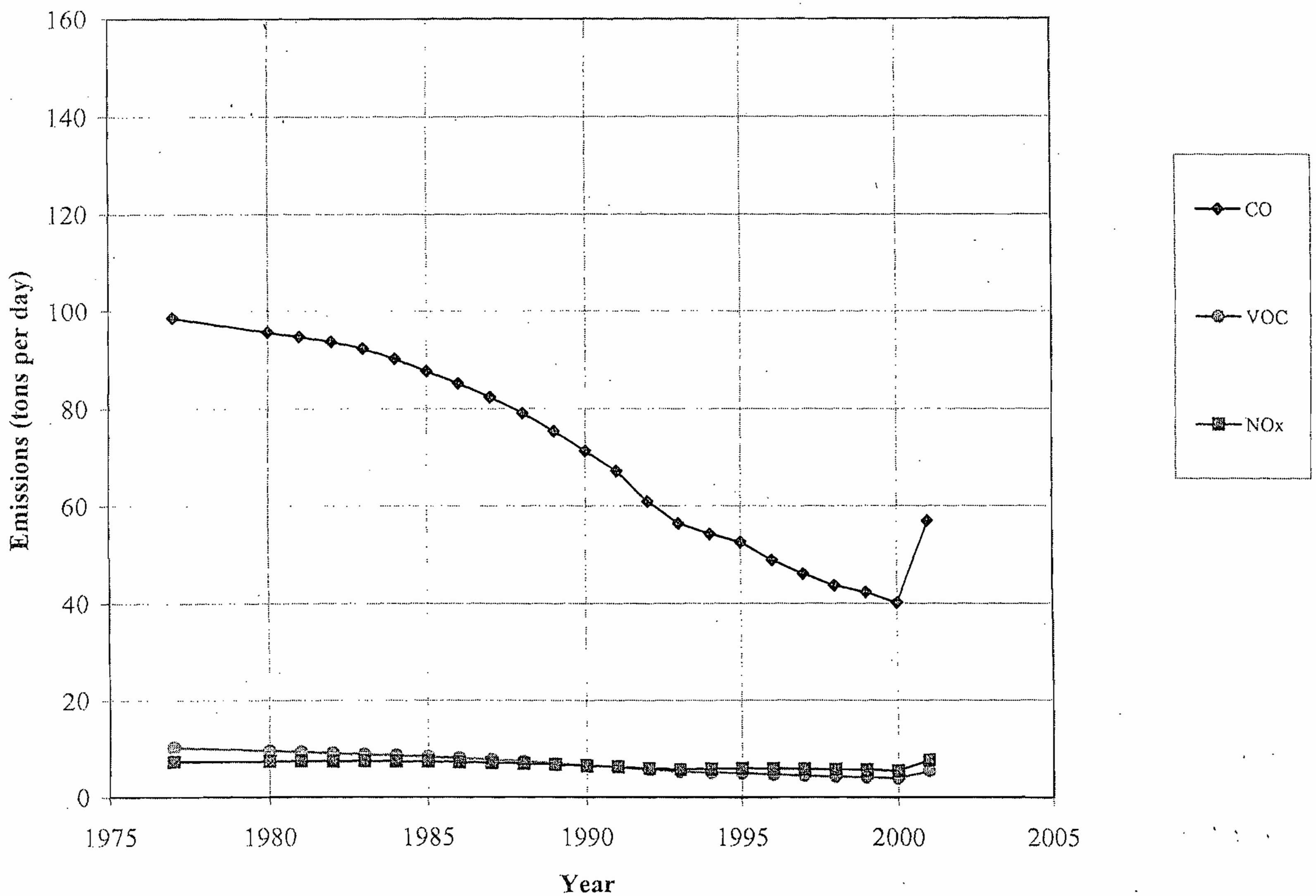


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Figure 1-9. Measured 3-Hour Average Sulfur Dioxide Concentrations (2nd Highest Values) from 1984 to 2002- Putnam County

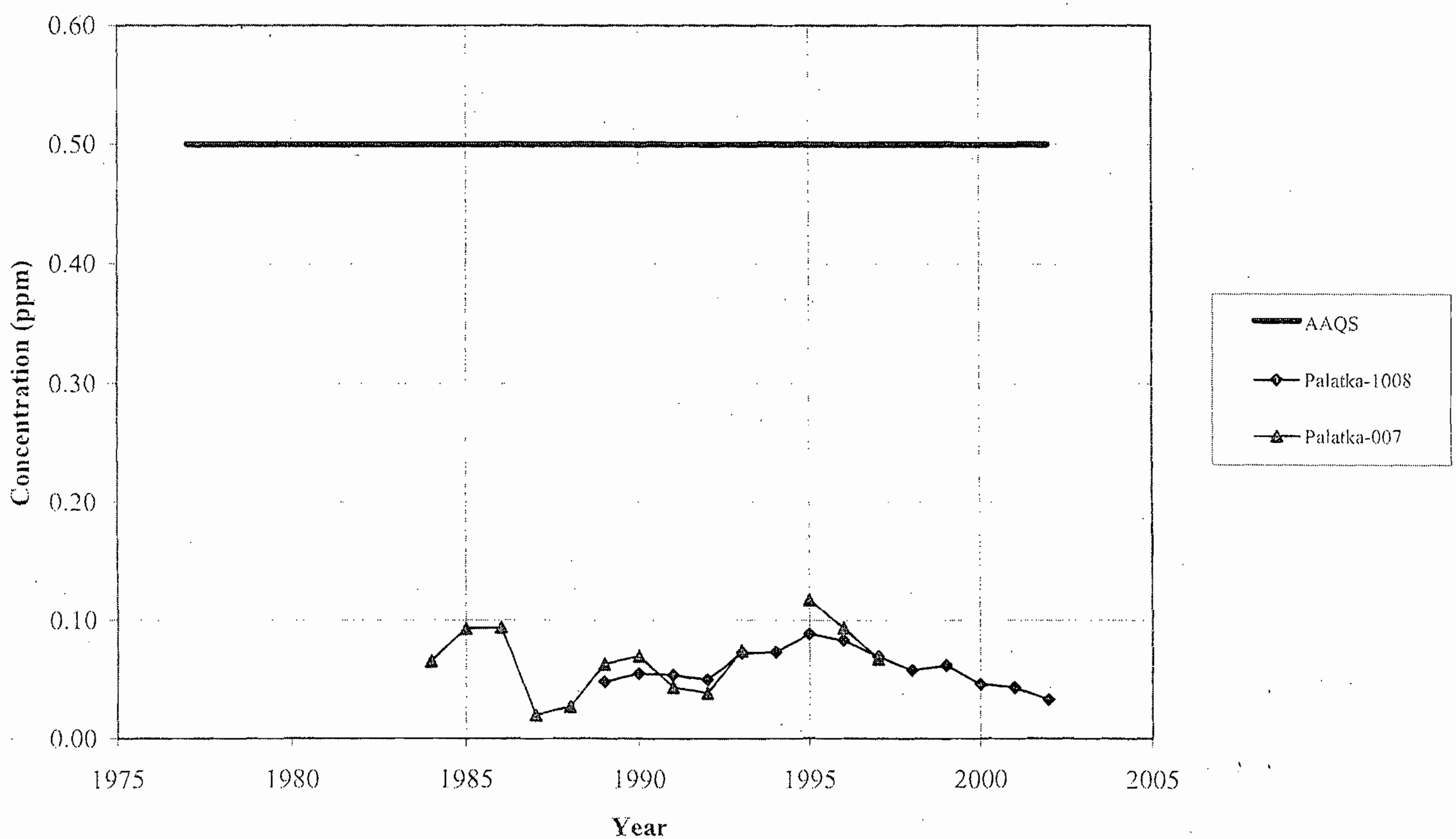

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Figure 1-10. Measured 24-Hour Average Sulfur Dioxide Concentrations (2nd Highest Values) from 1984 to 2002- PutnamCounty

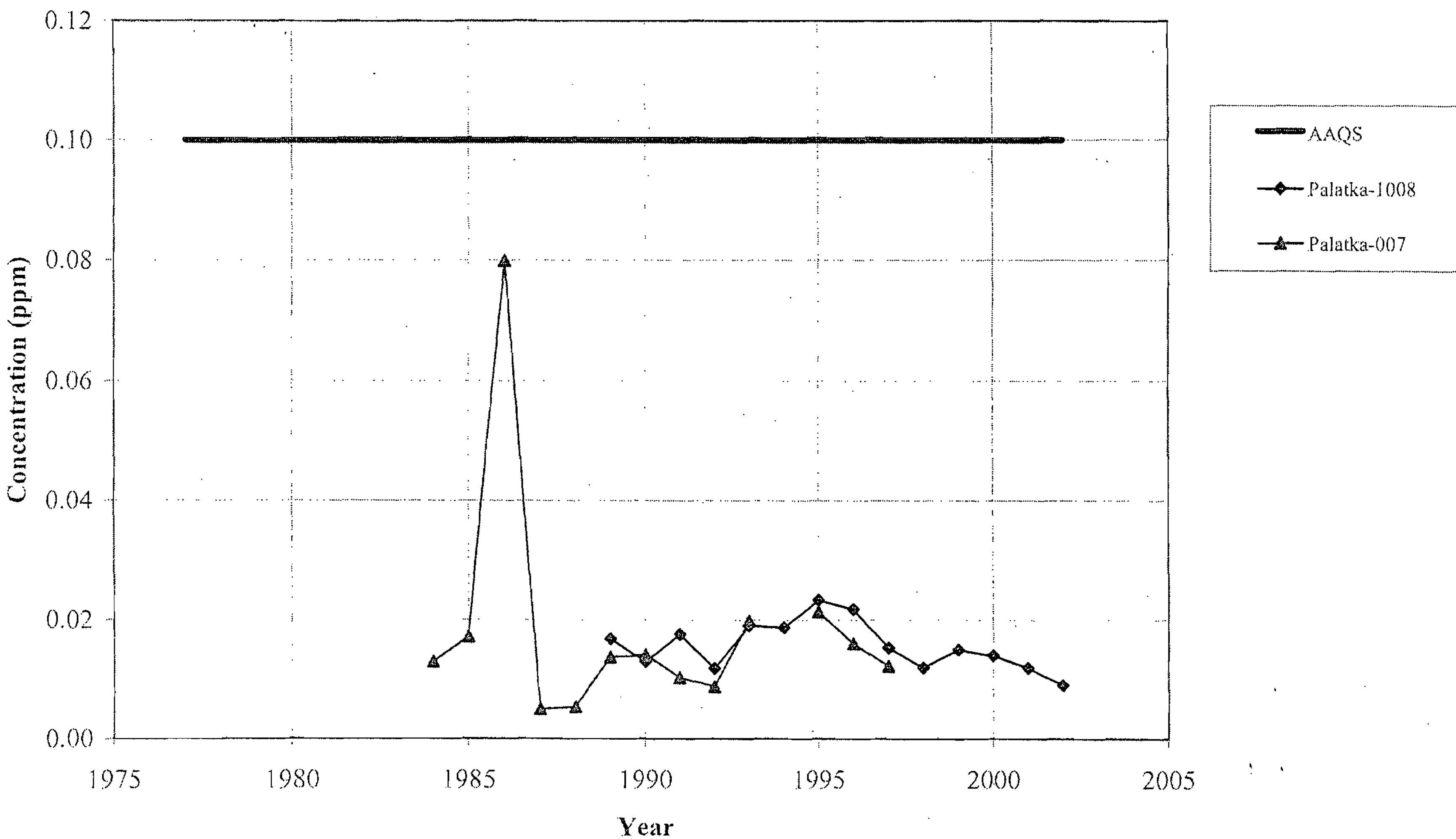

Figure 1-11. Measured Annual Average Sulfur Dioxide Concentrations from 1984 to 2002- Putnam County

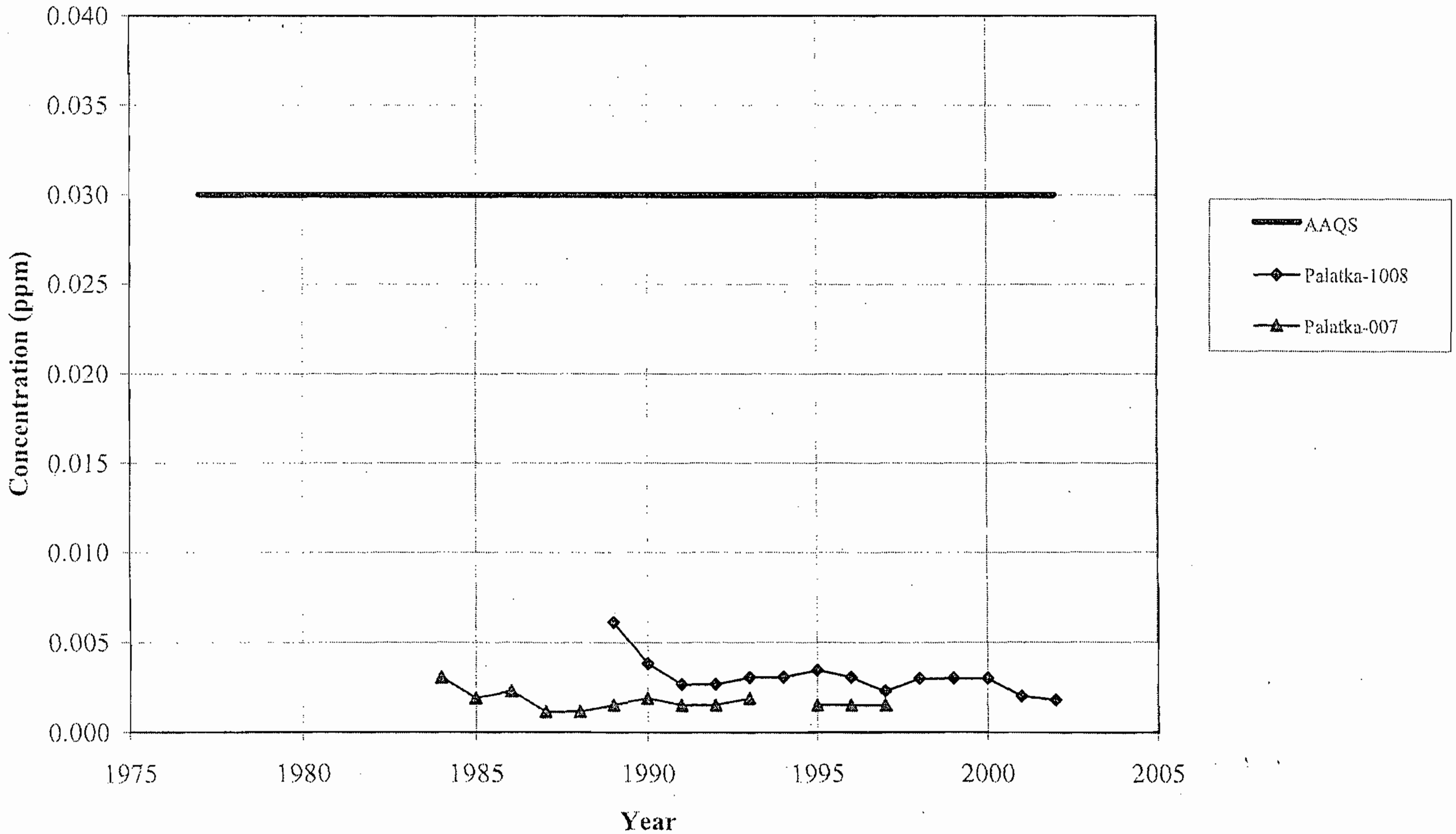

Figure 1-12. Measured 24-Hour Average PM_{10} Concentrations (1988 to 2002) and Total Suspended Particulate Concentrations (1981 to 1987) (2nd Highest Values) - Putnam County

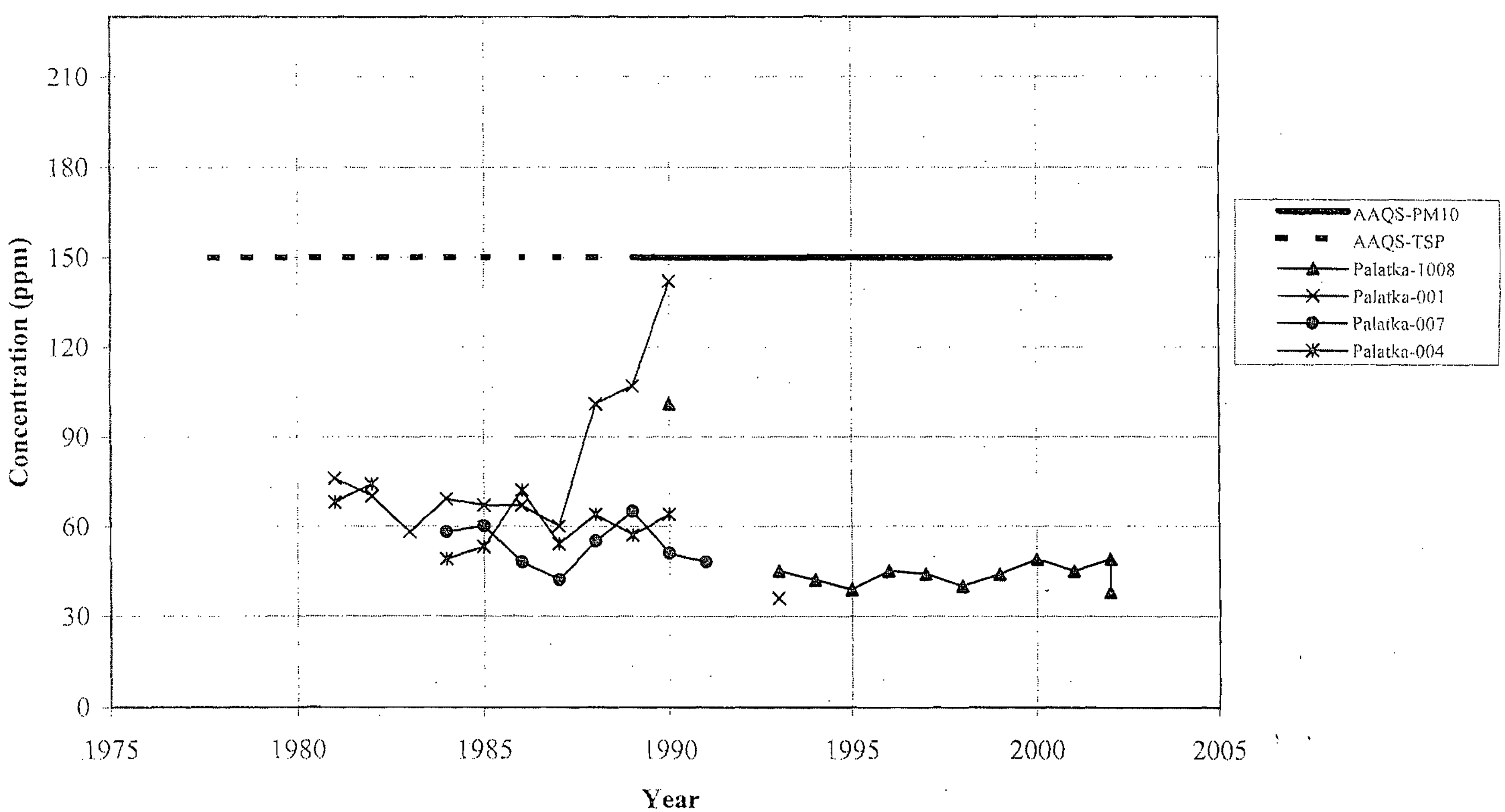

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Figure 1-13. Measured Annual Average PM_{10} Concentrations (1988 to 2002) and Total Suspended Particulate Concentrations (1981 to 1987) - Putnam County

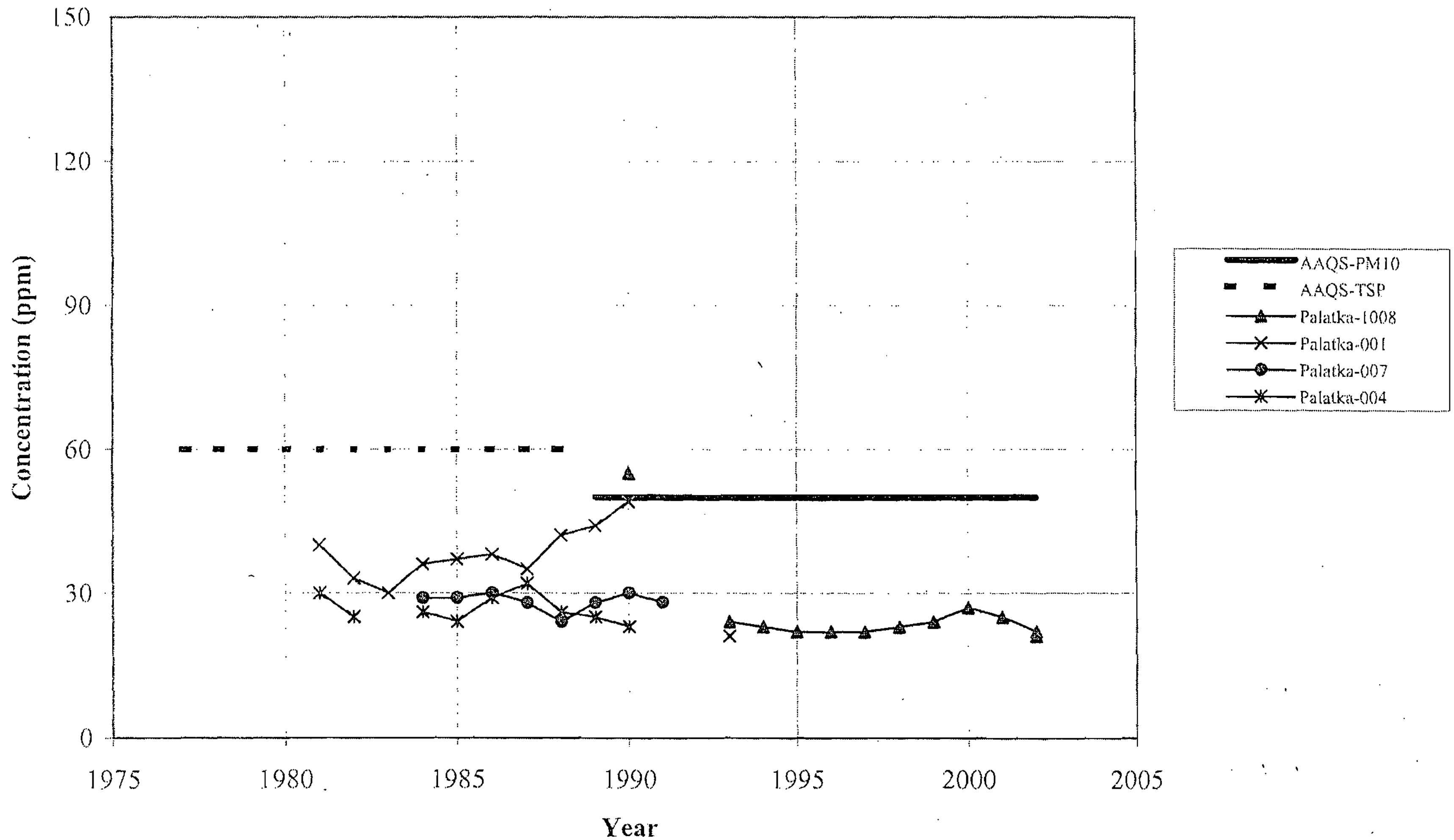

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Figure 1-14. Measured Annual Average Nitrogen Dioxide Concentrations from 1981 to 2002 - Putnam County

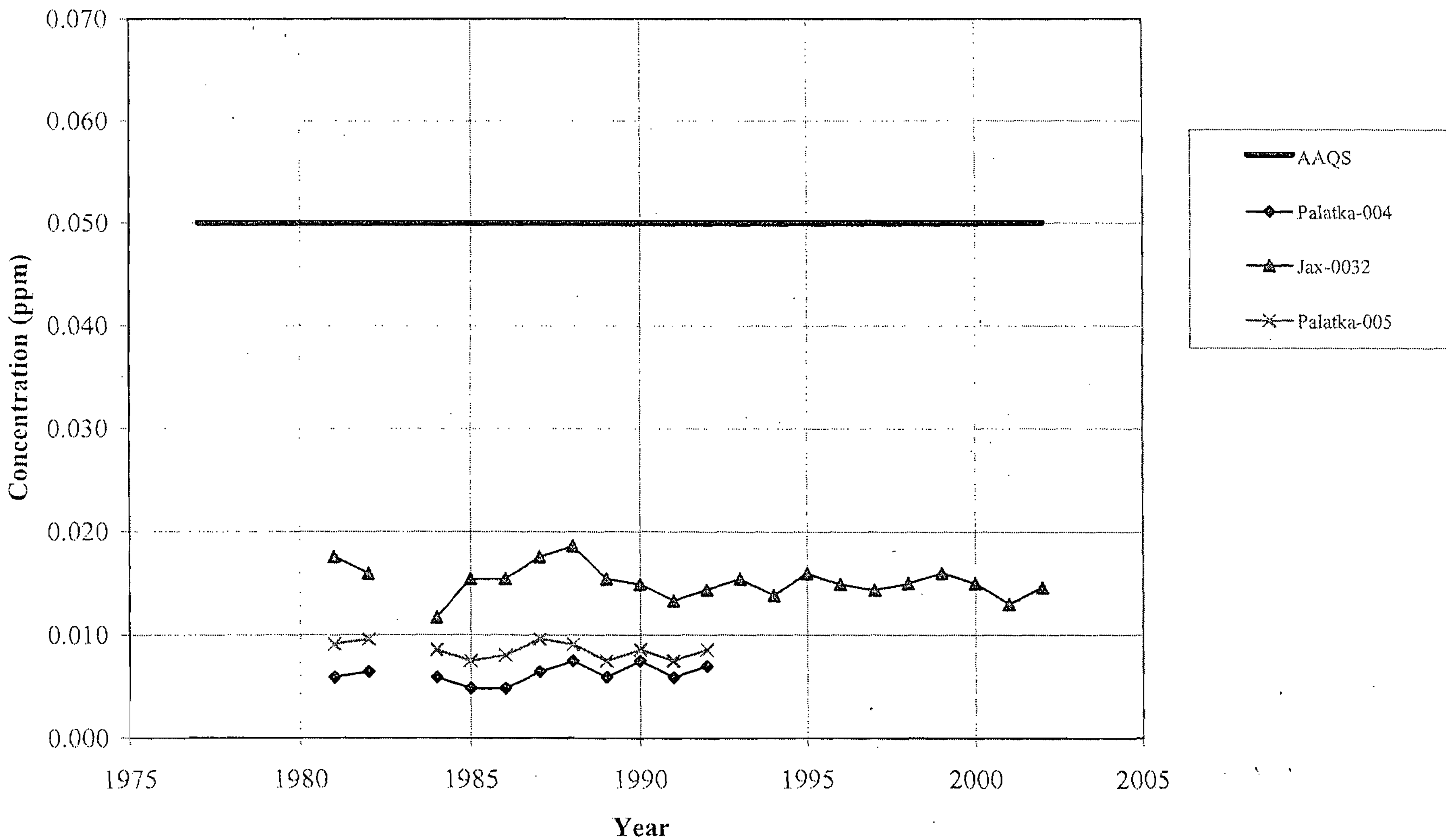

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Figure 1-15. Measured 1-Hour Average Carbon Monoxide Concentrations (2nd Highest Values) from 1981 to 2002 - Putnam County

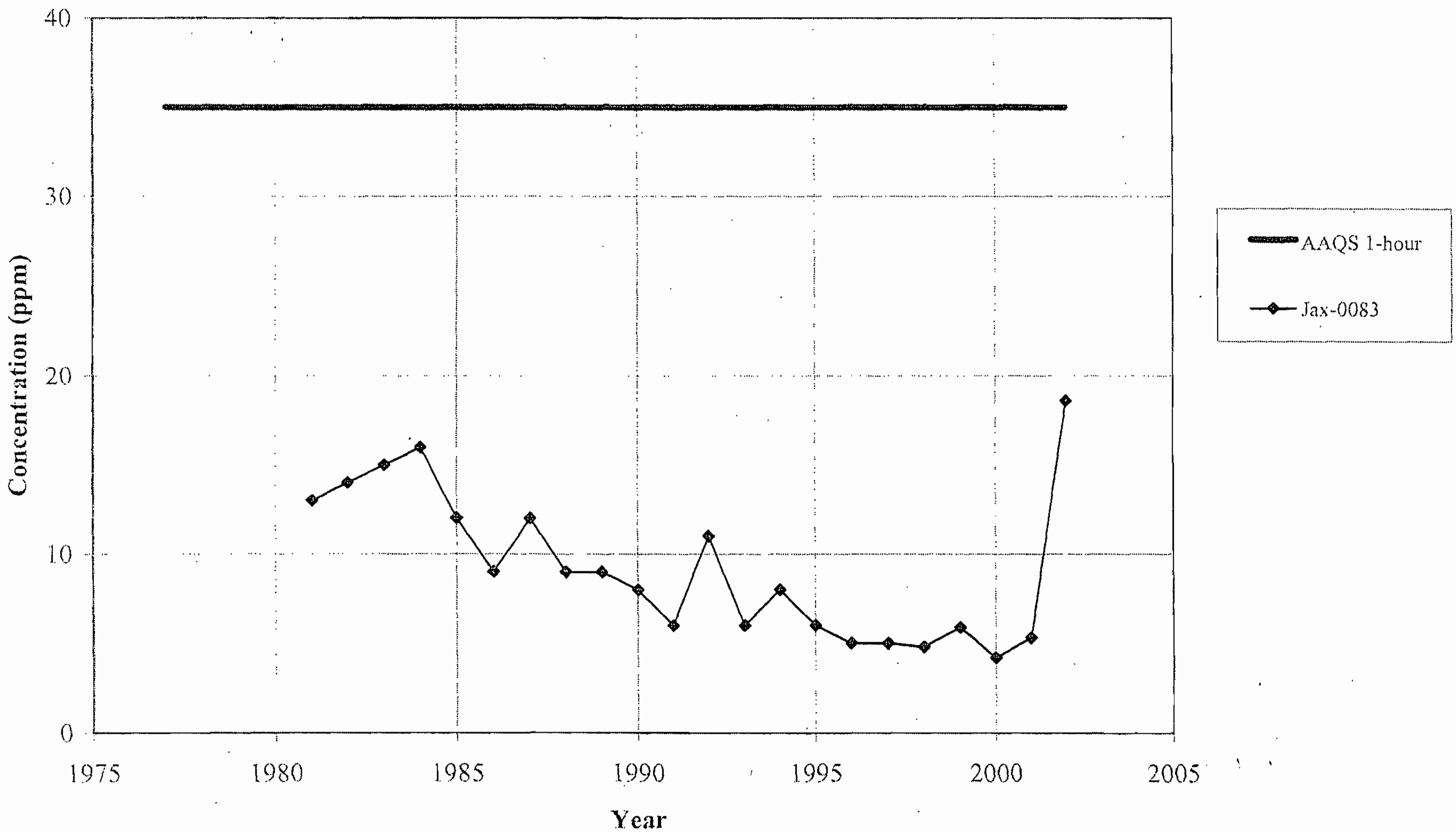

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Figure 1-16. Measured 8-Hour Average Carbon Monoxide Concentrations (2nd Highest Values) from 1981 to 2002 - Putnam County

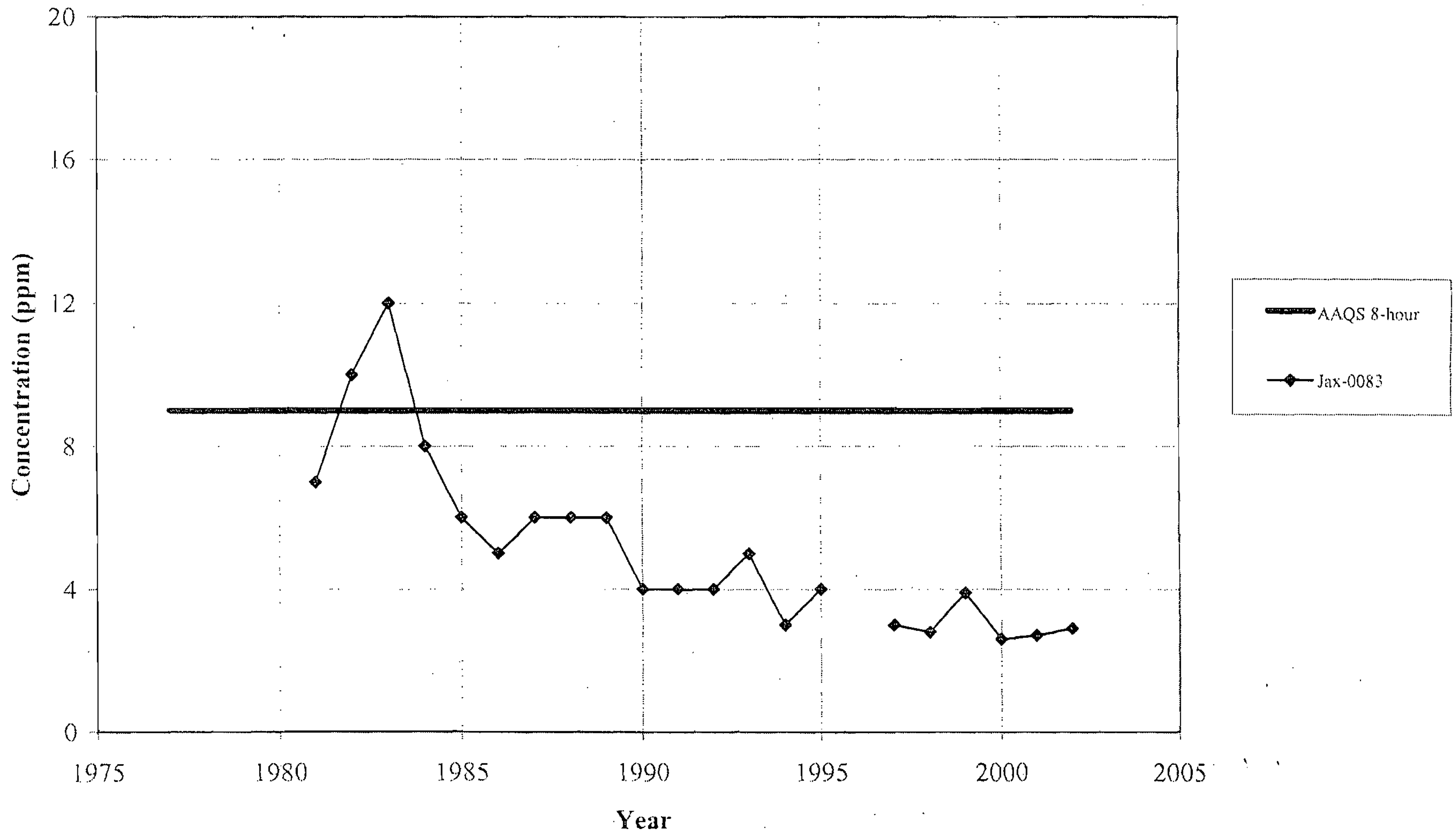

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Figure 1-17. Measured 1-Hour Average Ozone Concentrations (2nd Highest Values) from 1981 to 2002 - Putnam County

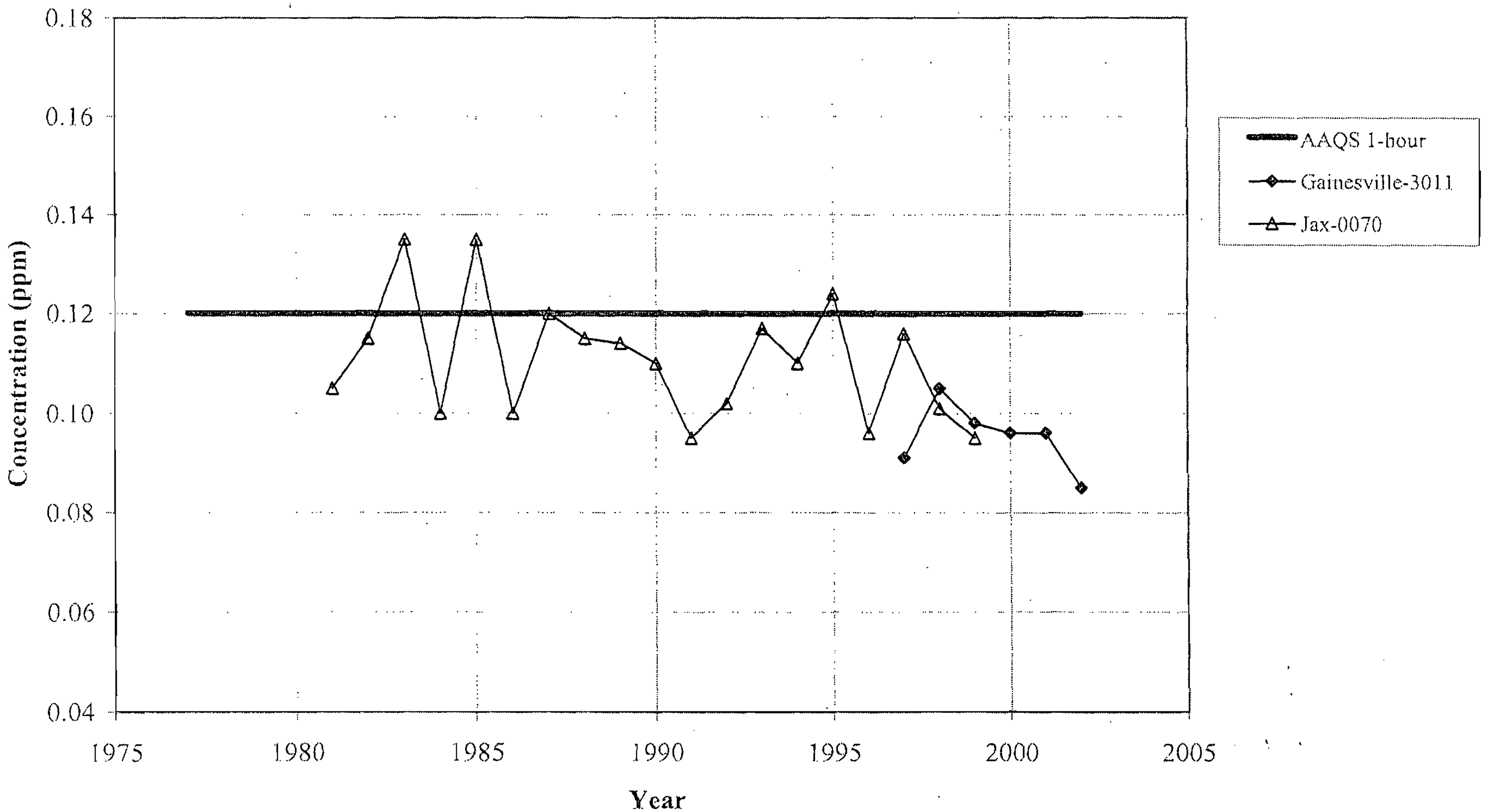

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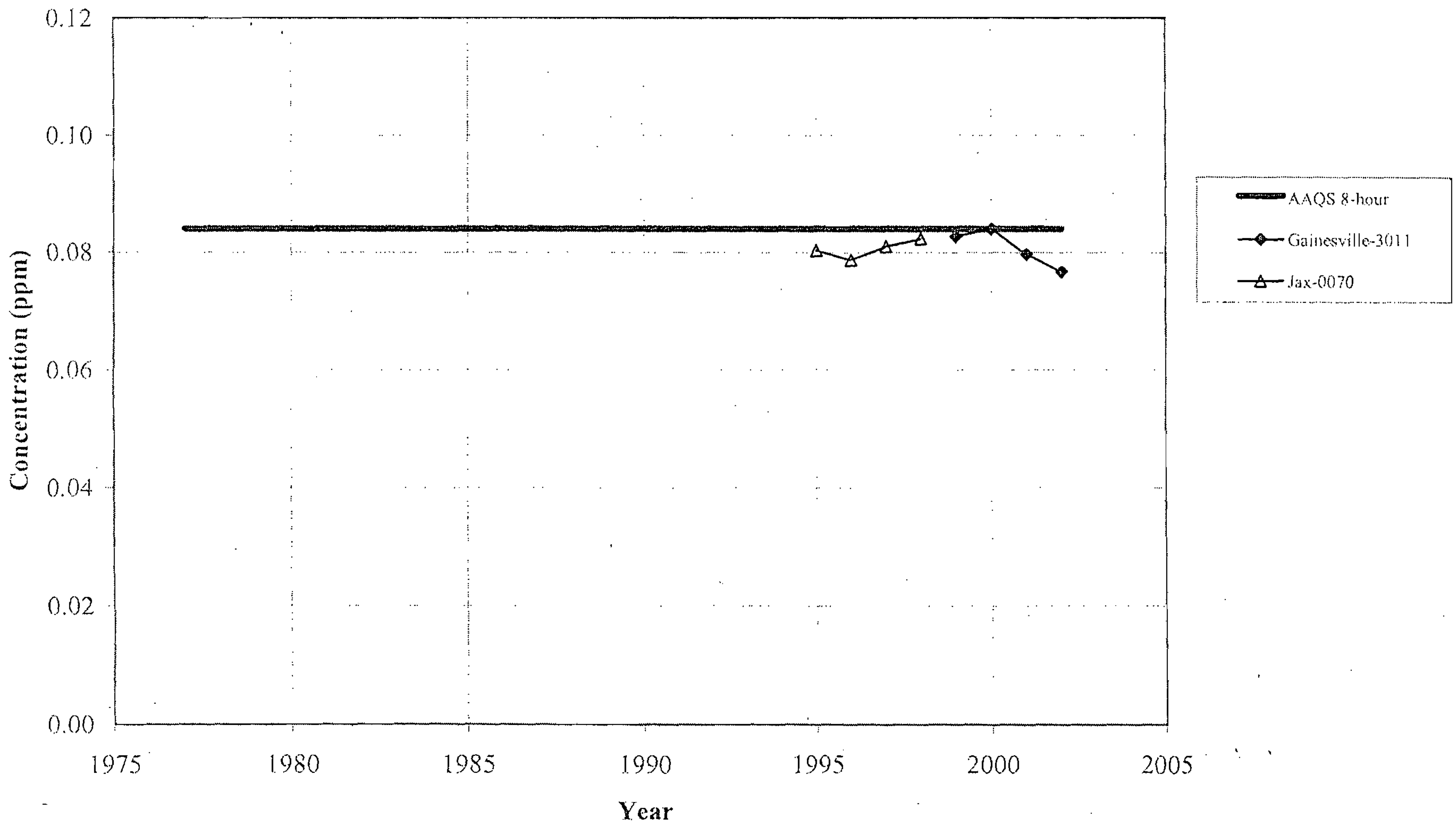
Figure 1-18. Measured 8-Hour Average Ozone Concentrations (3-Year Average of the 4th Highest Values) from 1995 to 2002 - Putnam County



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2.0 ADDITIONAL IMPACT ANALYSIS ON THE OFKEFENOKEE CLASS I AREA

2.1 INTRODUCTION

GP has proposed changes to its pulp mill located in Putnam County, near Palatka, Florida. The changes were described in Section 2.0. The facility is subject to the PSD new source review requirements for SO_2, NO_x, PM, PM_{10}, CO, VOC, and SAM. The Class I area analysis addresses these pollutants.

The analysis addresses the potential impacts on vegetation, soils, and wildlife of the Okefenokee NWA Class I area due to the proposed project. In addition, potential impacts upon visibility resulting from the proposed project are assessed. The Okefenokee NWA Class I area is located approximately 108 km north of the GP Palatka Mill. Although the Wolf Island NWA Class I area is located approximately 186 km north of the GP Palatka Mill, only the Okefenokee NWA Class I area was evaluated since it is much closer to the Mill than Wolf Island, and both have similar AQRVs.

The analysis demonstrates that the increase in impacts due to the proposed project is extremely low. Regardless of the existing conditions in the vicinity of the Class I area, the proposed project will not cause any significant adverse effects due to the predicted low impacts upon that area.

2.2 SOILS, VEGETATION, AND AQRV ANALYSIS METHODOLOGY

This analysis uses the maximum air quality impacts predicted to occur in the Class I area due to the proposed increase in emissions. These impacts are summarized in Attachment C of the PSD permit application.

The analysis involved predicting worst-case maximum short- and long-term concentrations of pollutants in the Class I area and comparing the maximum predicted concentrations to lowest observed effect levels for AQRVs or analogous organisms. In conducting the assessment, several assumptions were made as to how pollutants interact with the different matrices, *i.e.*, vegetation, soils, wildlife, and aquatic environment.

A screening approach was used to evaluate potential effects by comparison of the maximum predicted ambient concentrations with effect threshold limits for the pollutants of concern, for both vegetation and wildlife, as reported in the scientific literature. A literature search was conducted which specifically addressed the effects of air contaminants on plant species reported to occur in the vicinity of the plant and the Class I area. It is recognized that effects threshold information is not available for all species found in the Okefenokee NWA, although studies have been performed on other similar species that may be used as models.

2.3 IDENTIFICATION OF AQRVS AND METHODOLOGY

An AQRV analysis was conducted to assess the potential risk to AQRVs of the Okefenokee NWA due to the proposed GP project. The U.S. Department of the Interior in 1978 administratively defined AQRVs to be:

> *All those values possessed by an area except those that are not affected by changes in air quality and include all those assets of an area whose vitality, significance, or integrity is dependent in some way upon the air environment. These values include visibility and those scenic, cultural, biological, and recreational resources of an area that are affected by air quality.*
>
> *Important attributes of an area are those values or assets that make an area significant as a national monument, preserve, or primitive area. They are the assets that are to be preserved if the area is to achieve the purposes for which it was set aside (Federal Register 1978).*

Except for visibility, AQRVs were not specifically defined. However, odor, soil, flora, fauna, cultural resources, geological features, water, and climate generally have been identified by land managers as AQRVs. Since specific AQRVs have not been identified for the Okefenokee NWA, this AQRV analysis evaluates the effects of air quality on general vegetation types and wildlife found in the Class I area.

Vegetation type AQRVs and their representative species types have been defined as:

- Freshwater Marsh - sawgrass, pickerelweed, and sand cordgrass
- Marsh Islands - cabbage palm and eastern red cedar
- Estuarine Habitat - black needlerush, salt marsh cordgrass, and wax myrtle
- Hardwood Swamp - red maple, red bay, sweet bay, and cabbage palm
- Upland Forests - live oak, scrub oak, longleaf pine, slash pine, wax myrtle, and saw palmetto

Wildlife AQRVs have been identified as endangered species, waterfowl, wading birds, shorebirds, reptiles, and mammals.

The maximum pollutant concentrations predicted for the project in the Okefenokee NWA are presented in the 2004 Lime Kiln PSD application. These results were compared with effect threshold limits for both vegetation and wildlife as reported in the scientific literature. While the literature search focused on such species as cabbage palm, eastern red cedar, lichens, and species of the hardwood swamplands and mangrove forest, no specific citations that addressed these species were found. 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.

2.4 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 soils of the Okefenokee NWA are generally classified as histosols. Histosols (peat soils) are organic and have extremely high buffering capacities based on their CEC, base saturation, and bulk density. Therefore, they would be relatively insensitive 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 for the Okefenokee NWA precludes any significant impact on soils.

2.5 IMPACTS TO VEGETATION

In general, the effects of air pollutants on vegetation occur primarily from SO_2, NO_2, O_3, and PM_{10}. Effects from minor air contaminants such as fluoride, chlorine, hydrogen chloride, ethylene, ammonia, hydrogen sulfide, CO, and pesticides have also been reported in the literature. The effects of air pollutants are dependent both on the concentration of the contaminant and the duration of the exposure. The term "injury," as opposed to damage, is commonly used to describe all plant responses to air contaminants and will be used in the context of this analysis. Air contaminants are thought to interact primarily with plant foliage, which is considered to be the major pathway of exposure.

Injury to vegetation from exposure to various levels or air contaminants can be termed acute, physiological, or chronic. Acute injury occurs as a result of a short-term exposure to a high contaminant concentration and is typically manifested by visible injury symptoms ranging from chlorosis (discoloration) to necrosis (dead areas). Physiological or latent injury occurs as the result of a long-term exposure to contaminant concentrations below that which results in acute injury symptoms. Chronic injury results from repeated exposure to low concentrations over extended periods of time, often without any visible symptoms, but with some effect on the overall growth and productivity of the plant. In this assessment, 100 percent of the particular air pollutant in the ambient air was assumed to interact with the vegetation. This is a conservative approach.

The response of vegetation and wildlife to atmospheric pollutants is influenced by the concentration of the pollutant, duration of exposure, and frequency of exposures. The pattern of pollutant exposure expected from the facility is that of a few episodes of relatively high ground-level concentration which occur during certain meteorological conditions interspersed with long periods of extremely low ground-level concentrations. If there are any effects of stack emissions on plants or animals, they will likely arise from the short-term, higher doses. A dose is the product of the concentration of the pollutant and duration of the exposure.

2.5.1 NITROGEN DIOXIDE

NO_2 can injure plant tissue with symptoms usually appearing as irregular white to brown collapsed lesions between the leaf veins and near the margins. Conversely, non-injurious levels of NO_2 can be absorbed by plants, enzymatically transformed into ammonia, and incorporated into plant constituents such as amino acids (Matsumaru *et al.*, 1979).

Plant damage can occur through either acute (short-term, high concentration) or chronic (long-term, relatively low concentration) exposure. For plants that have been determined to be more sensitive to NO_2 exposure than others, acute (1-, 4-, and 8-hour) exposure caused 5 percent predicted foliar injury at concentrations ranging from 3,800 to 15,000 $\mu g/m^3$ (Heck and Tingey, 1979). Chronic exposure of selected plants (some considered NO_2-sensitive) to NO_2 concentrations of 2,000 to 4,000 $\mu g/m^3$ for 213 to 1,900 hours caused reductions in yield of up to 37 percent and some chlorosis (Zahn, 1975).

The maximum 8-hour average NO_2 concentration due to the increase in emissions resulting from the proposed project in the Okefenokee Class I area is predicted to be less of the levels that cause foliage injury in acute exposure scenarios. By comparison of published toxicity values for NO_2 exposure to long-term (annual averaging time) modeled concentrations, the possibility of plant damage in the Class I areas can be examined for chronic exposure situations. For a chronic exposure, the maximum annual average NO_2 concentration due to the proposed project in the Okefenokee NWA Class I area is less than 0.01 $\mu g/m^3$.

2.5.2 SULFUR DIOXIDE

Sulfur is an essential plant nutrient usually taken up as sulfate ions by the roots from the soil solution. When sulfur dioxide in the atmosphere enters the foliage through pores in the leaves, it reacts with water in the leaf interior to form sulfite ions. Sulfite ions are highly toxic. They interact with enzymes, compete with normal metabolites, and interfere with a variety of cellular functions (Horsman and Wellburn, 1976). However, within the leaf, sulfite is oxidized to sulfate ions, which can then be used by the plant as a nutrient. Small amounts of sulfite may be oxidized before they prove harmful.

SO_2 gas at elevated levels has long been known to cause injury to plants. Acute SO_2 injury usually develops within a few hours or days of exposure, and symptoms include marginal, flecked, and/or intercoastal necrotic areas that appear water-soaked and dullish green initially. This injury generally occurs to younger leaves. Chronic injury usually is evident by signs of chlorosis, bronzing, premature senescence, reduced growth, and possible tissue necrosis (EPA, 1982). Observed SO_2 effect levels for several plant species and plant sensitivity groupings are presented in Tables 1-2 and 1-3, respectively.

Many studies have been conducted to determine the effects of high-concentration, short-term SO_2 exposure on natural community vegetation. Sensitive plants include ragweed, legumes, blackberry, southern pine, and red and black oak. These species are injured by exposure to 3-hour average SO_2

concentrations of 790 to 1,570 μg/m^3. Intermediate plants include locust and sweetgum. These species are injured by exposure to 3-hour average SO_2 concentrations of 1,570 to 2,100 μg/m^3. Resistant species (injured at concentrations above 2,100 μg/m^3 for 3 hours) include white oak and dogwood (EPA, 1982).

A study of native Floridian species (Woltz and Howe, 1981) demonstrated that cypress, slash pine, live oak, and mangrove exposed to 1,300 μg/m^3 SO_2 for 8 hours were not visibly damaged. This finding supports the levels cited by other researchers on the effects of SO_2 on vegetation. A corroborative study (McLaughlin and Lee, 1974) demonstrated that approximately 20 percent of a cross-section of plants ranging from sensitive to tolerant was visibly injured at 3-hour average SO_2 concentrations of 920 μg/m^3. Jack pine seedlings exposed to SO_2 concentrations of 470 to 520 μg/m^3 for 24 hours demonstrated inhibition of foliar lipid synthesis; however, this inhibition was reversible (Malhotra and Kahn, 1978). Black oak exposed to 1,310 μg/m^3 SO_2 for 24 hours a day for 1 week demonstrated a 48 percent reduction in photosynthesis (Carlson, 1979). Two species of lichens exhibited signs of SO_2 damage in the form of decreased biomass gain and photosynthetic rate as well as membrane leakage when exposed to concentrations of 200 to 400 μg/m^3 for 6 hours/week for 10 weeks (Hart *et al.*, 1988).

The maximum 24-hour average SO_2 concentration due to the increase in emissions resulting from the proposed project at the Okefenokee NWA Class I area is presented in the 2004 Lime Kiln PSD application. The maximum 24-hour average SO_2 concentration is predicted for the project at the Class I area is less than 1 percent of those that caused damage to the most sensitive lichens. The modeled annual incremental increase in SO_2 adds slightly to background levels of this gas and poses only a minimal threat to area vegetation.

2.5.3 PARTICULATE MATTER (PM_{10})

Although information pertaining to the effects of PM on plants is scarce, some threshold concentrations are available. Mandoli and Dubey (1998) exposed ten species of native Indian plants to levels of PM ranging from 210 to 366 μg/m^3 for an 8-hour averaging period. Damage in the form of a higher leaf area/dry weight ratio was observed at varying degrees for most plants tested. Concentrations of PM lower than 163 μg/m^3 did not appear to be injurious to the tested plants.

By comparison of these published toxicity values for PM exposure (*i.e.*, concentrations for an 8-hour averaging time), the possibility of plant damage in the Okefenokee NWA can be determined. The maximum predicted short term PM_{10} concentration due to the increase in emissions resulting from the proposed project at the Class I area is presented in the 2004 Lime Kiln PSD applicaiton. These concentrations are less than 1 percent of the lower threshold value that reportedly affects plant foliage. As a result, no effects to vegetative AQRVs are expected from the project's emissions.

2.5.4 CARBON MONOXIDE

As with PM_{10}, information pertaining to the effects of CO on plants is scarce. The main effect of high concentrations of CO is the inhibition of cytochrome *c* oxidase, the terminal oxidase in the mitochondrial electron transfer chain. Inhibition of cytochrome *c* oxidase depletes the supply of adenosine triphosphate (ATP), the principal donor of free energy required for cell functions. However, this inhibition only occurs at extremely high concentrations of CO. Pollok *et al.* (1989) reported that exposure to $CO:O_2$ ratio of 25 (equivalent to an ambient CO concentration of 6.85×10^6 $\mu g/m^3$) resulted in stomatal closure in the leaves of the sunflower (*Helianthus annuus*). Naik *et al.* (1992) reported cytochrome *c* oxidase inhibition in corn, sorghum, millet, and Guinea grass at $CO:O_2$ ratios of 2.5 (equivalent to an ambient CO concentration of 6.85×10^5 $\mu g/m^3$). These plants were considered the species most sensitive to CO-induced inhibition of cytochrome *c* oxidase. GP estimates that the predicted impact of CO to be much less than 685,000 $\mu g/m^3$.

2.5.5 SULFURIC ACID MIST

Acidic precipitation or acid rain is coupled to SO_2 emissions mainly formed during the burning of fossil fuels. This pollutant is oxidized in the atmosphere and dissolves in rain forming SAM, which falls as acidic precipitation (Ravera, 1989). Although concentration data are not available, SAM has been reported to yield necrotic spotting on the upper surfaces of leaves (Middleton *et al.*, 1950).

No significant adverse effects on vegetation are expected from the project's emissions because SO_2 concentrations, which lead directly to the formation of SAM concentrations, are predicted to be well below levels which have been documented as negatively affecting vegetation. During the last decade, much attention has been focused on acid rain. Acidic deposition is an ecosystem-level problem that affects vegetation because of some alterations of soil conditions such as increased leaching of essential base cations or elevated concentrations of aluminum in the soil water (Goldstein *et al.*, 1985). Although effects of acid rain in eastern North America have been well published and publicized, detrimental effects of acid rain on Florida vegetation are lacking documentation.

2.5.6 VOC EMISSIONS AND IMPACTS ON OZONE

It is difficult to predict what effect the proposed increase in emissions of VOC will have on ambient O_3 concentrations on a regional scale. VOC and NO_x emissions are precursors to the formation of O_3. O_3 is not directly emitted from fuel combustion, but is formed down-wind from emission sources when VOC and NO_x emissions react in the presence of sunlight. Natural (without man-made sources) ambient concentrations of O_3 are normally in the range of 20 to 39 $\mu g/m^3$ (0.01 to 0.02 ppm) (Heath, 1975).

The nearest monitors to the GP Palatka Mill that measure O_3 concentrations are located in Gainesville (AIRS No. 12-001-0025 and 12-001-3011). These stations measure concentrations according to EPA procedures. Based on the O_3 monitoring concentrations measured over the last several years in Gainesville , the region is in attainment of the existing 1-hour O_3 AAQS as well as the new 8-hour O_3 AAQS.

O_3 can cause various damage to broad-leaved plants including: tissue collapse, interveinal necrosis and markings on the upper surface leaves know as stippling (pigmented yellow, light tan, red brown, dark brown, red, or purple), flecking (silver or bleached straw white), mottling, chlorosis or bronzing, and bleaching. O_3 can also stunt plant growth and bud formation. On certain plants such as citrus, grape, and tobacco, it is common for leaves to wither and drop early.

As described in Section 1.3.1, the VOC emissions due to the proposed GP project represents less than a 1-percent increase in regional VOC emissions. Therefore, the effects of O_3, as a result of VOC emissions from the project, are expected to be insignificant.

2.5.7 SUMMARY

In summary, 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.

2.6 <u>IMPACTS TO WILDLIFE</u>

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.*, Los Angeles Basin. 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.

For impacts on wildlife, the lowest threshold values of NO_2, PM_{10}, and SO_2 that are reported to cause physiological changes discussed above. These values are up to orders of magnitude larger than maximum concentrations predicted due to the GP project in the Okefenokee NWA Class I area. No effects on wildlife AQRVs from SO_2, NO_2, and particulates are expected. 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 very 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 extremely unlikely.

2.7 IMPACTS ON VISIBILITY

2.7.1 GENERAL

The CAA Amendments of 1977 provide for implementation of guidelines to prevent visibility impairment in mandatory Class I area. The guidelines are intended to protect the aesthetic quality of these pristine areas from reduction in visual range and atmospheric discoloration due to various pollutants. Sources of air pollution can cause visible plumes if emissions of PM_{10} and NO_x are sufficiently large. A plume will be visible if its constituents scatter or absorb sufficient light so that the plume is brighter or darker than its viewing background (e.g., the sky or a terrain feature, such as a mountain). PSD Class I areas, such as national parks and wilderness areas, are afforded special visibility protection designed to prevent plume visual impacts to observers within a Class I area.

Visibility is an AQRV for the Okefenokee NWA. Visibility can take the form of plume blight for nearby areas, or regional haze for long distances (e.g., distances beyond 50 km). Because the Okefenokee NWA lies more than 50 km from the GP Palatka Mill, the change in visibility is analyzed as regional haze.

Currently, there are several air quality modeling approaches recommended by the Interagency Workgroup on Air Quality Models (IWAQM) to perform these analyses. The IWAQM consists of EPA and Federal Land Managers (FLM) of Class I areas responsible for ensuring that AQRVs are not adversely impacted by new and existing sources. These recommendations have been summarized in two documents:

- *Interagency Workgroup on Air Quality Models (IWAQM), Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts* (EPA, 1998), referred to as the IWAQM Phase 2 report.
- *Federal Land Managers' Air Quality Related Values Workgroup (FLAG), Phase I Report;* U.S. Forestry Service (USFS), National Park Service (NPS), and U.S. Fish and Wildlife Service (USFWS) (December 2000); referred to as the FLAG document.

The methods and assumptions recommended in these documents were used to assess visibility impairment due to the project.

2.7.2 METHODOLOGY

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:

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

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.

Processing of visibility impairment for this study was performed with the CALPUFF model (see Appendix C) 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. For the Okefenokee NWA, the hygroscopic and non-hygroscopic components are 0.9 and 8.5 inverse megameter (Mm^{-1}). CALPOST then calculates the percent extinction change for each day of the year.

2.7.3 RESULTS

As discussed in the 2004 Lime Kiln PSD application, the project's maximum visibility impairment is predicted at Okefenokee NWA to be below the FLM's screening criteria of 5 percent change. As a result, since the proposed project's regional haze maximum impacts are below the FLM's screening criteria at the PSD Class I area, it is expected the proposed project would not have an adverse impact on the existing regional haze at the PSD Class I area of the Okefenokee NWA.

2.8 NITROGEN AND SULFUR DEPOSITION

2.8.1 GENERAL METHODS

As part of the AQRV analyses, total nitrogen (N) and sulfur (S) deposition rates were predicted for the proposed project at the Okefenokee NWA. The deposition analysis criterion is based on the annual averaging period. The total N and S deposition is estimated in units of kilogram per hectare per year (kg/ha/yr). The CALPUFF model is used to predict wet and dry deposition fluxes of various oxides of these elements.

For N deposition, the species include:

- Particulate ammonium nitrate (from species NO_3), wet and dry deposition;
- Nitric acid (species HNO_3), wet and dry deposition;
- NO_x dry deposition; and
- Ammonium sulfate (species SO_4), wet and dry deposition.

For S deposition, the species include:

- SO_2 wet and dry deposition, and
- SO_4 wet and dry deposition.

The CALPUFF model produces results in units of micrograms per square meter per second ($\mu g/m^2/s$). The modeled deposition rates are then converted to N and S deposition in kilograms per hectare, respectively, by using a multiplier equal to the ratio of the molecular weights of the substances (refer to the IWAQM Phase 2 report, Section 3.3).

The deposition analysis threshold (DAT) for N of 0.01 kg/ha/yr was provided by the USFWS (January 2002). A DAT is the additional amount of N or 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 GP project is, therefore, compared to these DAT or significant impact levels.

2.8.2 RESULTS

The maximum predicted N and S depositions predicted for the project in the PSD Class I area of the Okefenokee NWA are summarized in the 2004 Lime Kiln PSD Application. The maximum N and S deposition rates for the project are predicted to below the DAT of 0.01 kg/ha/yr.

In addition, although the project's impacts are predicted to be above the DAT for S deposition at the Class I area, the soils and vegetation are not sensitive to the very low deposition rates predicted for the project. As discussed above, the dominant soil of the Okefenokee NWA is the organic histosols with extremely high buffering capacities. This soil is resistant to acidic atmospheric inputs. The average buffering capacity of histosols is 765,000 equivalence per hectare (eq/ha) [Florida Acid Deposition Study (FADS), 1986]. As acid inputs (*e.g.*, HNO_3^{-1} and $H_2SO_4^{-2}$), the maximum predicted N and S deposition rates are extremely small compared to the buffering capacity of the soils in the Okefenokee NWA. These deposition rates are also small compared to the observed N and S deposition obtained from the FADS. Measurements taken at a rural site in Jefferson County, about 120 miles west-southwest of the Okefenokee NWA, found total (*i.e.*, wet and dry) N and S deposition rates of 304 and 474 eq/ha/yr, respectively, over a 3-year period (FADS, 1986).

The relatively low sensitivity of the soils to acid inputs coupled with the extremely low ground level concentrations of contaminants projected for the Okefenokee NWA from the project emissions precludes any significant impact on soils. Similarly, the total annual N and S deposition rates at the Okefenokee NWA as a result of the project are not expected to alter soil and/or groundwater pH that may result in adverse effects on vegetation.

3.0 ADDITIONAL IMPACT ANALYSIS ON THE CHASSAHOWITZKA NWA CLASS I AREA

3.1 INTRODUCTION

As discussed above, the GP Palatka Mill is subject to the PSD new source review requirements for SO_2, NO_x, PM, PM_{10}, CO, VOC, and SAM. The analysis presented in this section addresses the potential impacts on vegetation, soils, and wildlife of the Chassahowitzka NWA Class I area due to the proposed GP Palatka Mill project. The Chassahowitzka NWA is located approximately 137 km southwest of the GP Palatka Mill. In addition, potential impacts upon visibility resulting from the proposal modification are assessed.

The analysis demonstrates that the increase in impacts due to the proposed project is extremely low. Regardless of the existing conditions in the vicinity of the Class I area, the proposed project will not cause any significant adverse effects due to the predicted low impacts upon these areas.

3.2 SOIL, VEGETATION, AND AQRV ANALYSIS METHODOLOGY

This analysis uses the maximum air quality impacts predicted to occur in the Chassahowitzka NWA Class I area due to the increase in the proposed project's emissions. These impacts are summarized in the 2004 Lime Kiln PSD application

The analysis involved predicting worst-case maximum short- and long-term concentrations of pollutants in the Class I area and comparing the maximum predicted concentrations to lowest observed effect levels for AQRVs or analogous organisms. In conducting the assessment, several assumptions were made as to how pollutants interact with the different matrices, *i.e.*, vegetation, soils, wildlife, and aquatic environment.

A screening approach was used to evaluate potential effects by comparison of the maximum predicted ambient concentrations with effect threshold limits for the pollutant of concern, for vegetation and wildlife, as reported in the scientific literature. A literature search was conducted which specifically addressed the effects of air contaminants on plant species reported to occur in the Class I area. It was recognized that effects threshold information is not available for all species found in the Chassahowitzka NWA, although studies have been performed on a few of the common species and on other similar species, which can be used as models.

3.3 IDENTIFICATION OF AQRVS AND METHODOLOGY

An AQRV analysis was conducted to assess the potential risk to AQRVs of the Chassahowitzka NWA due to the proposed emissions from the GP project. The U.S. Department of the Interior in 1978 administratively defined AQRVs to be:

> *All those values possessed by an area except those that are not affected by changes in air quality and include all those assets of an area whose vitality, significance, or integrity is dependent in some way upon the air environment. These values include visibility and those scenic, cultural, biological, and recreational resources of an area that are affected by air quality.*
>
> *Important attributes of an area are those values or assets that make an area significant as a national monument, preserve, or primitive area. They are the assets that are to be preserved if the area is to achieve the purposes for which it was set aside (Federal Register, 1978).*

Except for visibility, AQRVs were not specifically defined. However, odor, soil, flora, fauna, cultural resources, geological features, water, and climate generally have been identified by land managers as AQRVs. Since specific AQRVs have not been identified for the Chassahowitzka NWA, this AQRV analysis evaluates the effects of air quality on general vegetation types and wildlife found in the Chassahowitzka NWA.

Vegetation type AQRVs and their representative species types have been defined by the USFWS as:

- Marshlands - black needlerush, saw grass, salt grass, and salt marsh cordgrass
- Marsh Islands - cabbage palm and eastern red cedar
- Estuarine Habitat - black needlerush, salt marsh cordgrass, and wax myrtle
- Hardwood Swamp - red maple, red bay, sweet bay, and cabbage palm
- Upland Forests - live oak, scrub oak, longleaf pine, slash pine, wax myrtle, and saw palmetto
- Mangrove Swamp - red, white, and black mangrove

Wildlife AQRVs have been identified as endangered species, waterfowl, marsh and waterbirds, shorebirds, reptiles, and mammals.

The maximum pollutant concentrations predicted for the project in the Chassahowitzka NWA are presented in Table 9-1. These results were compared with effect threshold limits for both vegetation and wildlife as reported in the scientific literature. A literature search was conducted that specifically addressed the effects of air contaminants on plant species reported to occur in the Chassahowitzka NWA. While the literature search focused on such species as cabbage palm, eastern red cedar, lichens, and species of the hardwood swamplands and mangrove forest, no specific citations that addressed these species were found. It is recognized that effect threshold information is not available for all species found in the Chassahowitzka NWA, 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.

3.4 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 soils of the Chassahowitzka NWA are generally classified as histosols. According to the U.S. Department of Agriculture (USDA) Soil Surveys of Citrus and Hernando Counties, nine soil complexes are found in the Chassahowitzka NWA. These include Aripeka fine sand, Aripeka-Okeelanta-Lauderhill, Hallendale-Rock outcrop, Homosassa mucky fine sandy loam, Lacooche, Okeelanta mucks, Okeelanta-Lauderdale-Terra Ceia mucks, Rock outcrop-Homosassa-Lacoochee, and Weekiwachee-Durbin mucks (Porter, 1996). The majority of the soil complexes found in the Chassahowitzka NWA are inundated by tidal waters, contain a relatively high organic matter content, and have high buffering capacities based on their CEC, base saturation, and bulk density. The regular flooding of these soils by the Gulf of Mexico regulates the pH and any change in acidity in the soil would be buffered by this activity. Therefore, they would be relatively insensitive to atmospheric inputs. However, Terra Ceia, Okeelanta, and Lauderdale freshwater mucks are present along the eastern border of the Chassahowitzka NWA, and may be more sensitive to atmospheric sulfur deposition (Porter, 1996). Although not tidally influenced, these freshwater mucks are highly organic and, therefore, have a relatively high intrinsic buffering capacity.

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

3.5 IMPACTS TO VEGETATION

In general, the effects of air pollutants on vegetation occur primarily from SO_2, NO_2, O_3, and PM. Effects from minor air contaminants, such as fluoride (F), chlorine, hydrogen chloride, ethylene, ammonia, hydrogen sulfide, CO, and pesticides, have also been reported in the literature. The effects of air pollutants are dependent both on the concentration of the contaminant and the duration of the exposure. The term "injury," as opposed to damage, is commonly used to describe all plant responses to air contaminants and will be used in the context of this analysis. Air contaminants are thought to interact primarily with plant foliage, which is considered to be the major pathway of exposure. For purposes of this analysis, it was assumed that 100 percent of each air contaminant of concern is accessible to the plants.

Injury to vegetation from exposure to various levels or air contaminants can be termed acute, physiological, or chronic. Acute injury occurs as a result of a short-term exposure to a high contaminant concentration and is typically manifested by visible injury symptoms ranging from chlorosis (discoloration) to necrosis (dead areas). Physiological or latent injury occurs as the result of a long-term exposure to contaminant concentrations below that which results in acute injury symptoms. Chronic injury results from repeated exposure to low concentrations over extended periods of time, often without any visible symptoms, but with some effect on the overall growth and productivity of the plant. In this assessment, 100 percent of the particular air pollutant in the ambient air was assumed to interact with the vegetation. This is a conservative approach.

The concentrations of the pollutants, duration of exposure and frequency of exposures influence the response of vegetation and wildlife to atmospheric pollutants. The pattern of pollutant exposure expected from the facility is that of a few episodes of relatively high ground-level concentrations, which occur during certain meteorological conditions interspersed with long periods of extremely low ground-level concentrations. If there are any effects of stack emissions on plants and animals they will be from the short-term, higher doses. A dose is the product of the concentration of the pollutant and duration of the exposure.

3.5.1 NITROGEN DIOXIDE

NO_2 can injure plant tissue with symptoms usually appearing as irregular white to brown collapsed lesions between the leaf veins and near the margins. Conversely, non-injurious levels of NO_2 can be absorbed by plants, enzymatically transformed into ammonia, and incorporated into plant constituents such as amino acids (Matsumaru *et al.*, 1979).

Plant damage can occur through either acute (short-term, high concentration) or chronic (long-term, relatively low concentration) exposure. For plants that have been determined to be more sensitive to NO_2 exposure than others, acute (1, 4, 8 hours) exposure caused 5 percent predicted foliar injury at concentrations ranging from 3,800 to 15,000 $\mu g/m^3$ (Heck and Tingey, 1979). Chronic exposure of selected plants (some considered NO_2-sensitive) to NO_2 concentrations of 2,000 to 4,000 $\mu g/m^3$ for 213 to 1,900 hours caused reductions in yield of up to 37 percent and some chlorosis (Zahn, 1975).

The maximum NO_2 concentration due to the increase in emissions from the GP project is predicted to be less than 0.1 percent of the levels that cause foliar injury in acute exposure scenarios. By comparison of published toxicity values for NO_2 exposure to long-term (annual averaging time) modeled concentrations, the possibility of plant damage in the Chassahowitzka NWA Class I area can be examined for chronic exposure situations. For a chronic exposure, the maximum annual average NO_2 concentration due to the project in the Chassahowitzka NWA Class I area is less than 0.01 percent of the levels that caused minimal yield loss and chlorosis in plant tissue. Average and maximum background 24-hour average concentrations of NO_2 reported in the Chassahowitzka NWA are 0.006 and 0.104 $\mu g/m^3$, respectively.

Although it has been shown that simultaneous exposure to SO_2 and NO_2 results in synergistic plant injury (Ashenden and Williams, 1980), the magnitude of this response is generally only 3 to 4 times greater than either gas alone and usually occurs at unnaturally high levels of each gas. Therefore, the concentrations within the Chassahowitzka NWA are still far below the levels that potentially cause plant injury for either acute or chronic exposure.

3.5.2 SULFUR DIOXIDE

Sulfur is an essential plant nutrient usually taken up as sulfate ions by the roots from the soil solution. When sulfur dioxide in the atmosphere enters the foliage through pores in the leaves, it reacts with water in the leaf interior to form sulfite ions. Sulfite ions are highly toxic. They interact with enzymes, compete with normal metabolites, and interfere with a variety of cellular functions (Horsman and Wellburn, 1976). However, within the leaf, sulfite is oxidized to sulfate ions, which can then be used by the plant as a nutrient. Small amounts of sulfite may be oxidized before they prove harmful.

SO_2 gas at sufficiently elevated levels has long been known to cause injury to plants. Acute SO_2 injury usually develops within a few hours or days of exposure, and symptoms include marginal, flecked, and/or intercoastal necrotic areas that appear water-soaked and dullish green initially. This injury generally occurs to younger leaves. Chronic injury usually is evident by signs of chlorosis, bronzing, premature senescence, reduced growth, and possible tissue necrosis (EPA, 1982). Background levels of SO_2 in the Chassahowitzka NWA average 1.3 $\mu g/m^3$, with a maximum 24-hour average concentration of 14.5 $\mu g/m^3$ (IMPROVE, 2002). Observed SO_2 effect levels for several plant species and plant sensitivity groupings are presented in Tables 1-2 and 1-3, respectively.

Many studies have been conducted to determine the effects of high-concentration, short-term SO_2 exposure on natural community vegetation. Sensitive plants include ragweed, legumes, blackberry, southern pine, and red and black oak. These species are injured by exposure to 3-hour average SO_2 concentrations of 790 to 1,570 $\mu g/m^3$. Intermediate plants include locust and sweetgum. These species are injured by exposure to 3-hour average SO_2 concentrations of 1,570 to 2,100 $\mu g/m^3$. Resistant species (injured at concentrations above 2,100 $\mu g/m^3$ for 3 hours) include white oak and dogwood (EPA, 1982).

A study of native Floridian species (Woltz and Howe, 1981) demonstrated that cypress, slash pine, live oak, and mangrove exposed to 1,300 $\mu g/m^3$ SO_2 for 8 hours were not visibly damaged. This finding supports the levels cited by other researchers on the effects of SO_2 on vegetation. A corroborative study (McLaughlin and Lee, 1974) demonstrated that approximately 20 percent of a cross-section of plants ranging from sensitive to tolerant was visibly injured at 3-hour average SO_2 concentrations of 920 $\mu g/m^3$.

Jack pine seedlings exposed to SO_2 concentrations of 470 to 520 μg/m^3 for 24 hours demonstrated inhibition of foliar lipid synthesis; however, this inhibition was reversible (Malhotra and Kahn, 1978). Black oak exposed to 1,310 μg/m^3 SO_2 for 24 hours a day for 1 week demonstrated a 48 percent reduction in photosynthesis (Carlson, 1979).

Two lichen species indigenous to Florida exhibited signs of SO_2 damage in the form of decreased biomass gain and photosynthetic rate as well as membrane leakage when exposed to concentrations of 200 to 400 μg/m^3 for 6 hours/week for 10 weeks (Hart *et al.*, 1988).

The maximum 24-hour average SO_2 concentration increase that is predicted for the proposed project at the Chassahowitzka NWA Class I area is less than 1 μg/m^3. When added to the maximum 24-hour average background concentration of 14.5 μg/m^3 at the Chassahowitzka NWA, the maximum worst-case total SO_2 concentration is less than 15 μg/m^3, which is much lower than those known to cause damage to test species. The modeled annual incremental increase in SO_2 adds slightly to background levels of this gas and poses only a minimal threat to area vegetation.

3.5.3 PARTICULATE MATTER (PM_{10})

Although information pertaining to the effects of PM on plants is scarce, some threshold concentrations are available. Mandoli and Dubey (1998) exposed ten species of native Indian plants to levels of PM ranging from 210 to 366 μg/m^3 for an 8-hour averaging period. Damage in the form of a higher leaf area/dry weight ratio was observed at varying degrees for most plants tested. Concentrations of PM lower than 163 μg/m^3 did not appear to be injurious to the tested plants.

By comparison of these published toxicity values for PM exposure (*i.e.*, concentrations for an 8-hour averaging time), the possibility of plant damage in the Chassahowitzka NWA can be determined. The maximum predicted short term PM_{10} concentration due to the increase in emissions resulting from the proposed project at the Chassahowitzka NWA Class I area is less than 0.1 μg/m^3. This concentration is less than 1 percent of the lower threshold value that reportedly affects plant foliage. As a result, no effects to vegetative AQRVs are expected from the project's emissions.

3.5.4 CARBON MONOXIDE

As with PM_{10}, information pertaining to the effects of CO on plants is scarce. The main effect of high concentrations of CO is the inhibition of cytochrome *c* oxidase, the terminal oxidase in the mitochondrial electron transfer chain. Inhibition of cytochrome *c* oxidase depletes the supply of

ATP, the principal donor of free energy required for cell functions. However, this inhibition only occurs at extremely high concentrations of CO. Pollok *et al.* (1989) reported that exposure to $CO:O_2$ ratio of 25 (equivalent to an ambient CO concentration of 6.85 x 10^6 $\mu g/m^3$) resulted in stomatal closure in the leaves of the sunflower (*Helianthus annuus*). Naik *et al.* (1992) reported cytochrome *c* oxidase inhibition in corn, sorghum, millet, and Guinea grass at $CO:O_2$ ratios of 2.5 (equivalent to an ambient CO concentration of 6.85 x 10^5 $\mu g/m^3$). These plants were considered the species most sensitive to CO-induced inhibition of cytochrome *c* oxidase.

By comparison of published effect values for CO exposure, the possibility of plant damage in the Class I area can be determined. The maximum 1-hour (most conservative) estimated CO concentration due to the increase in emissions resulting from the proposed project in the Chassahowitzka NWA Class I area is less than 1 $\mu g/m^3$. This concentration is less than 0.01 percent of the value that caused inhibition in laboratory studies. The amount of damage sustained at this level (if any) for 1 hour would have negligible effects over an entire growing season. The predicted maximum annual CO concentration is less than 0.001 percent of the value that caused cytochrome *c* oxidase inhibition.

3.5.5 SULFURIC ACID MIST

Acidic precipitation or acid rain is coupled to SO_2 emissions mainly formed during the burning of fossil fuels. This pollutant is oxidized in the atmosphere and dissolves in rain forming SAM, which falls as acidic precipitation (Ravera, 1989). Although concentration data are not available, SAM has been reported to yield necrotic spotting on the upper surfaces of leaves (Middleton *et al.*, 1950).

No significant adverse effects on vegetation are expected from the project's emissions because SO_2 concentrations, which lead directly to the formation of SAM concentrations, are predicted to be well below levels that have been documented as negatively affecting vegetation. During the last decade, much attention has been focused on acid rain. Acidic deposition is an ecosystem-level problem that affects vegetation because of some alterations of soil conditions such as increased leaching of essential base cations or elevated concentrations of aluminum in the soil water (Goldstein *et al.*, 1985). Although effects of acid rain in eastern North America have been well published and publicized, detrimental effects of acid rain on Florida vegetation are lacking documentation.

3.5.6 VOC EMISSIONS AND IMPACTS ON OZONE

It is difficult to predict what effect the proposed increase in emissions of VOC will have on ambient O_3 concentrations on a regional scale. VOC and NO_x emissions are precursors to the formation of O_3. O_3 is not directly emitted from fuel combustion, but is formed down-wind from emission sources when VOC and NO_x emissions react in the presence of sunlight. Natural (without man-made sources) ambient concentrations of O_3 are normally in the range of 20 to 39 $\mu g/m^3$ (0.01 to 0.02 ppm) (Heath, 1975).

The nearest monitors to the GP Palatka Mill that measure O_3 concentrations are located in Gainesville (AIRS No. 12-001-0025 and 12-001-3011). These stations measure concentrations according to EPA procedures. Based on the O_3 monitoring concentrations measured over the last several years in Gainesville (see Table 4-1), the region is in attainment of the existing 1-hour O_3 AAQS as well as the new 8-hour O_3 AAQS.

O_3 can cause various damage to broad-leaved plants including: tissue collapse, interveinal necrosis and markings on the upper surface leaves know as stippling (pigmented yellow, light tan, red brown, dark brown, red, or purple), flecking (silver or bleached straw white), mottling, chlorosis or bronzing, and bleaching. O_3 can also stunt plant growth and bud formation. On certain plants such as citrus, grape, and tobacco, it is common for leaves to wither and drop early.

As described in above, the VOC emissions due to the proposed GP project represent less than 1-percent increase in regional VOC emissions. Therefore, the effects of O_3, as a result of VOC emissions from the project, are expected to be insignificant.

3.5.7 SUMMARY

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

3.6 IMPACTS TO WILDLIFE

The major air quality risk to wildlife in the United States is from continuous exposure to pollutants above the NAAQS. This occurs in non-attainment areas, *e.g.*, Los Angeles Basin. 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.

For impacts on wildlife, the lowest threshold values of SO_2, NO_2, and particulates that are reported to cause physiological changes are shown in Table 2-2. These values are orders of magnitude larger than maximum concentrations predicted for the GP project at the Chassahowitzka NWA Class I area. No effects on wildlife AQRVs from SO_2, NO_2, and particulates are expected. The proposed project's contribution to cumulative impacts is expected to be negligible.

3.7 IMPACTS ON VISIBILITY

3.7.1 INTRODUCTION

The CAA Amendments of 1977 provide for implementation of guidelines to prevent visibility impairment in mandatory Class I areas. The guidelines are intended to protect the aesthetic quality of these pristine areas from reduction in visual range and atmospheric discoloration due to various pollutants. Sources of air pollution can cause visible plumes if emissions of PM_{10} and NO_x are sufficiently large. A plume will be visible if its constituents scatter or absorb sufficient light so that the plume is brighter or darker than its viewing background (e.g., the sky or a terrain feature, such as a mountain). PSD Class I areas, such as national parks and wilderness areas, are afforded special visibility protection designed to prevent plume visual impacts to observers within a Class I area.

Visibility is an AQRV for the Chassahowitzka NWA. Visibility can take the form of plume blight for nearby areas or regional haze for long distances (e.g., distances beyond 50 km). Because the Chassahowitzka NWA is more than 50 km from the GP Palatka Mill, the potential change in visibility is analyzed as regional haze.

Currently, there are several air quality modeling approaches recommended by the Interagency Workgroup on Air Quality Models (IWAQM) to perform these analyses. The IWAQM consists of EPA and FLM of Class I areas who are responsible for ensuring that AQRVs are not adversely impacted by new and existing sources. These recommendations have been summarized in two documents:

- *Interagency Workgroup on Air Quality Models (IWAQM), Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts* (EPA, 1998), referred to as the IWAQM Phase 2 report; and
- *Federal Land Managers' Air Quality Related Values Workgroup (FLAG), Phase I Report,* USFS, NPS, USFWS (December 2000), referred to as the FLAG document.

The methods and assumptions recommended in these documents were used to assess visibility impairment due to the project.

3.7.2 METHODOLOGY

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:

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

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.

Processing of visibility impairment for this study was performed with the CALPUFF model (see Appendix D) and the CALPUFF post-processing programs POSTUTIL and 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 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. For the Chassahowitzka NWA Class I area evaluated, the hygroscopic and non-hygroscopic components are 0.9 and 8.5 inverse mega meter (Mm^{-1}). CALPOST then predicts the percent extinction change for each day of the year.

3.7.3 RESULTS

The results of the refined analysis for regional haze are presented in the 2004 Lime Kiln.PSD permit application. As shown in this table, the project's maximum visibility impairment is predicted at Chassahowitzka NWA, to be less than the FLM's screening criteria of 5 percent change. As a result, since the proposed project's regional haze maximum impacts are below the FLM's screening criteria at the PSD Class I area, it is expected the proposed project would not have an adverse impact on the existing regional haze at the PSD Class I area of the Chassahowitzka NWA.

3.8 NITROGEN AND SULFUR DEPOSITION

3.8.1 GENERAL METHODS

As part of the AQRV analyses, total nitrogen (N) and total sulfur (S) deposition rates were predicted at the Chassahowitzka NWA Class I area. The deposition analysis threshold is based on the annual averaging period. The total nitrogen and sulfur deposition is estimated in units of kilogram per hectare per year (kg/ha/yr). The CALPUFF model is used to predict wet and dry deposition fluxes of various oxides of these elements.

For N deposition, the species include:

- Particulate ammonium nitrate (from species NO_3), wet and dry deposition;
- Nitric acid (species HNO_3), wet and dry deposition;
- NO_x, dry deposition; and
- Ammonium sulfate (species SO_4), wet and dry deposition.

For S deposition, the species include:

- SO_2, wet and dry deposition; and
- SO_4, wet and dry deposition.

The CALPUFF model produces results in units of $\mu g/m^2/s$. The modeled deposition rates are then converted to N and S deposition in kg/ha, respectively, by using a multiplier equal to the ratio of the molecular weights of the substances (refer to IWAQM Phase 2 report, Section 3.3).

The DAT for nitrogen of 0.01 kg/ha/yr was provided by the USFWS (January 2002). A DAT is the additional amount of N or 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 GP project is, therefore, compared to these DAT or significant impact levels.

3.8.2 RESULTS

The maximum predicted N and S depositions predicted for the Project in the PSD Class I area of the Chassahowitzka NWA are summarized in the 2004 Lime Kiln PSD application. The maximum N and S deposition rates for the project are predicted to be below the DAT of 0.01 kg/ha/yr. Although the project's impacts are predicted to be above the DAT for S deposition at the Class I area, the soils and vegetation are not sensitive to the very low deposition rates predicted for the project.

As discussed in above, the dominant soil of Chassahowitzka NWA is the organic histosols with extremely high buffering capacities. This soil is resistant to acidic atmospheric inputs. The average buffering capacity of histosols is 765,000 eq/ha (FADS, 1986). The predicted deposition rates are extremely small compared to the buffering capacity of the soils in the Chassahowitzka NWA. These deposition rates are also small compared to the observed N and S deposition obtained from the FADS. Measurements taken at a rural site in Pasco County, about 60 miles southeast of the Chassahowitzka NWA, found total (*i.e.*, wet and dry) N and S deposition rates of 366 and 491eq/ha/yr, respectively, over a 3-year period (FADS, 1986). The relatively low sensitivity of the soils to acid inputs coupled with the extremely low ground-level concentrations of contaminants projected for the Chassahowitzka NWA from the project emissions precludes any significant impact on soils. Similarly, the total annual N and S deposition rates as a result of the project at the Chassahowitzka NWA are not expected to alter soil and/or groundwater pH that may result in adverse effects on vegetation.

4.0 REFERENCES

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File Copy

Department of Environmental Protection

Jeb Bush
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Colleen M. Castille
Secretary

October 1, 2004

CERTIFIED MAIL – Return Receipt Requested

Mr. Theodore D. Kennedy
Vice President – Palatka Operations
Georgia-Pacific
Palatka Mill
P.O. Box 919
Palatka, Florida 32178-0919

RE: Request to Replace the Lime Kiln Shell and Associated Tube Coolers
Project No.: 1070005-030-AC/PSD-FL-345

Dear Mr. Kennedy:

On September 4, 2004, the Department received a request to replace a portion of the lime kiln shell and all of the associated tube coolers. Based on our review of the proposed project, we have determined that the following additional information is needed in order to continue processing this application package. Please provide all assumptions, calculations, and reference material(s), that are used or reflected in any of your responses to the following issues:

1. Please provide the cost analysis for this project, which is the replacement of a portion of the existing lime kiln shell and the ten (10) tube coolers. Also, please provide the cost analysis of a new lime kiln with tube coolers of like-and-kind pursuant to the definition of an "affected facility" in accordance to 40 CFR 60, Subpart BB.

2. Will the replacement portion of the lime kiln shell be exactly the same size and diameter as the existing section that is being replaced?

3. Based on the write-up in the Executive Summary, you are claiming that the "existing coolers are causing excessive stress on the Kiln shell," therefore all of the coolers need to be replaced and the new bracket will relieve the stress on the new Kiln shell.
   a. With the knowledge that the coolers have caused the stress on the Kiln shell, then why are you going to replace the equipment with more of the same that could potentially cause damage to the new section being replaced? Please explain.
   b. Why can't the existing coolers be used and just replace their attachment bracket?
   c. What are the manufacturer's original design criteria for the existing tube coolers? For each existing tube cooler, please include the processing throughput rates, the inlet air temperature and the exit temperature, the diameter and length, and the volumetric flow rates.
   d. For the new tube coolers, what are the manufacturer's design criteria. For each new tube cooler, please include the processing throughput rates, the inlet air temperature and the exit temperature, the diameter and length, and the volumetric flow rates.

4. For PSD purposes, please provide the daily production rate of the lime kiln for the last two years (24-months) in order to determine the baseline production rate of the lime kiln; and, please include 2004 data.

5. With the proposed activity of the lime kiln and its associated coolers, are there any other changes being made to the burner, the induced draft fan, the control device, or any other part of the lime kiln operation? If any, please provide a detailed description of the proposed changes.

6. Even though the presentation is attempting to state that the Kiln shell portion and tube coolers that are being replaced are part of a maintenance project, will the proposed changes allow for an increase in production from its present configuration and operation?

7. Will there be an increased production from the baseline production rate (see No. 4, above) felt after the proposed changes are completed?

8. Please provide an explanation as to why the volumetric flow rate increased in the lime kiln between the years 1991 and 1995 to present years. Did the mill do anything to the control system, including changes to the induced draft fan system? What was the manufacturer's design flow rate? Please provide the specifications from the original vendor on the design flow rate.

9. Due to our awareness of the proposed upcoming applications for the Combination Boiler No. 4 and the No. 4 Recovery Boiler, we consider them to be contemporaneous with this project as a Phased PSD project. We also consider the changes made to the mill for the last five years to be contemporaneous to this project. Therefore, for significant impact analyses, increment consumption and ambient air quality impact analyses, please combine these projects with this project for these evaluations.

10. Pursuant to Rule 62-212.400(5)(h)5., F.A.C., please provide the information relating to the air quality impacts of, and the nature and extent of, all general commercial, residential, industrial and other growth that has occurred since August 7, 1977, in the area the facility or modification would affect.

11. For the potential applicability of 40 CFR 60, Subpart BB, please use Appendix C, 40 CFR 60, to determine if there is/are an emissions rate increase for the pollutants affected by this project.

The Department will resume processing this application after receipt of the requested information. If you have any questions regarding this matter, please call Bruce Mitchell at (850)413-9198.

Sincerely,

Trina L. Vielhauer

Trina L. Vielhauer
Chief
Bureau of Air Regulation

TLV/bm

cc: Gregg Worley, U.S. EPA, Region 4
Chris Kirts, NED
Myra J. Carpenter, GP
David A. Buff, P.E., GAI
John Bunyak, NPS
Bruce
Clere

SENDER: *COMPLETE THIS SECTION*

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Mr. Theodore D. Kennedy
Vice President - Palatka Oper.
Georgia-Pacific
Palatka Mill
P. O. Box 919
Palatak, FL 32178-0919

COMPLETE THIS SECTION ON DELIVERY

A. Received by *(Please Print Clearly)* John Alexander
B. Date of Delivery

C. Signature John Alexander
☐ Agent
☐ Addressee

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? *(Extra Fee)* ☐ Yes

2. Article Number *(Copy from service label)* 7000 0600 0026 4129 7965

PS Form 3811, July 1999 Domestic Return Receipt 102595-99-M-1789

U.S. Postal Service
CERTIFIED MAIL RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)

7000 0600 0026 4129 7965

PALATKA FL 32178

Postage	$ $0.37
Certified Fee	$2.30
Return Receipt Fee (Endorsement Required)	$1.75
Restricted Delivery Fee (Endorsement Required)	$0.00
Total Postage & Fees	$ $4.42

Postmark Here: TALLAHASSEE FL 0680 11 OCT 1 2004 10/01/2004

Recipient's Name (Please Print Clearly) (to be completed by mailer)
Mr. Theodore D. Kennedy, Georgia-Pac.
Street, Apt. No.; or PO Box No.
P.O. Box 919
City, State, ZIP+4
Palatka, FL 32178-0919

PS Form 3800, February 2000 See Reverse for Instructions

GEORGIA-PACIFIC CORPORATION

PALATKA MILL

PSD PERMIT APPLICATION

Lime Kiln Shell Replacement

(Update to August 2004 Application)

PALATKA (PUTNAM COUNTY), FLORIDA

April 2005

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Department of Environmental Protection

Jeb Bush
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

David B. Struhs
Secretary

September 8, 2004

Mr. Gregg M. Worley, Chief
Air Permits Section
U.S. EPA, Region 4
61 Forsyth Street
Atlanta, Georgia 30303-8960

RE: Georgia-Pacific Corporation, Palatka Mill
Lime Kiln Shell Replacement
1070005-030-AC, PSD-FL-345

Dear Mr. Worley:

Enclosed for your review and comment is a PSD application submitted by Georgia-Pacific Corporation for the replacement/repair of the lime kiln shell at their existing mill in Palatka, Putnam County, Florida.

Your comments may be forwarded to my attention at the letterhead address or faxed to the Bureau of Air Regulation at 850/921-9533. If you have any questions, please contact Bruce Mitchell, review engineer, at 850/413-9198.

Sincerely,

Patty Adams

for James K. Pennington, P.E.
Administrator
North Permitting Section

JKP/pa

Enclosure

cc: B. Mitchell

Department of
Environmental Protection

Jeb Bush
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

David B. Struhs
Secretary

September 3, 2004

Mr. John Bunyak, Chief
Policy, Planning & Permit Review Branch
NPS – Air Quality Division
12795 W. Alameda Parkway
Lakewood, Colorado 80228

RE: Georgia-Pacific Corporation, Palatka Mill
Lime Kiln Shell Replacement
1070005-030-AC, PSD-FL-345

Dear Mr. Bunyak:

Enclosed for your review and comment is a PSD application submitted by Georgia-Pacific Corporation for the replacement/repair of the lime kiln shell at their existing mill in Palatka, Putnam County, Florida.

Your comments may be forwarded to my attention at the letterhead address or faxed to the Bureau of Air Regulation at 850/921-9533. If you have any questions, please contact Bruce Mitchell, review engineer, at 850/413-9198.

Sincerely,

Patty Adams

for James K. Pennington, P.E.
Administrator
North Permitting Section

JKP/pa

Enclosure

cc: B. Mitchell

Georgia-Pacific

Palatka Pulp and Paper Operations
Consumer Products Division

P.O. Box 919
Palatka, FL 32178-0919
(386) 325-2001

September 1, 2004

Florida Department of Environmental Protection
Bureau of Air Regulation
2600 Blair Stone Road, MS# 3500
Tallahassee, FL 32399

Attention: PSD Permit Application

RE: PSD APPLICATION FOR REPLACEMENT / REPAIR OF LIME KILN SHELL

To whom it may concern:

Please find enclosed four (4) copies of the PSD Application for the replacement / repair of the Lime Kiln shell and also a check in the amount of $7,500.

Please contact me at 386-329-0918 if you have any questions.

Sincerely,

Myra J. Carpenter
Environmental Superintendent

cc: T. Wyles
E. Jamro
W. Jernigan
S. Matchett - GP

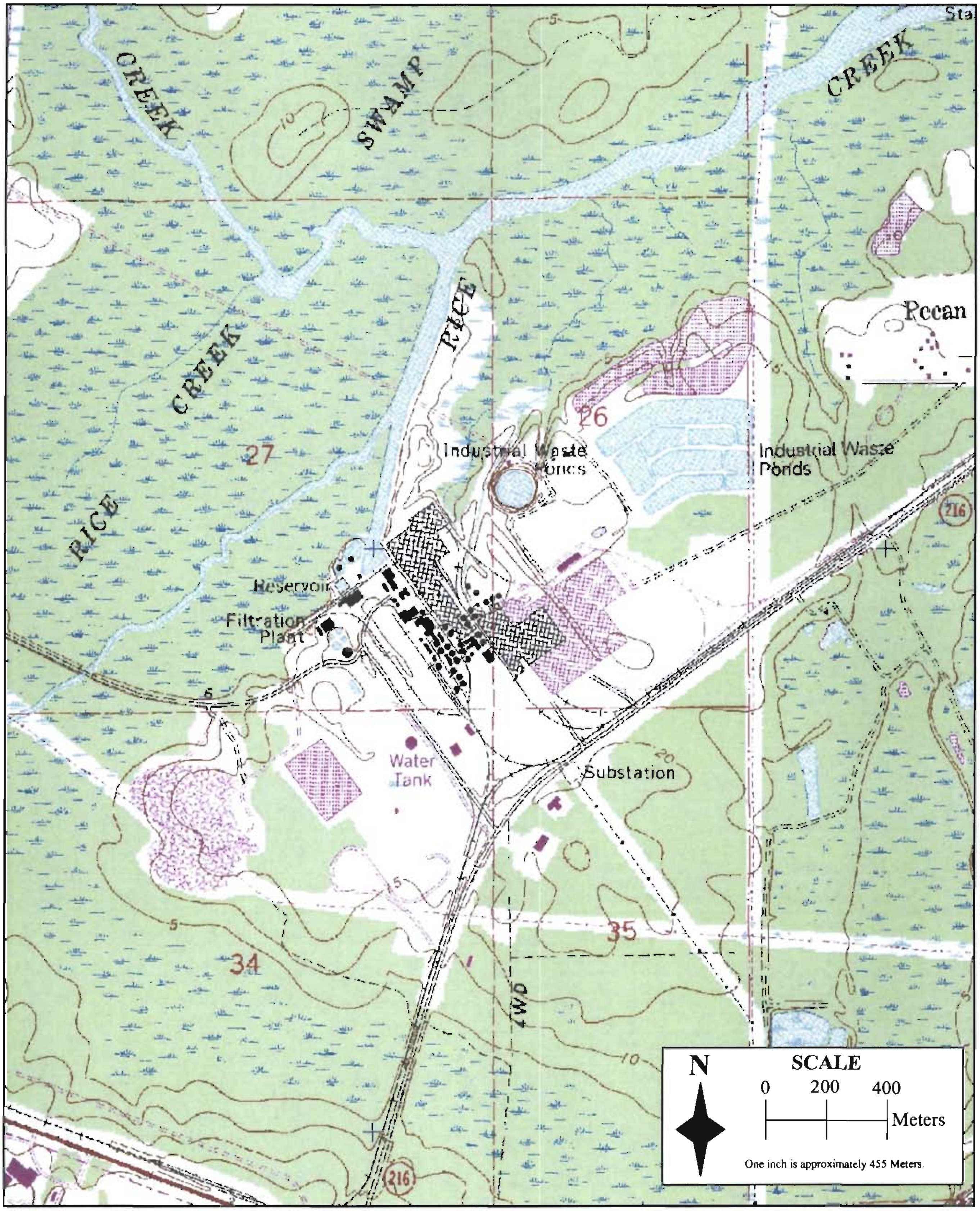


Figure 3-1
Area Map
Georgia-Pacific Corporation, Palatka Paper Mill

Title

Figure 3-2.
Buildings Considered in Downwash Analysis for the GP Palatka Paper Mill

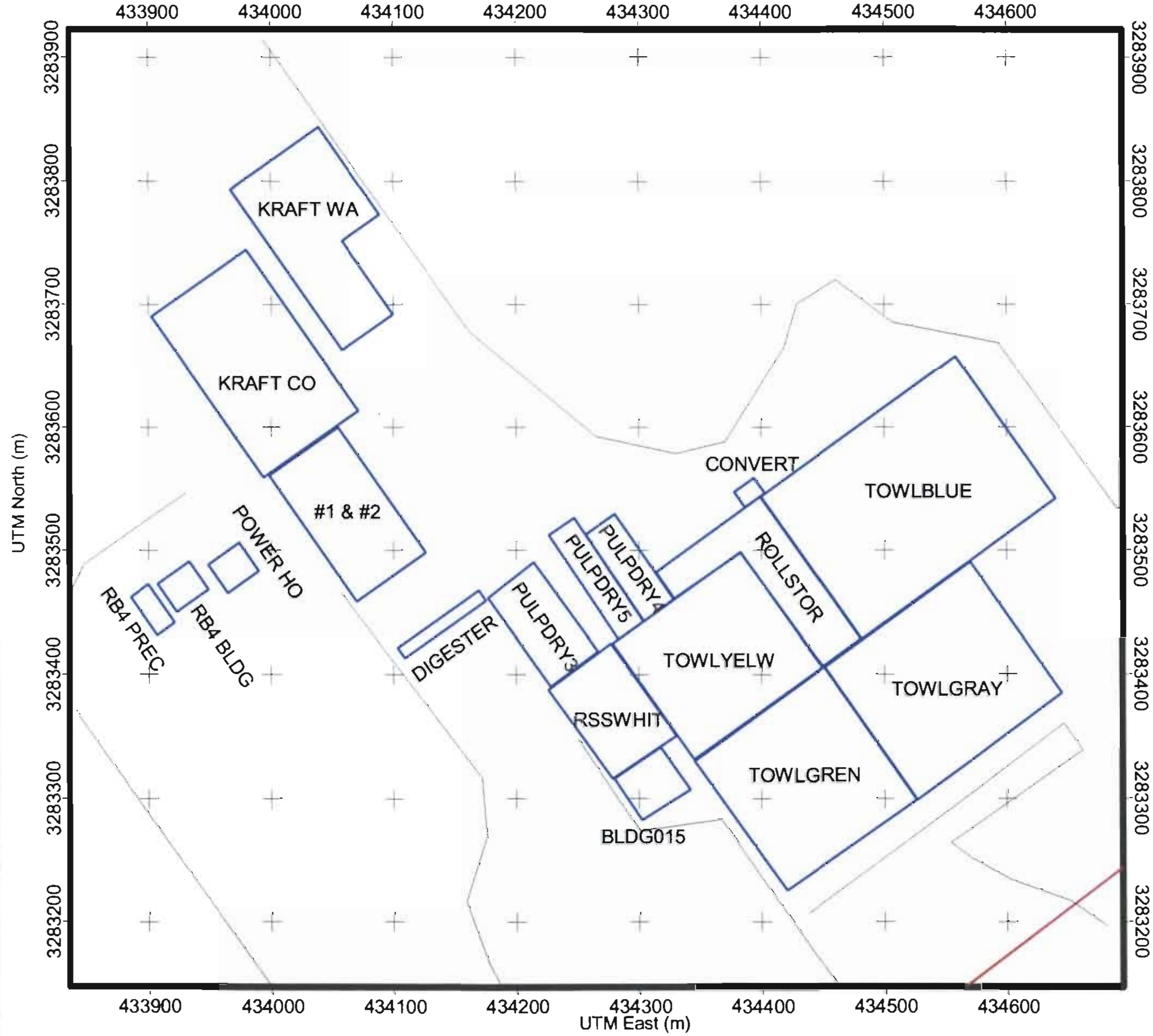
Legend

- Buildings
- Roads
- Property Boundary

Scale

100 0 100 Meters

N W E S



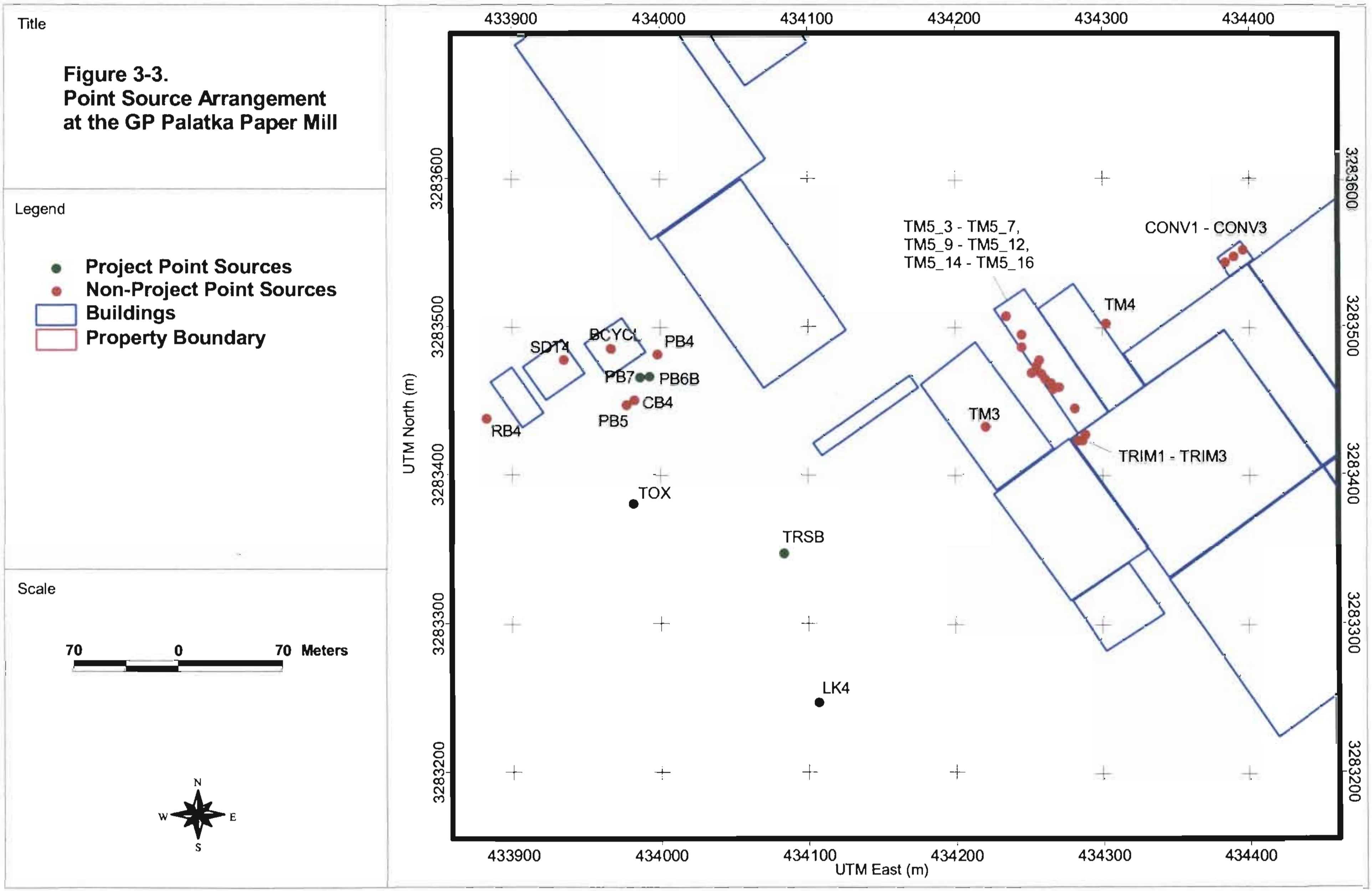


Figure 3-3.
Point Source Arrangement
at the GP Palatka Paper Mill

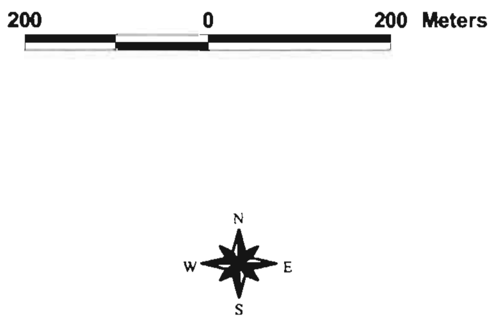
Title

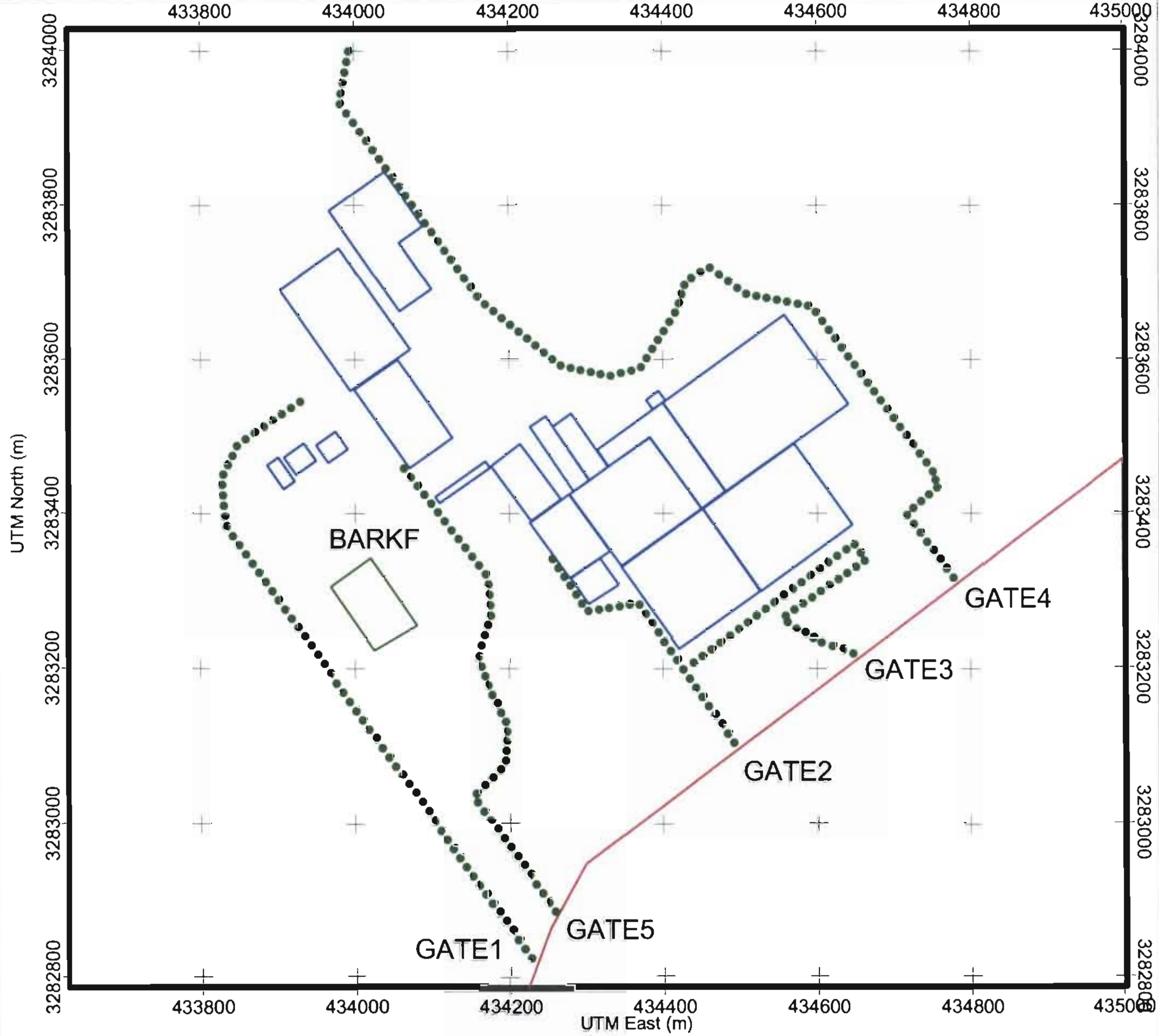
Figure 3-4.
Location of Road Sources and Area Sources at the GP Palatka Paper Mill

Legend

- Road Volume Sources
- Area Sources
- Buildings
- Property Boundary

Scale





Title

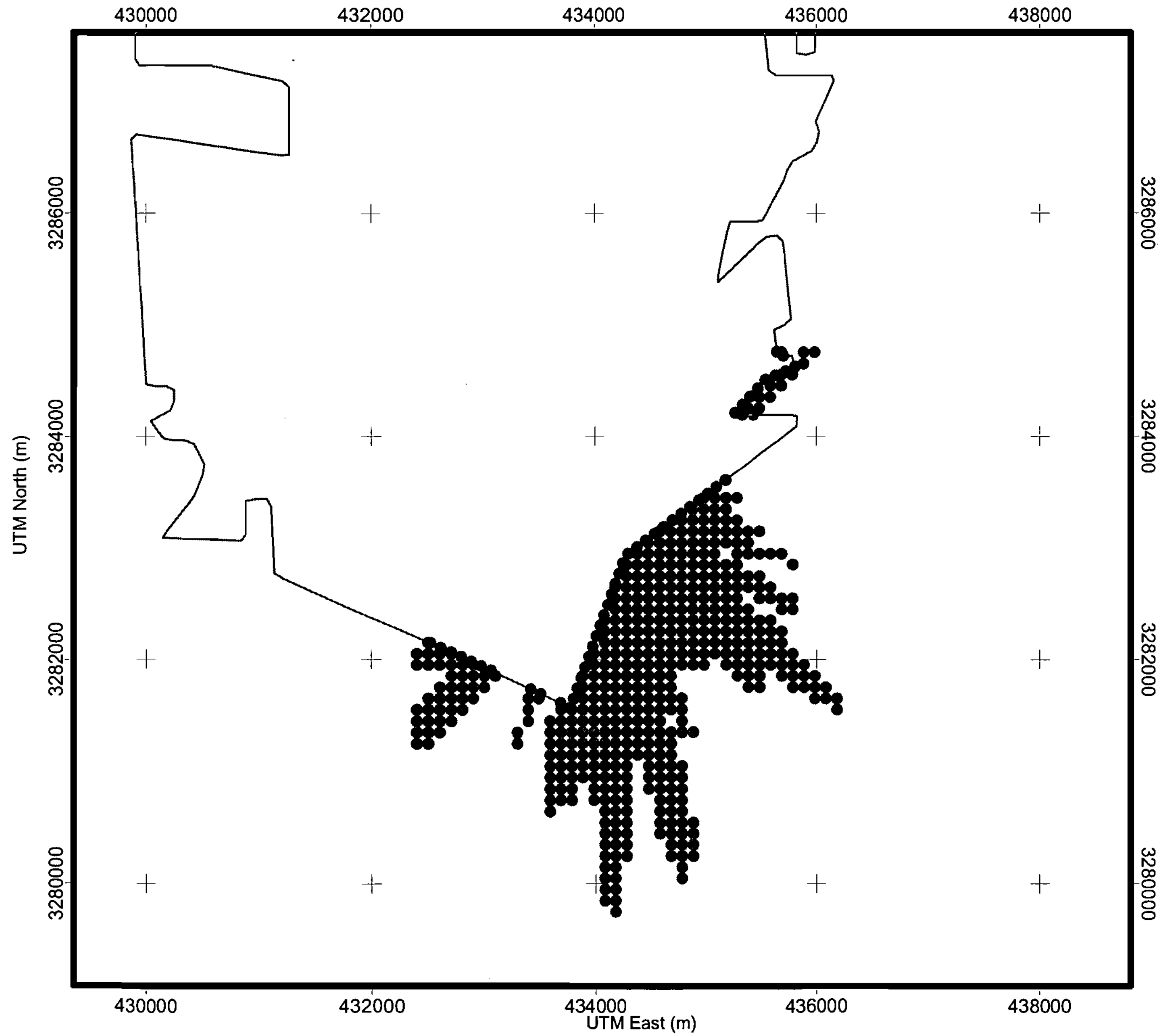
Figure 3-5.
Predicted PM10
Significant Impact Receptors
GP Palatka No. 4 Lime Kiln Project

Legend

● **LK4 Project Significant Impacts - PM10**
▭ **Property Boundary**

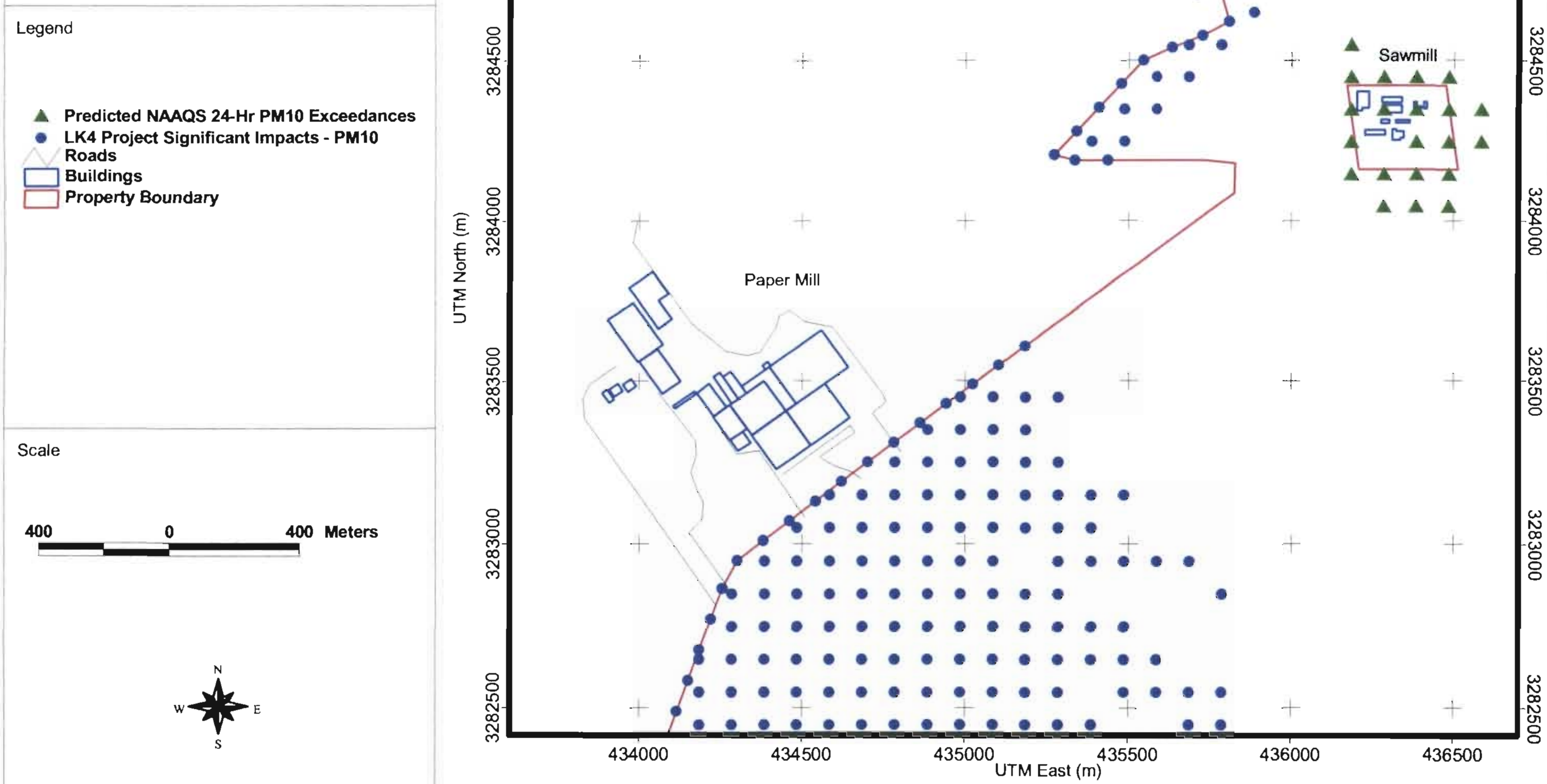
Scale

1000 0 1000 Meters



Title

Figure 3-6.
Areas of Predicted 24-Hour PM10 NAAQS Exceedances



Title

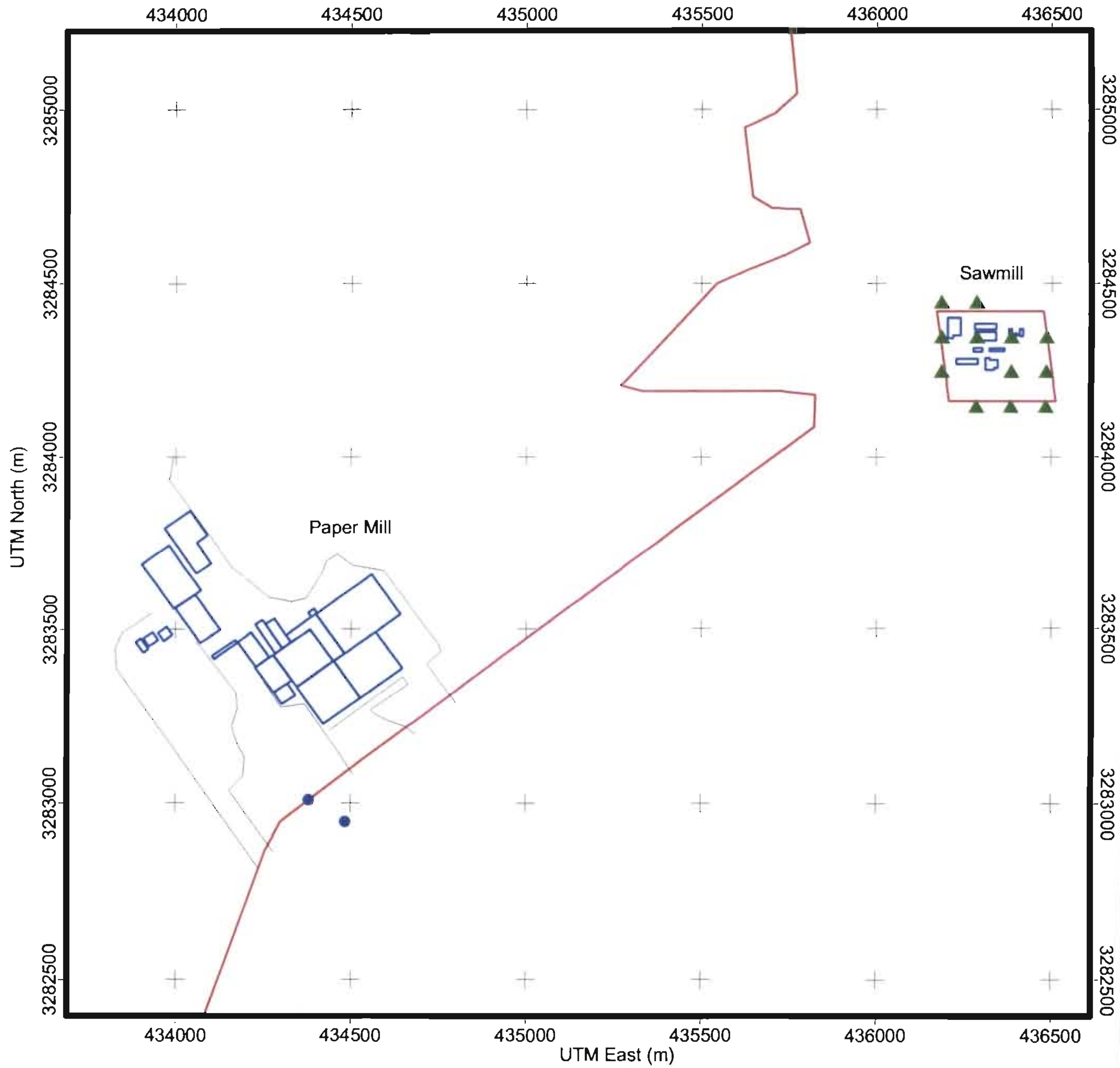
Figure 3-7.
Areas of Predicted Annual PM10 NAAQS Exceedances

Legend

- Predicted NAAQS Annual PM10 Exceedances
- LK4 Project Annual Significant Impacts-PM10
- Roads
- Buildings
- Property Boundary

Scale

400 0 400 Meters



Title

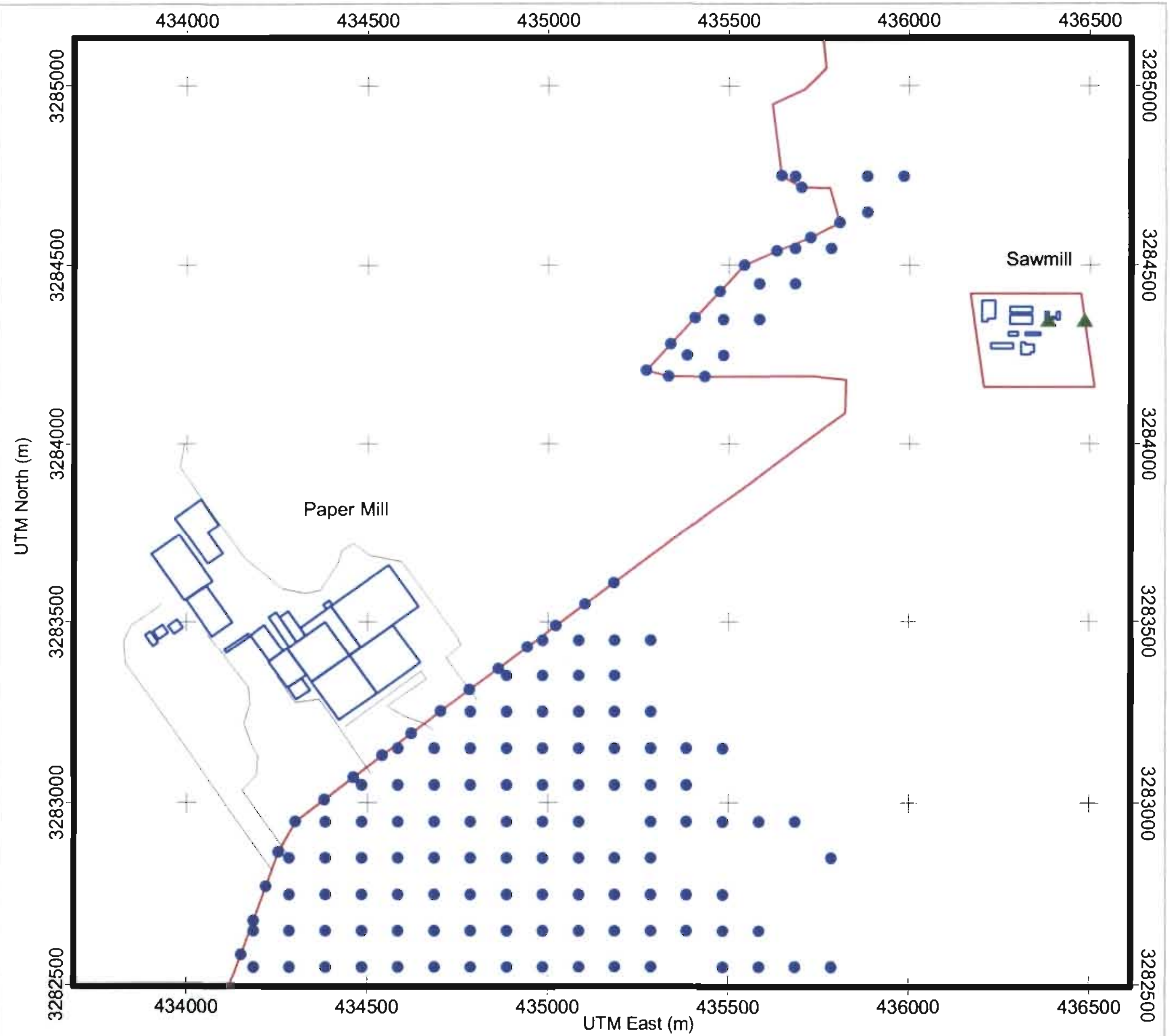
Figure 3-8.
Areas of Predicted 24-Hour
PM10 PSD Class II Exceedances

Legend

- ▲ **Predicted Increment PM10 Exceedances**
- ● **LK4 Project Significant Impacts - PM10**
- **Roads**
- **Buildings**
- **Property Boundary**

Scale

400 **0** **400 Meters**



Title

Figure 3-9.
CALMET Modeling Domain
Used in the Class I Analysis

Legend

★ GP Palatka Paper Mill

Class I Areas

Scale

100 0 100 Kilometers

N W E S

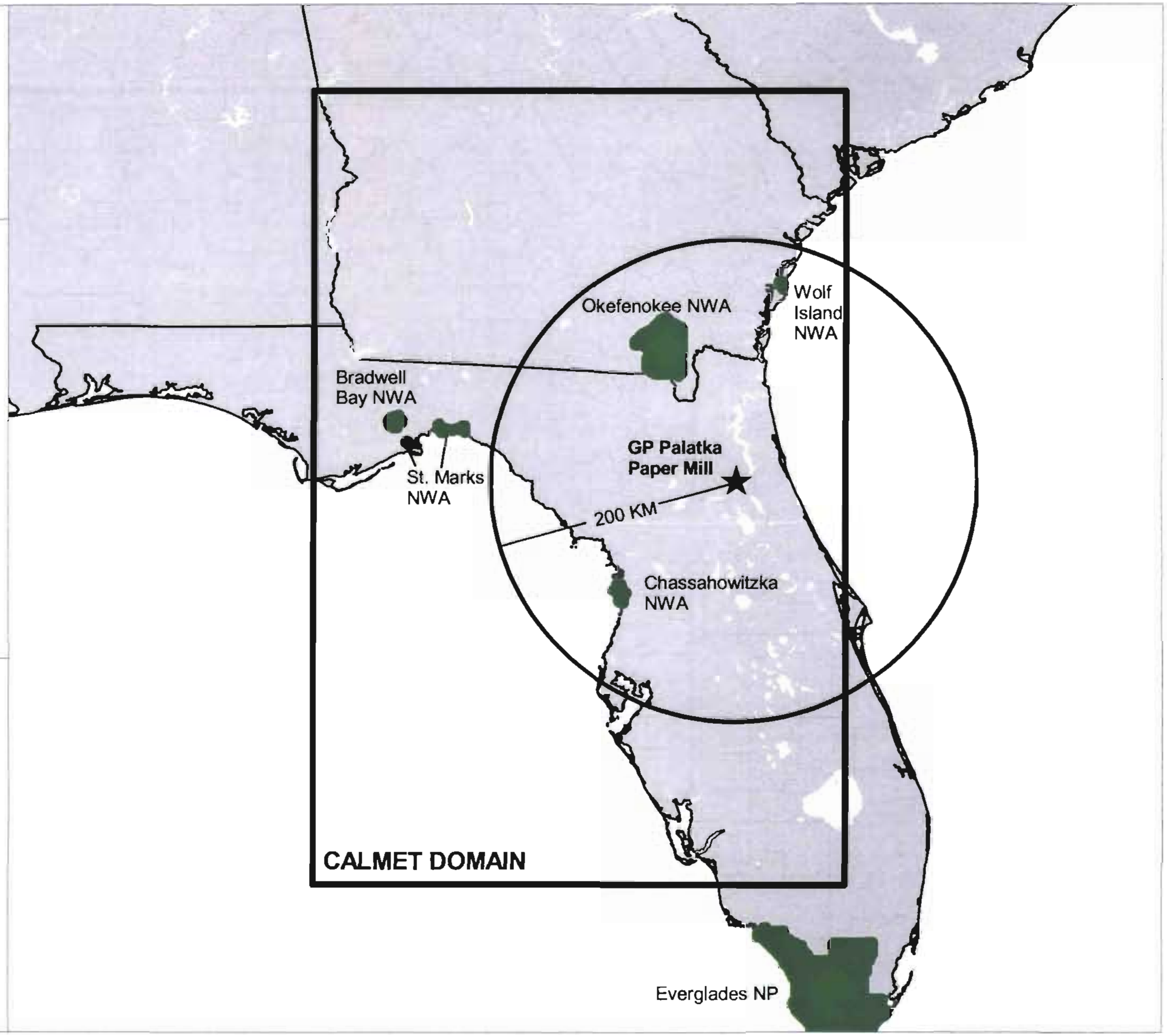
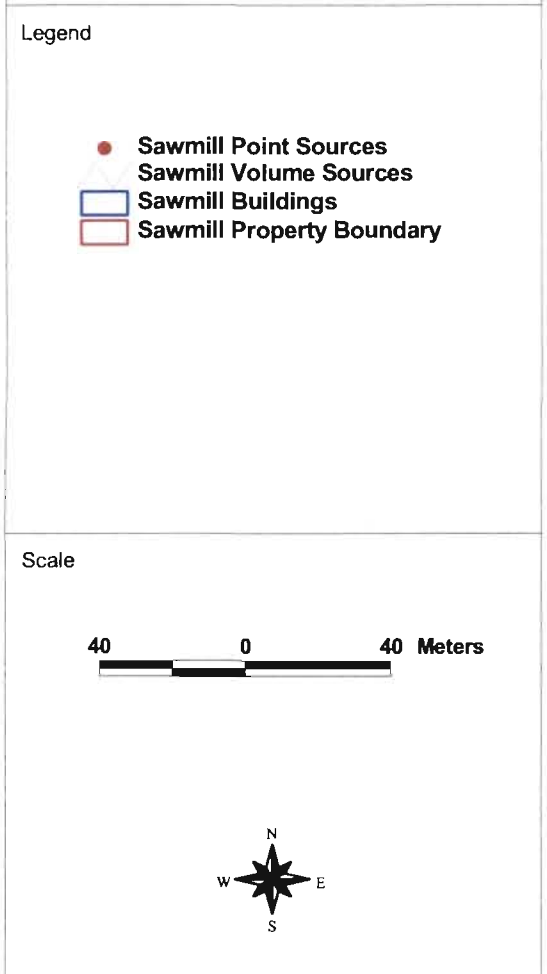


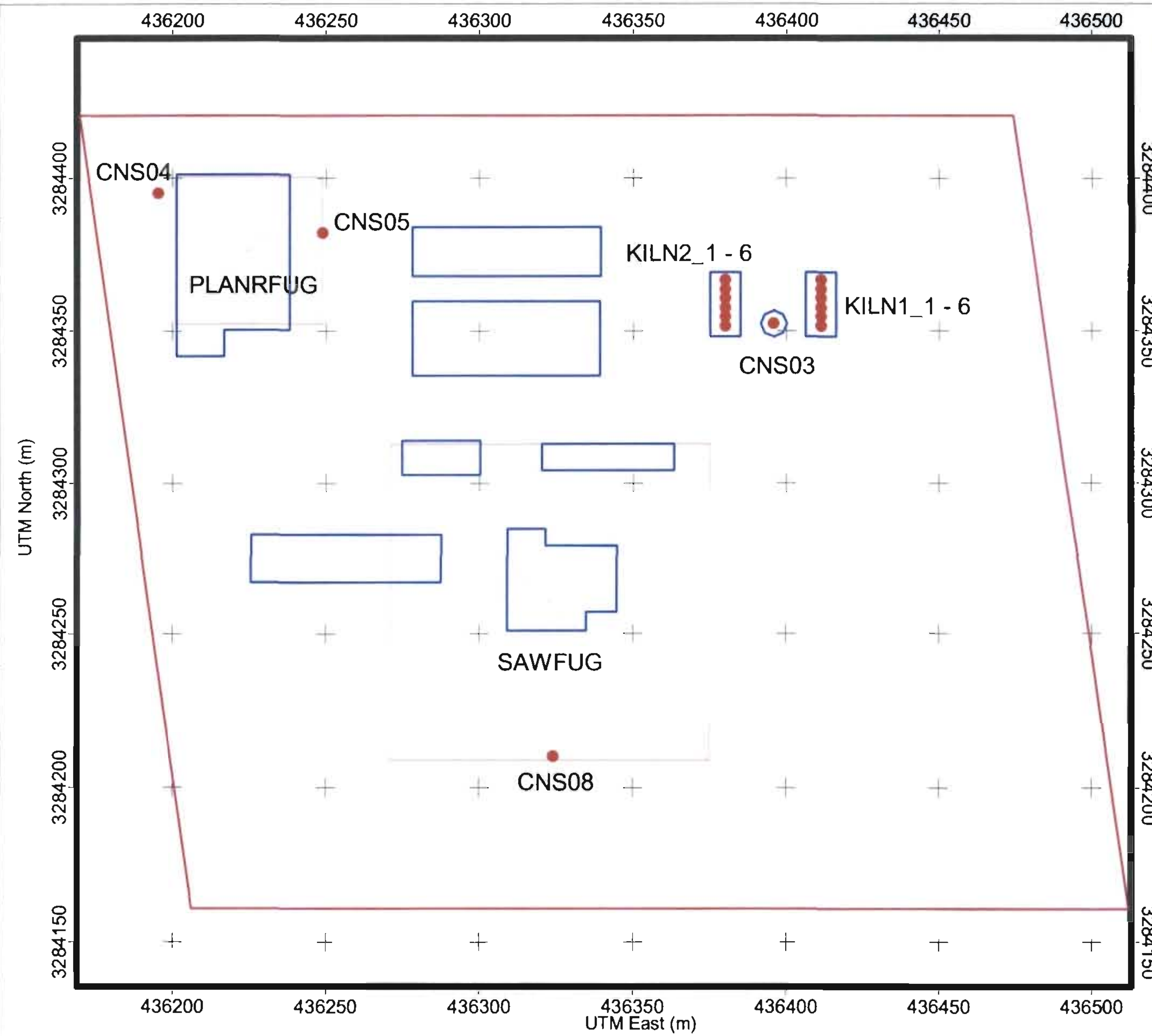
Table APP-1. Structure Dimensions for the Chip-N-Saw Mill Used in the Modeling Analysis

Structure	Height		Length		Width	
	(ft)	(m)	(ft)	(m)	(ft)	(m)
Chip-N-Saw Building	25	7.6	116	35.4	112	34.1
Dry Finish Lumber Shed	20	6.1	200	61.0	50	15.2
Dry Rough Lumber Shed 1	20	6.1	200	61.0	50	15.2
Dry Rough Lumber Shed 2	20	6.1	200	61.0	80	24.4
Kiln 1	30	9.1	68	20.7	33	10.1
Kiln 2	30	9.1	68	20.7	33	10.1
Kiln Fuel Silo	72	21.9	28	8.5	28	8.5
Sorter	21.5	6.6	140	42.7	29	8.8
Stacker	21	6.4	84	25.6	37	11.3
Planer Mill	22	6.7	195	59.4	120	36.6

Title

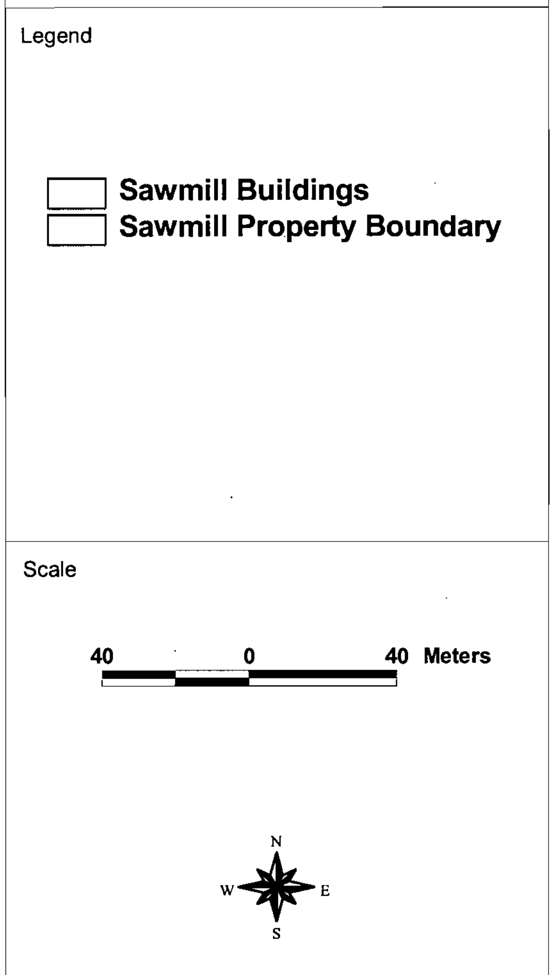
Figure APP3B-1.
Locations of Point and Area Sources at the GP Palatka Sawmill

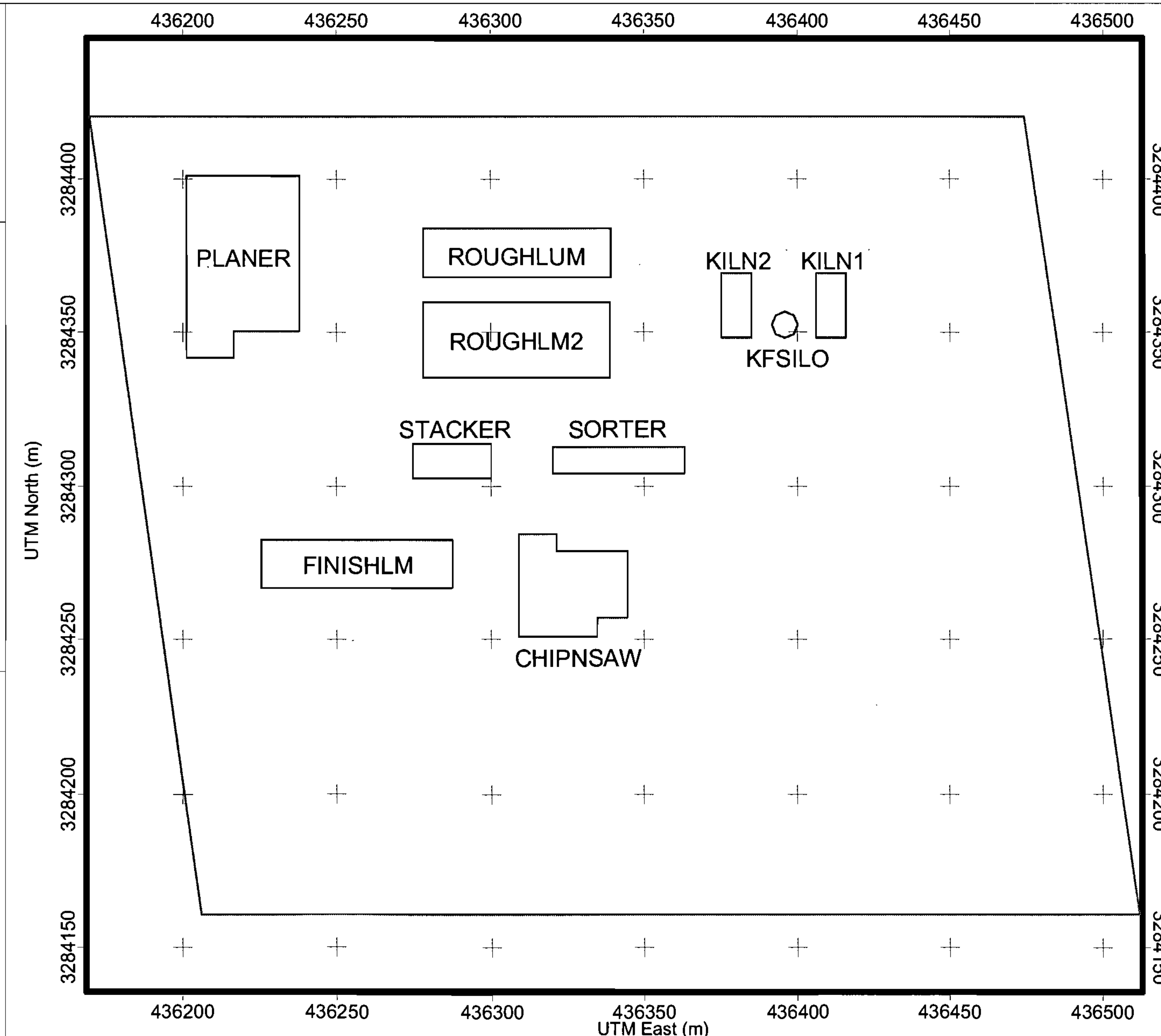




Title

Figure APP3B-2.
Buildings Considered in the Downwash Analysis for the GP Palatka Sawmill





GP Palatka LK4 and Contemporaneous Projects - Modeling Files
April, 2005
Golder Associates Inc
Steve Marks smarks@golder.com (352) 336-5600 Ext 539

```
*******************************************************************
Use WinZip to return ZIP files to original directory structure
*******************************************************************

CALPUFF Files are contained in folders for each year: \1990, \1992 and \1996
NOTE: CALPUFF SYSTEM FILENAMES ARE THE SAME FOR EACH YEAR
-------------------------------------------------------------------
UNDER EACH YEAR ARE THE FOLLOWING FOLDERS:
-----------------------------------------
calpuff and calsum
postutil for deposition
calpost for deposition
calpost for concentrations
calpost for visibility
-----------------------

File Name                  Description
--------------    ------------------------------------------------------

Under \Calpuff and calsum
-----------------------------------------------------------
PUFFAVEC.INP/LST - CALPUFF CONTROL/LIST - CONTEMP. PROJECT ANNUAL EMISS. CURRENT
PUFFAVEF.INP/LST - CALPUFF CONTROL/LIST - CONTEMP. PROJECT ANNUAL EMISS. FUTURE
PUFFMAXC.INP/LST - CALPUFF CONTROL/LIST - CONTEMP. PROJECT MAX EMISS. CURRENT
PUFFMAXF.INP/LST - CALPUFF CONTROL/LIST - CONTEMP. PROJECT MAX EMISS. FUTURE
SUMAVE.INP/LST   - CALSUM INPUT/LIST FILES - ANNUAL EMISSIONS CONCENTRATIONS
SUMAVED.INP/LST  - CALSUM INPUT/LIST FILES - ANNUAL EMISSIONS DRY FLUX
SUMAVEW.INP/LST  - CALSUM INPUT/LIST FILES - ANNUAL EMISSIONS WET FLUX
SUMMAX.INP/LST   - CALSUM INPUT/LIST FILES - MAXIMUM EMISSIONS CONCENTRATIONS

Under \Postutil for deposition
------------------------------
PUTDEP.INP/LST     Postutil input and list - annual deposition

Under \Calpost for deposition
-----------------------------
PSTNDPOK.INP/LST - Calpost input/list - N Deposition for Okefenokee
PSTNDPWI.INP/LST - Calpost input/list - N Deposition for Wolf Island
PSTSDPCH.INP/LST - Calpost input/list - N Deposition for Chassahowitzka

Under \Calpost for visibility
------------------------------
PSTVISOK.INP/LST - Calpost input/list - Regional Haze for Okefenokee
PSTVISWI.INP/LST - Calpost input/list - Regional Haze for Wolf Island
PSTVISCH.INP/LST - Calpost input/list - Regional Haze for Chassahowitzka

Under \Calpost for concentrations
---------------------------------
PSTNOXOK.INP/LST - Calpost input/list - NOX concentrations for Okefenokee
PSTNOXWI.INP/LST - Calpost input/list - NOX concentrations for Wolf Island
PSTNOXCH.INP/LST - Calpost input/list - NOX concentrations for Chassahowitzka
PSTPMOK.INP/LST  - Calpost input/list - PM10 concentrations for Okefenokee
PSTPMWI.INP/LST  - Calpost input/list - PM10 concentrations for Wolf Island
PSTPMCH.INP/LST  - Calpost input/list - PM10 concentrations for Chassahowitzka


Under \Executables
--------------------
EXE Files for CALPUFF, CALSUM, POSTUTIL, and CALPOST

Under \Ozone
--------------------
Hourly ozone files from FDEP for 1990, 1992, and 1996
-------------------------------------------------------

The following folders are under \ISCST Files:
-------------------------------------------
\Metdata - 5 years of Jacksonville/Waycross, 1984-1988
\NAAQS Analyses        - contains NAAQS folders for PM10 and NOX
\PSD CLASS II Analyses - contains PSD Class II folders for PM10 and NOX
\Sig Analyses          - contains Sig Analysis folders for PM10 and NOX

Under \Sig Analyses\PM10
----------------------
Pmsig24.zip  - ISCST3 INPUT/LIST/SUM AND PLOT FILES FOR 24-HOUR AVERAGE
PMSIGAN.zip  - ISCST3 INPUT/LIST/SUM AND PLOT FILES FOR ANNUAL AVERAGE

Under \Sig Analyses\NOX
----------------------
noxsig.zip   - ISCST3 INPUT/LIST/SUM AND PLOT FILES FOR NOX

Under \NAAQS Analyses\PM10
-------------------------
Pmaqs.zip    -  INPUT/LIST/EVENT/SUM AND PLOT FILES FOR PM10 NAAQS ANALYSIS
PMAQS24X.ZIP - INPUT/LIST/SUM FOR PROJECT IMPACT AT RECEPTORS OVER 24-HOUR NAAQS
PMAQSANX.ZIP - INPUT/LIST/SUM FOR PROJECT IMPACT AT RECEPTORS OVER ANNUAL NAAQS

Under \NAAQS Analyses\NOX
-------------------------
noxaqs.zip  - ISCST3 INPUT/LIST/SUM FILES FOR NOX NAAQS ANALYSIS

Under \PSD Class II Analyses\PM10
----------------------
```

```
Pmcl2.zip   - ISCST3 INPUT/LIST AND PLOT FILES FOR PM10 PSD INCREMENT ANALYSIS
Pmcl2X.zip  - INPUT/LIST/SUM FOR PROJECT IMPACT AT RECEPTORS OVER 24-HOUR INCREMENT

Under \PSD Class II Analyses\NOX
----------------------
noxcl2.zip  - ISCST3 INPUT/LIST FILES FOR NOX PSD INCREMENT ANALYSIS


Under \BPIP
-----------
GPPALUTM.BPI      BPIP Input File for Paper Mill
GPPALUTM.BPO      BPIP Output File for Paper Mill
GPPALUTM.SUM      BPIP Summary File for Paper Mill
GPSAWMIL.BPI      BPIP Input File for GP Chip-N-Saw Mill
GPSAWMIL.BPO      BPIP Output File for GP Chip-N-Saw Mill
GPSAWMIL.SUM      BPIP Summary File for GP Chip-N-Saw Mill
```

Georgia-Pacific

Palatka Pulp and Paper Operations
Consumer Products Division

P.O. Box 919
Palatka, FL 32178-0919
(386) 325-2001

RUN 7/20/07

April 14, 2005

Ms. Trina Vielhauer
Chief, Bureau of Air Regulation
Florida Department of Environmental Protection
Division of Air Resource Management
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Re: Georgia-Pacific Palatka Mill
Request to Replace the Lime Kiln Shell and Associated Tube Coolers
Project No.: 1070005-030-AC/PSD-FL-345

Dear Ms. Vielhauer:

Per our response to the Agency's Request for Information (RAI) (letter from Georgia-Pacific to Ms. Vielhauer, dated December 7, 2004), this letter provides the updated information for the application referenced in our answer to Question 8. This letter also addresses the Agency's request, per Question 3 of the second RAI (letter (draft) from Georgia-Pacific to Ms Vielhauer, dated April 5, 2005), that contemporaneous changes be considered as part of the air quality analysis. Each of these updates is discussed briefly in the following sections:

Flow Rate Update

As summarized in our answer to Question 8 of the first RAI (December 7, 2004), recent testing has indicated a flow rate for the Lime Kiln as high as 54,200 dry standard cubic feet per minute (dscfm) at 10% (March 2004 testing). As you are aware, the emission calculations associated with the application at hand utilize a flow rate of 44,500 dscfm (also at 10% oxygen). While the flow rate from the March 2004 test is higher than what has been measured in the past, the student t-test indicates that there is not a statistically significant difference between the 1992-1998 flow rates compared to the 1999-2004 flow rates.

The increased flow rate impacts the future potential emission calculations for total reduced sulfur (TRS), particulate matter (PM), particulate matter less than 10 microns in aerodynamic diameter (PM_{10}), nitrogen oxides (NO_x), carbon monoxide (CO) and volatile organic compounds (VOCs). The revised emission calculations are provided in Attachment 1 to this letter. Table 1 compares the future potential values reported in the original application (August 2004) to the revised values reflecting the higher flow rate (Attachment 1).

Table 1. Comparison of Revised Rates to August 2004 Rates

Pollutant	Future Potential August 2004 (tpy)	Future Potential Revised (tpy)
TRS	20.7	25.2
PM/PM_{10}	135.3	164.8
NO_x	383.7	467.2
CO	58.6	71.4
VOCs	89.8	109.5

The original PSD permit application addressed PM, PM_{10}, NO_x, ozone (based on a significant increase in VOCs) and TRS (including hydrogen sulfide (H_2S). There are no changes in the pollutants that trigger Prevention of Significant Deterioration (PSD) review as a result of this update.

Inclusion of Contemporaneous Emission Changes

In the August 2004 application, a netting analysis was not performed, as the inclusion of the creditable increases and decreases had no bearing on the pollutants that would be required to undergo PSD review. However, as requested in the Department's second RAI (letter from Ms. Vielhauer, dated January 7, 2005), the contemporaneous changes are now included, both in the applicability analysis and in the air quality analysis.

One other, albeit minor, update has been made for the estimate of past actual emissions for lead (Pb). The original, past actual calcium oxide (CaO) throughputs that were used in the calculations were 107,017 and 111,329 tons CaO per year for 2002 and 2003, respectively. In responding to the Department's second RAI, using a slightly different technique, the Mill updated these throughputs to 111,564 and 112,423 tons CaO for 2002 and 2003, respectively. This change increases the estimate of past actual emissions of Pb from 0.011 to 0.012 ton per year. This actually reduced the "project" increase for Pb from 0.007 to 0.006 ton per year. Lead was the only pollutant where the CaO throughput was utilized in calculating past actual emissions. As such, the past actual emissions for the other pollutants are not impacted by this minor update. With this update, the increased emissions are compared to the PSD significant increase thresholds in Table 2.

Table 2. Past Actual and Proposed Allowable Emissions Compared to PSD Significance Levels

	Emissions (tons per year)							
	NO_x	**CO**	**PM/PM_{10}**	**SO_2***	**VOCs**	**Pb**	**TRS**	**SAM***
Potential Emissions	467.2	71.4	164.8	40.0	109.5	0.018	25.2	2.0
Past Actual Emissions	100.6	5.6	42.5/36.6	10.5	2.4	0.012	2.3	0.51
Emissions Increase	366.6	65.8	122.3/128.2	29.5	107.1	0.006	22.9	1.5
PSD Significance Level	40	100	25/15	40	40	0.6	10	7
Netting Triggered?	Yes	No	Yes	No	Yes	No	Yes	No

* Emissions are not updated for this pollutant as part of this submittal.

Based on these increases, and following the direction of the Department in Question 3 of the second RAI, netting is now required for PM, PM_{10}, NO_x, VOCs and TRS (including H_2S). These are the same pollutants that were shown to trigger PSD review in the August 2004 application. The netting analysis is provided in Table 3.

Table 3. Netting Analysis (all emissions expressed in tons per year)

Project	NO_x	PM	PM_{10}	VOC	TRS
Increases from Lime Kiln Project (Table 2)	366.6	122.3	128.2	107.1	22.9
Creditable, Contemporaneous Projects[a]					
New Bleach Plant	---	---	---	-64.0	+7.8
Chlorine Dioxide Plant	---	---	---	+0.08	---
MACT I Compliance Project	+139.7[b]	+10.1	+10.1	+2.4	-3.1
No. 7 Package Boiler (w/shutdown of No. 6 Boiler)	+30.2	+1.4	+1.4	+0.58	---
Bark Hog Replacement	---	+8.2[c]	+3.3[c]	+300.4[b,c]	---
Total Contemporaneous Changes	+30.2	+19.7	+14.8	0.0	+4.7
Net Emissions Increase (after netting)	396.8	142.0	143.0	107.1	27.6
PSD Review Required (yes or no)?	Yes	Yes	Yes	Yes	Yes

[a] Permits for the various projects are as follows:
New Bleach Plant – Permit Nos. 1070005-006, 010, and 019-AC, start-up February 2001
Chlorine Dioxide Plant – Permit No. 1070005-005-AC, start-up February 2001
MACT I Compliance Project – Permit Nos. 1070005-007 and 017-AC, start-up 2002
New Package Boiler (EU-044) – Permit No. 1070005-018-AC, start-up October 2002
Bark Hog Replacement – Permit No. 1070005-028-AC and PSD-FL-341, start-up March 2005

[b] Project triggered PSD/PCP. As such, this and prior contemporaneous increases and decreases, cannot be considered in
the emissions netting for this project.

[c] As estimated by FDEP (see Technical Evaluation and Preliminary Determination for Bark Hog Replacement Project)

Based on the results of the netting analysis, PSD review is still required for PM, PM_{10}, NO_x, VOCs and TRS (including H_2S). These are the same pollutants that were shown to trigger PSD review in the August 2004 application.

The implications of these changes are discussed in the following sections for each aspect of the PSD permit application.

Permit Application Forms

Updated forms are provided in Attachment 2 to this letter. The only forms that are included are those that are updated as part of this submittal.

Regulatory Applicability

As discussed above, while the increases, after the netting, are greater for NO_x, PM, PM_{10}, VOCs and TRS, no additional pollutants trigger PSD review as a result of this update.

With regard to New Source Performance Standards (NSPS) applicability, the facts and conclusions presented in Section 5.2 of the August 2004 application do not change with this update. The Lime Kiln will not become subject to NSPS Subpart BB as a result of the proposed maintenance work. As discussed in Section 5.3 of the August 2004 application, the Lime Kiln is subject to the National Emission Standards for Hazardous Air Pollutants for Chemical Recovery Combustion Sources as an existing source. The specific updates that are addressed in this letter do not impact the applicability of that regulation in any way. Furthermore, no additional Florida Department of Environmental Protection (FDEP) regulations apply as a result of this update.

Air Quality Analysis

The air quality analysis has been updated based on the revised flow rate and resulting emission rates. The analysis has also been revised to include the contemporaneous changes listed in Table 3. The updated air quality analysis is provided in Attachment 3 to this letter.

This project at the Palatka Mill, including the contemporaneous emission changes, does not cause or contribute to violations of the National Ambient Air Quality Standards (NAAQS) or PSD Class II increments.

As discussed in great detail in Attachment 3, exceedances of the NAAQS, however, do occur as a result of PM emissions from a competing source. However, the Lime Kiln project at the Palatka Mill (including contemporaneous changes) is not significant at those receptors. For NO_x, there are no exceedances of either the NAAQS or PSD Class II increment.

Best Available Control Technology (BACT) Analysis

The only pollutants that would potentially be impacted in the BACT analysis would be those that had a cost effectiveness calculation presented in the August 2004 application. In the BACT analysis that was presented as Attachment D of that application, this only included PM. For PM, a cost effectiveness calculation was performed in assessing the impact of using a scrubber/electrostatic precipitator (ESP) combination. Since the cost effectiveness calculation relied on baseline emissions (per EPA guidance) and these costs were excessively high, the existing scrubber would still be considered BACT for PM. In fact, based on the higher flow rate, the estimated capital costs for the ESP would likely increase even further, resulting in an even higher cost effectiveness.

If you have any questions regarding this information, please contact Ms. Myra Carpenter at 386/329-0918.

Sincerely,

Theodore D. Kennedy

Theodore D. Kennedy
Vice President

cc: T.D. Kennedy
W.M. Jernigan
T.R. Wyles

Attachment 1
Emission Rate Calculations (Updated)

Attachment 1
Emission Rate Calculations (Updated April 2005)
Palatka Mill, Lime Kiln – Shell Replacement

Emission Rate Calculations for Lime Kiln

Recent Stack Test Results

Pollutant	Test Results (lbs/hour)	
	2002	**2003**
Total Reduced Sulfur (TRS)	0.606	0.556
Sulfur Dioxide (SO_2)	1.06	4.3
Particulate Matter (PM)	9.51	11.94
Fine Particulate Matter (PM_{10})	8.18[1]	10.27[1]
Nitrogen Oxides (NO_x)	18.88	32.0
Carbon Monoxide (CO)	1.04	1.8
Volatile Organic Compounds (VOCs)	0.58	0.609

[1] PM_{10} assumed to be 86% of PM (from annual emissions reports).

Operating Hours:	2002	8,145 hours/year
	2003	7,763 hours/year
CaO Throughput	2002	111,564 tons/year
	2003	112,423 tons/year
	Maximum	170,294 tons/year (19.44 tons/hour)

Baseline Emissions (average 2002/2003 and based on average of recent stack tests and emission factors)

Total Reduced Sulfur (based on stack tests)

2002 0.606 lb/hour x 8,145 hours/year x ton/2000 lbs = 2.5 tpy
2003 0.556 lb/hour x 7,763 hours/year x ton/2000 lbs = 2.2 tpy

Average 2.3 tpy

Sulfur Dioxide

2002 1.06 lbs/hour x 8,145 hours/year x ton/2000 lbs = 4.3 tpy
2003 4.3 lbs/hour x 7,763 hours/year x ton/2000 lbs = 16.7 tpy

Average 10.5 tpy

Particulate Matter (total)

2002 9.51 lbs/hour x 8,145 hours/year x ton/2000 lbs = 38.7 tpy
2003 11.94 lbs/hour x 7,763 hours/year x ton/2000 lbs = 46.3 tpy

Average 42.5 tpy

Particulate Matter (PM_{10})

2002 8.18 lbs/hour x 8,145 hours/year x ton/2000 lbs = 33.3 tpy
2003 10.27 lbs/hour x 7,763 hours/year x ton/2000 lbs = 39.9 tpy

Average 36.6 tpy

Nitrogen Oxides

2002 18.88 lbs/hour x 8,145 hours/year x ton/2000 lbs = 76.9 tpy
2003 32.0 lbs/hour x 7,763 hours/year x ton/2000 lbs = 124.2 tpy

Average 100.6 tpy

Carbon Monoxide

2002 1.04 lbs/hour x 8,145 hours/year x ton/2000 lbs = 4.2 tpy
2003 1.8 lbs/hour x 7,763 hours/year x ton/2000 lbs = 7.0 tpy

Average 5.6 tpy

Volatile Organic Compounds

2002 0.58 lb/hour x 8,145 hours/year x ton/2000 lbs = 2.4 tpy
2003 0.609 lb/hour x 7,763 hours/year x ton/2000 lbs = 2.4 tpy

Average 2.4 tpy

Sulfuric Acid Mist

Calculated based on basis of 4% of sulfur dioxide being sulfates and then correcting the molecular weight for sulfuric acid mist

10.5 tpy (average) x 0.04 (4%) x 98/80 (ratio of molecular weights for H_2SO_4 and SO_3) = 0.51 tpy

Average = 0.51 tpy

Lead

Calculated based on current NCASI factor from Technical Bulletin 701 – see attached HAP spreadsheet for detailed explanation of emission factor

2002	111,564 tons CaO/year x 2.1 x 10^{-4} lbs/ton CaO x ton/2000 lbs = 0.012 tpy
2003	112,423 tons CaO/year x 2.1 x 10^{-4} lbs/ton CaO x ton/2000 lbs = 0.012 tpy
Average	*0.012 tpy*

Future Potential Emissions

For conversions from parts per million (ppm) to mass emission rates (lbs/hour), the following formula and factors are used:

PV=nRT, where n=mass/molecular weight (MW)

Therefore, mass/volume (V) = P x MW/R x T

P = pressure = 1 atmosphere x 14.7 lb/in^2/atmosphere x 144 in^2/ft^2 x = 2116.8 lb/ft^2
T = temperature = 68 degrees Fahrenheit (°F) = 528 R
R = 1545.6 ft-lb$_f$/lb mole-R
Flow rate (from testing; see discussion in Section 4 of main text) = 44,500 dscfm (@ 10% oxygen)

Total Reduced Sulfur

Based on 20 ppmvd at 10% oxygen (existing limit)

Corresponding mass emission limits are calculated as follows:

(20 ft^3 TRS/10^6 ft^3 air x 2116.8 lb/ft^2 x 34.1 lb/lb-mole)/(1545.6 ft-lb$_f$/lb mole-R x 528 R)
= 1.77 x 10^{-6} lb/ft^3

Mass emission rate = 1.77 x 10^{-6} lb/ft^3 x 54,200 dscf/min x 60 mins/hour = 5.8 lbs/hour (25.2 tpy)

Sulfur Dioxide

Based on 0.47 lb/ton CaO (NCASI TB 646, February 1993 – from Table 13, average of all of the oil-fired values – 0.18, 0.02, 0.45, 0.07, and 1.63 – average = 0.47 lb/ton CaO)

19.44 ton CaO/hour x 0.47 lb/ton CaO = 9.1 lbs/hour (40.0 tpy)

Particulate Matter (total)

Based on 0.081 gr/dscf at 10% oxygen (existing limit)

Corresponding mass emission limits are calculated as follows:

0.081 gr/dscf x 54,200 dscf/min x 60 mins/hour x lb/7000 grains = 37.6 lbs/hour (164.8 tpy)

Particulate Matter (PM_{10})

Based on 0.081 gr/dscf at 10% oxygen (existing limit)

Corresponding mass emission limits are calculated as follows:

0.081 gr/dscf x 54,200 dscf/min x 60 mins/hour x lb/7000 grains = 37.6 lbs/hour (164.8 tpy)

Nitrogen Oxides

Based on 275 ppmvd at 10% oxygen (lowered from existing limit of 290 ppmvd)

Corresponding mass emission limits are calculated as follows:

(275 ft^3 $NO_x/10^6$ ft^3 air x 2116.8 lb/ft^2 x 46 lb/lb-mole)/(1545.6 ft-lb_f/lb mole-R x 528 R)
= 3.28 x 10^{-5} lb/ft^3

Mass emission rate = 3.28 x 10^{-5} lb/ft^3 x 54,200 dscf/min x 60 mins/hour = 106.7 lbs/hour (467.2 tpy)

Carbon Monoxide

Based on 69 ppmvd at 10% oxygen (existing limit)

(69 ft^3 CO/10^6 ft^3 air x 2116.8 lb/ft^2 x 28 lb/lb-mole)/(1545.6 ft-lb_f/lb mole-R x 528 R)
= 5.01 x 10^{-6} lb/ft^3

Mass emission rate = 5.01 x 10^{-6} lb/ft^3 x 54,200 dscf/min x 60 mins/hour = 16.3 lbs/hour (71.4 tpy)

Volatile Organic Compounds

Based on 185 ppmvd at 10% oxygen (existing limit); used molecular weight for methane (CH_4)

(185 ft^3 VOC/10^6 ft^3 air x 2116.8 lb/ft^2 x 16 lb/lb-mole)/(1545.6 ft-lb_f/lb mole-R x 528 R)
= 7.68 x 10^{-6} lb/ft^3

Mass emission rate = 7.68 x 10^{-6} lb/ft^3 x 54,200 dscf/min x 60 mins/hour = 25.0 lbs/hour (109.5 tpy)

Sulfuric Acid Mist

Assume 4% of sulfur dioxide is sulfates

9.1 lbs/hour x 0.04 = 0.36 lb/hour (as sulfates)

SAM rate = 0.36 lb/hour x 98 lbs SAM/lb-mole SAM x lb-mole SAM/lb-mole SO_3
x lb-mole SO_3/80 lbs SO_3 = 0.45 lb/hour (2.0 tpy) as SAM

Lead

Updated factors to match NCASI Technical Bulletin 701, Table 14A; details provided in attached HAP tables

19.44 tons CaO/hour x 2.1 x 10^{-4} lb Pb/ton CaO = 0.0041 lb/hour (0.018 tpy)

Summary – Emission Rate Calculations and Changes

Annual Emission Rates and Changes (tons per year)

	TRS	SO_2	PM/PM_{10}	NO_x	CO	SAM	VOCs	Pb
Potential	25.2	40.0	164.8	467.2	71.4	2.0	109.5	0.018
Baseline	2.3	10.5	42.5/36.6	100.6	5.6	0.51	2.4	0.012
Change	22.9	29.5	122.3/128.2	366.6	65.8	1.5	107.1	0.006
PSD Significance Level	10	40	25/15	40	100	7	40	0.6
PSD Triggered?	Yes	No	Yes	Yes	No	No	Yes	No

TRS – total reduced sulfur compounds
SO_2 – sulfur dioxide
PM – total particulate matter
PM_{10} – particulate matter less than 10 microns in aerodynamic diameter
CO – carbon monoxide
SAM – sulfuric acid mist
VOCs – volatile organic compounds
Pb – lead

Attachment 2
Permit Application Forms (Updated Forms)

Owner/Authorized Representative Statement

Complete if applying for an air construction permit or an initial FESOP.

1. Owner/Authorized Representative Name :
   Theodore D. Kennedy, Vice President, Georgia-Pacific, Palatka Operations
2. Owner/Authorized Representative Mailing Address...
   Organization/Firm: **Georgia-Pacific Corporation**
   Street Address: **P.O. Box 919**
   City: **Palatka** State: **FL** Zip Code: **32178**
3. Owner/Authorized Representative Telephone Numbers...
   Telephone: **(386) 325-2001** ext. Fax: **(386) 328-0014**
4. Owner/Authorized Representative Email Address: **Ted.Kennedy@gapac.com**
5. Owner/Authorized Representative Statement:

   I, the undersigned, am the owner or authorized representative of the facility addressed in this air permit application. I hereby certify, based on information and belief formed after reasonable inquiry, that the statements made in this application are true, accurate and complete and that, to the best of my knowledge, any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. The air pollutant emissions units and air pollution control equipment described in this application will be operated and maintained so as to comply with all applicable standards for control of air pollutant emissions found in the statutes of the State of Florida and rules of the Department of Environmental Protection and revisions thereof and all other requirements identified in this application to which the facility is subject. I understand that a permit, if granted by the department, cannot be transferred without authorization from the department, and I will promptly notify the department upon sale or legal transfer of the facility or any permitted emissions unit.

   Theodore D Kennedy — Signature   4/13/05 — Date

Professional Engineer Certification

1. Professional Engineer Name: **Mark J. Aguilar**
   Registration Number: **52248**
2. Professional Engineer Mailing Address:
   Organization/Firm: **Georgia-Pacific Corporation**
   Street Address: **133 Peachtree St**
   City: **Atlanta** State: **GA** Zip Code: **30303**
3. Professional Engineer Telephone Numbers...
   Telephone: **(404) 652-4293** ext. Fax: **(404) 654-4706**
4. Professional Engineer Email Address: **mjaguila@gapac.com**
5. Professional Engineer Statement:

I, the undersigned, hereby certify, except as particularly noted herein, that:*

(1) To the best of my knowledge, there is reasonable assurance that the air pollutant emissions unit(s) and the air pollution control equipment described in this application for air permit, when properly operated and maintained, will comply with all applicable standards for control of air pollutant emissions found in the Florida Statutes and rules of the Department of Environmental Protection; and

(2) To the best of my knowledge, any emission estimates reported or relied on in this application are true, accurate, and complete and are either based upon reasonable techniques available for calculating emissions or, for emission estimates of hazardous air pollutants not regulated for an emissions unit addressed in this application, based solely upon the materials, information and calculations submitted with this application.

(3) If the purpose of this application is to obtain a Title V air operation permit (check here ☐, if so), I further certify that each emissions unit described in this application for air permit, when properly operated and maintained, will comply with the applicable requirements identified in this application to which the unit is subject, except those emissions units for which a compliance plan and schedule is submitted with this application.

(4) If the purpose of this application is to obtain an air construction permit (check here ☒, if so) or concurrently process and obtain an air construction permit and a Title V air operation permit revision or renewal for one or more proposed new or modified emissions units (check here ☐, if so), I further certify that the engineering features of each such emissions unit described in this application have been designed or examined by me or individuals under my direct supervision and found to be in conformity with sound engineering principles applicable to the control of emissions of the air pollutants characterized in this application.

(5) If the purpose of this application is to obtain an initial air operation permit or operation permit revision or renewal for one or more newly constructed or modified emissions units (check here ☐, if so), I further certify that, with the exception of any changes detailed as part of this application, each such emissions unit has been constructed or modified in substantial accordance with the information given in the corresponding application for air construction permit and with all provisions contained in such permit.

[signature] 4/8/05

Signature Date

(seal)

*Attach any exception to certification statement.

C. EMISSION POINT (STACK/VENT) INFORMATION
(Optional for unregulated emissions units.)

Emission Point Description and Type

1. Identification of Point on Plot Plan or Flow Diagram: **017**		2. Emission Point Type Code: **1**
3. Descriptions of Emission Points Comprising this Emissions Unit for VE Tracking:		
4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common:		
5. Discharge Type Code: **V**	6. Stack Height: **131** feet	7. Exit Diameter: **4.4** feet
8. Exit Temperature: **164** °F	9. Actual Volumetric Flow Rate: **65,238 acfm**	10. Water Vapor: **34** %
11. Maximum Dry Standard Flow Rate: **54,200 dscfm @ 10% oxygen (03/04 test)**		12. Nonstack Emission Point Height: feet
13. Emission Point UTM Coordinates... Zone: East (km): North (km):		14. Emission Point Latitude/Longitude... Latitude (DD/MM/SS) Longitude (DD/MM/SS)
15. Emission Point Comment: **Maximum Dry Standard Flow Rate is @ 10 percent oxygen. Actual volumetric flow rate and exit temperature reflect observations at highest tested production rate.**		

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: **PM**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **37.6** lb/hour **164.8** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.081 gr/dscf** Reference: **Existing limit**	7. Emissions Method Code: **0**
8. Calculation of Emissions: **0.081 gr/dscf x 54,200 dscf/min x 60 min/hr ÷ 7,000 gr/lb = 37.6 lbs/hour** **Flow rate and emission factor conditions are set to 10% oxygen**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **0.081 gr/dscf @ 10 percent O_2**	4. Equivalent Allowable Emissions: **37.6** lb/hour **164.8** tons/year
5. Method of Compliance: **Annual stack test using EPA Method 5.**	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: **PM_{10}**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **37.6** lb/hour **164.8** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **0.081 gr/dscf @ 10 percent O_2** Reference: **Existing limit**	7. Emissions Method Code: **0**
8. Calculation of Emissions: **0.081 gr/dscf x 54,200 dscf/min x 60 min/hr ÷ 7,000 gr/lb = 37.6 lbs/hour**	
9. Pollutant Potential/Estimated Fugitive Emissions Comment: **GP Proposes to retain the emission limit of 0.081 gr/dscf@10% oxygen. However, GP proposes to replace the 26.0 lbs/hour and 113.9 tpy emission limits with 37.6 lbs/hr and 164.8 tpy.**	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **0.081 gr/dscf @ 10 percent O_2**	4. Equivalent Allowable Emissions: **37.6** lb/hour **164.8** tons/year
5. Method of Compliance: **Annual stack test using EPA Method 5.**	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions __ of __

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: **TRS**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **5.8** lb/hour **25.2** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **20 ppmvd** Reference: **BACT limit**	7. Emissions Method Code: **2**

8. Calculation of Emissions:

Based on 20 ppmvd at 10% oxygen (existing limit)
PV=nRT, where n=mass/molecular weight (MW)
Therefore, mass/volume (V) = P x MW/R x T
P = pressure = 1 atmosphere x 14.7 lb/in^2/atmosphere x 144 in^2/ft^2 x = 2116.8 lb/ft^2
T = temperature = 68 degrees Fahrenheit (°F) = 528 R; R = 1545.6 ft-lb$_f$/lb mole-R
Flow rate = 54,200 dscfm (@ 10% oxygen)
Corresponding mass emission limits are calculated as follows:
(20 ft^3 TRS/10^6 ft^3 air x 2116.8 lb/ft^2 x 34.1 lb/lb-mole)/(1545.6 ft-lb$_f$/lb mole-R x 528 R) = 1.77 x 10^{-6} lb/ft^3
Mass emission rate = 1.77 x 10^{-6} lb/ft^3 x 54,200 dscf/min x 60 mins/hour = 5.8 lbs/hour (25.2 tpy)

9. Pollutant Potential/Estimated Fugitive Emissions Comment:

GP proposes to retain the emission limit 20 ppmvd @10% oxygen. GP proposes to replace the current permit allowable of 4.0 lbs/hr and 17.5 tpy with 5.8 lbs/hr and 25.2 tpy.

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **BACT**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **20 ppmvd**	4. Equivalent Allowable Emissions: **5.8** lb/hour **25.2** tons/year
5. Method of Compliance: **EPA Method 16 or 16A**	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: **NOX**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **106.7** lb/hour **467.2** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **275 ppmvd** Reference: BACT	7. Emissions Method Code: **2**

8. Calculation of Emissions:

Based on 275 ppmvd at 10% oxygen (lowered from existing limit of 290 ppmvd)
PV=nRT, where n=mass/molecular weight (MW)
Therefore, mass/volume (V) = P x MW/R x T
P = pressure = 1 atmosphere x 14.7 lb/in^2/atmosphere x 144 in^2/ft^2 x = 2116.8 lb/ft^2
T = temperature = 68 degrees Fahrenheit (°F) = 528 R; R = 1545.6 ft-lb$_f$/lb mole-R
Flow rate = 54,200 dscfm (@ 10% oxygen)
Corresponding mass emission limits are calculated as follows:
(275 ft^3 NO_x/10^6 ft^3 air x 2116.8 lb/ft^2 x 46 lb/lb-mole)/(1545.6 ft-lb$_f$/lb mole-R x 528 R)
= 3.28 x 10^{-5} lb NOx /ft^3
Mass emission rate = 3.28 x 10^{-5} lb/ft^3 x 54,200 dscf/min x 60 mins/hour = 106.7 lbs/hour (467.2 tpy)

9. Pollutant Potential/Estimated Fugitive Emissions Comment:

GP proposes to replace the current emission limit of 290 ppmvd to 275 ppmvd. GP also proposes to replace the current limits of 50.3 lb/hr and 223.3 tpy with 106.7 lb/hr and 467.2 tpy.

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **AMBIENT**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **275 ppmvd**	4. Equivalent Allowable Emissions: **106.7** lb/hour **467.2** tons/year
5. Method of Compliance: **EPA Method 7E**	
6. Allowable Emissions Comment (Description of Operating Method): **By restricting the NOx emissions below the current permit limit of 290 ppmvd to 275 ppmvd, the net emissions increase associated with the project will cause a predicted ambient impact below the modeling significant impact level.**	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: **CO**

2. Total Percent Efficiency of Control:

3. Potential Emissions: **16.3** lb/hour **71.4** tons/year

4. Synthetically Limited? ☐ Yes ☒ No

5. Range of Estimated Fugitive Emissions (as applicable): to tons/year

6. Emission Factor: **69 ppmvd**

Reference:

7. Emissions Method Code: **2**

8. Calculation of Emissions:

Based on 69 ppmvd at 10% oxygen (existing limit)
PV=nRT, where n=mass/molecular weight (MW)
Therefore, mass/volume (V) = P x MW/R x T
P = pressure = 1 atmosphere x 14.7 lb/in^2/atmosphere x 144 in^2/ft^2 x = 2116.8 lb/ft^2
T = temperature = 68 degrees Fahrenheit (°F) = 528 R; R = 1545.6 ft-lb$_f$/lb mole-R
Flow rate = 54,200 dscfm (@ 10% oxygen)
(69 ft^3 CO/10^6 ft^3 air x 2116.8 lb/ft^2 x 28 lb/lb-mole)/(1545.6 ft-lb$_f$/lb mole-R x 528 R)
= 5.01 x 10^{-6} lb/ft^3
Mass emission rate = 5.01 x 10^{-6} lb/ft^3 x 54,200 dscf/min x 60 mins/hour = 16.3 lbs/hour (71.4 tpy)

9. Pollutant Potential/Estimated Fugitive Emissions Comment:

GP proposes to retain the emission limit 69 ppmvd @10% oxygen. GP proposes to replace the current permit allowable of 7.3 lbs/hr and 32 tpy with 16.3 lbs/hr and 71.4 tpy.

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: RULE	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: 69 ppmvd	4. Equivalent Allowable Emissions: 16.3 lb/hour 71.4 tons/year
5. Method of Compliance: EPA Method 10	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions _____ of _____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: **VOC**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **25.0** lb/hour **109.5** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **185 ppmvd** Reference: BACT	7. Emissions Method Code: **2**

8. Calculation of Emissions:

Based on 185 ppmvd at 10% oxygen (existing limit)

PV=nRT, where n=mass/molecular weight (MW)
Therefore, mass/volume (V) = P x MW/R x T
P = pressure = 1 atmosphere x 14.7 lb/in^2/atmosphere x 144 in^2/ft^2 x = 2116.8 lb/ft^2
T = temperature = 68 degrees Fahrenheit (°F) = 528 R; R = 1545.6 ft-lb$_f$/lb mole-R
Flow rate = 54,200 dscfm (@ 10% oxygen)

(185 ft^3 VOC/10^6 ft^3 air x 2116.8 lb/ft^2 x 16 lb/lb-mole)/(1545.6 ft-lb$_f$/lb mole-R x 528 R)
= 7.68 x 10^{-6} lb/ft^3
Mass emission rate = 7.68 x 10^{-6} lb/ft^3 x 54,200 dscf /min x 60 mins/hour = 25.0 lbs/hour (109.5 tpy)

9. Pollutant Potential/Estimated Fugitive Emissions Comment:

GP proposes to retain the emission limit 185 ppmvd @10% oxygen. GP proposes to replace the current permit allowable of 17.2 lbs/hr and 75.3 tpy with 25.0 lbs/hr and 109.5 tpy.

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: BACT	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: 185 ppmvd	4. Equivalent Allowable Emissions: 25.0 lb/hour 109.5 tons/year
5. Method of Compliance: EPA Method 25A and 3A or 3B	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions ____ of ____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions ____ of ____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

ATTACHMENT 3
AIR QUALITY ANALYSIS
PALATKA, FL OPERATIONS

3.1 INTRODUCTION

United States Environmental Protection Agency (EPA) and Florida Department of Environmental Protection (FDEP) rules require major new facilities and major modifications of existing facilities 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. As described elsewhere in the application, the modifications at the GP Palatka Mill will result in emissions increases above the significant emission rate for several pollutants. Taking into account all contemporaneous emission increases and decreases within the past 5-years (see Attachment 1) the following pollutants will have net emission increases above the significant emission rate:

- ozone (based on the increase in volatile organic compound (VOC) emissions),
- particulate matter less than 10 microns in diameter (PM_{10}),
- nitrogen oxides (NO_x), and
- total suspended particulate matter (TSP)

Therefore, the project is subject to PSD review for these pollutants. In addition to an analysis of control technology discussed in other attachments, PSD review requires GP 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 3.2 of this attachment 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, GP performed an analysis of the physical arrangement of stacks and solid physical structures that may affect dispersion and computed GEP stack heights. The lime kiln stack is an existing and is not affected by building downwash (see results below). Section 3.3 of this attachment 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 3.4 of this attachment presents the Ambient Air Quality Analysis.

Lastly, EPA regulations (40 CFR 52.21(o)) require an analysis of additional impacts. Section 3.5 presents an analysis of the impacts on soils and vegetation, growth, and impairment to visibility that would occur as a result of the project in the vicinity of the Mill. Section 3.6 presents an analysis of the project's impact on existing air quality, visibility, and deposition in the Class I areas.

3.2. SOURCE IMPACT ANALYSIS

GP 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. GP compared these impacts to EPA thresholds for significance and ambient monitoring criteria. If the project impacts exceed the Significant Impact Levels (SILs), then GP conducts a full impact analysis. A full impact analysis predicts impacts from the sources across the entire Mill. GP compares these impacts to state and national ambient air quality standards. The following sections discuss the methodology, data inputs, and techniques for the Source Impact Analysis.

3.2.1 AIR MODELING METHODOLOGY

The general modeling approach follows EPA and FDEP modeling guidelines for determining compliance with the state AAQS and PSD Increments. In general, current policies stipulate that the highest annual average and highest, second-highest short-term (*i.e.*, 24 hours or less) concentrations be compared to the applicable standard when 5 years of meteorological data are used. The highest, second-highest concentration (HSH) is calculated for a receptor field by:

1. Eliminating the highest concentration predicted at each receptor,
2. Identifying the second-highest concentration at each receptor, and
3. Selecting the highest concentration among these second-highest concentrations.

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 GP Palatka 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, GP 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) and the screening grid result exceeded 75% of the applicable criteria. The refined analyses used a denser receptor grid centered on the receptor at which the identified in the screening phase. GP then executed the air dispersion model for the entire year.

3.2.2 MODEL SELECTION

GP selected an air dispersion model based on the model's ability to simulate air quality impacts in areas surrounding the Palatka Mill. The area surrounding the Mill is mostly rural and flat. The Mill is located on the western side of the St. John's River. Figure 3-1 presents a topographic map of the GP Palatka Mill vicinity. Based on these features, GP has selected the Industrial Source Complex Short-Term (ISCST3) model (Version 02035) 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

3.2.3 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. GP selected the land-use mode to reflect the majority of the classified area. The urban mode is selected if more than 50 percent of the land-use consists of one or more of the following land-use classifications:

- heavy industrial
- light-moderate industrial
- commercial, or
- compact residential

The USGS map indicates that there are no other significant commercial or industrial properties within 3 km. GP estimates that the urban classifications constitute less than 50% of the total area. Therefore, GP set the ISCST3 model in the rural mode is used for the ISCST3 modeling.

3.2.4 METEOROLOGICAL DATA

GP predicted impacts using hourly meteorological data for the five-year period 1984-1988. The nearest site for surface observations to the Palatka Mill is located approximately 57 km to the west in Gainesville. However, FDEP has routinely recommended analyses for Palatka apply surface observations from Jacksonville International Airport (JAX). While the distance between GP and JAX is approximately 92 km, GP and FDEP consider JAX to be more representative than Gainesville surface observations. While both JAX and GP are less than 40 km from the Atlantic coastline, Gainesville is over 95 km from the coastline. The analysis applied meteorological data was comprised of hourly surface data from JAX and upper air data collected in Waycross, Georgia.

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 the interpolation method developed by EPA (Holzworth, 1972). USEPA provided the dataset in an ISCST-ready format. GP did not perform any additional processing of the meteorological files.

3.2.5 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).

To select a background concentration, GP has analyzed FDEP and EPA ambient air quality observations. GP collected information on monitor locations, their proximity to the Palatka Mill, data quality, and how recent the data was collected. Preliminary dispersion modeling concluded that no full analyses are required. Table 3-1 presents the values for background concentrations in micrograms per cubic meter ($\mu g/m^3$) which represent current ambient air quality. These values reflect the most current year of data by a representative monitor.

3.2.6 BUILDING DOWNWASH

In accordance with current EPA policy, GP evaluated the effect of building downwash on predicted air quality concentration levels in the modeling analysis. For this analysis, GP used the US EPA-developed Building Profile Input Program (BPIP, Version 95086) to determine the appropriate direction-specific building dimensions for all modeled sources at the Mill. The building height, length, and width for all significant building structures are input to the program. For short stacks (*i.e.,* physical stack height is less than $H_b + 0.5\ L_b$, where H_b is the building height and L_b is the lesser of the building height or projected width), BPIP applies the Schulman and Scire (1980) algorithm. For cases where the physical stack is greater than $H_b + 0.5\ L_b$, but less than GEP, BPIP applies the Huber-Snyder (1976) algorithm. For both downwash methods, the ISCST3 model uses direction-specific building dimensions for H_b and L_b for 36 radial directions, with each direction representing a 10-degree sector. Table 3-2 presents a summary of the horizontal and vertical structure dimensions at the paper Mill that are considered in the BPIP analysis. Inspection of the ISCST3 model output indicates that no cavity effects are occurring at the model receptors. Figure 3-2 shows the building layout at the Mill. .

3.2.7 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 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). For the purposes of this report, the significant impact analysis will include both the No. 4 Lime Kiln project plus other contemporaneous project emission changes.

GP performed a significant impact analysis to determine whether the emissions increase result in maximum predicted impacts greater than the PSD modeling SILs or the EPA monitoring deminimis concentrations. Current EPA and FDEP policies stipulate that GP compare the highest predicted short-term impacts to these levels. Table 3-3 presents the SILs and deminimis concentrations.

Model Inventory

For the significant impact analysis, the model inventory includes all sources that will experience an increase or decrease in emissions due to the LK4 or contemporaneous project. The emission increase represents the difference between the potential emissions and the actual emissions during the baseline period. The baseline must reflect conditions prior to any modifications or physical changes. GP selected the average of 2002 and 2003 operations to represent the baseline. Table 3-4 summarizes the potential annual average and short-term maximum emission rates for the contemporaneous project. Supporting documentation from prior modeling reports is included in Appendix 3A.

Point Source Modeling Parameters

GP developed modeling parameters for the Lime Kiln No 4 and contemporaneous projects using physical data for stack height, stack diameter, and observation data for exit temperature and exit velocity. Table 3-5 presents these modeling parameters.

Receptor Locations

Modeling coordinates are UTM Zone 17, NAD 27. All analyses used refined Cartesian receptor grids in addition to discrete receptors along the Mill fenceline. The significant impact analysis used the following receptor spacing:

- 100-m intervals along the fenceline
- 100-m intervals within 8 km of the Mill

To determine the maximum impact from the project, GP reviewed the distribution of predicted impacts and the location of the maximum impact. Because the model settings include the FLAT option, the predicted impacts from the single model source will decrease with distance beyond the location of the maximum impact. Thus, if the predicted impacts decrease at the receptor edges, then no additional receptors at greater distances is necessary. If the predicting impacts indicate that the maximum impact may be further than 8 km from the source, then GP performed additional modeling using a 100m refined grid to identify the maximum impact out to further distances.

3.2.8 NAAQS MODELING ANALYSIS

Purpose and Methodology

As discussed in the result section (Section 3.2.10), preliminary modeling of the proposed project indicated a significant impact (*i.e.*, maximum impact at or above the PSD significance levels) for PM_{10} and NO_2. Therefore, PSD review requires GP 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 3-6 summarizes the NAAQS

Inventory - GP

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. GP also analyzed PM_{10} emissions from Mill roads. The model inventory distributes emissions from individual routes into many model sources, each representing a square-based segment of a route. Therefore, the emission rate is constant among each model source along a particular route. The Mill roads are paved.

Tables 3-7 and 3-8 summarize the PM_{10} and NO_X emission rates for the NAAQS analysis, respectively. Table 3-9 summarizes the modeling parameters for the point sources and Figure 3-3 presents the arrangement of these sources.

Fugitive Source Modeling Parameters

GP also calculated modeling parameters for fugitive sources that are modeled as either an AREAPOLY or VOLUME sources. The parameters for the areapoly sources are release height, number of corners, and initial vertical source dimension. The parameters for the volume sources are release height and initial lateral and vertical source dimensions. GP calculated values for the parameters in accordance with the ISCST3 manual and general EPA guidance. For the area source, the release height is the height of the expected release. For a volume source, the release height is at the center of the physical source. Table 3-10 presents the modeling parameters for the fugitive sources, and Figure 3-4 presents the arrangement of the these sources.

Inventory – Competing Sources

A full analysis must include the emissions of competing sources. GP 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 PM_{10} and NO_2 are 53.6 and 52.6 km, respectively. In addition to the sources within the screening area, GP also considered larger sources that are beyond the screening area.

GP included all competing sources within the SID in the NAAQS modeling analysis and evaluated all facilities that are beyond the SID with the North Carolina Screening Technique. The technique compares the annual emissions (in tons per year (tpy)) to a specific threshold. If the emissions are less than the threshold, then GP expects that the emissions from the facility will not have significant interaction with the Palatka Mill. The threshold is equal to the quantity of 20 x (D-S) (Note D is the distance between the competing source and the Mill, S is the SID). GP included a facility from the NAAQS modeling analysis if the facility-wide permitted emission rate was above the threshold.

Table 3-11 presents the screening analysis for competing PM_{10} sources. Table 3-12 presents the individual stack parameters for sources at these facilities.

Among the competing sources to be modeled are Florida Rock and GP's Chip-n-saw Mill (Sawmill), both within 3 km of the paper mill. For Florida Rock, the potential emission rate in the FDEP's inventory database, 17 pounds per hour (lb/hr), was revised to 0.2 lb/hr, based on current information provided for the baghouse from Florida Rock. The original 17 lb/hr emission rate is the process weight table rule emission rate (i.e., allowable) and does not reflect a baghouse. The proposed 0.2 lbs/hr reflects the actual modeled flowrate and an emission factor of a typical baghouse of 0.01 grains/cubic ft. For GP's Sawmill, updated potential emission rates and source parameters were obtained from GP and this information has been included in Tables 3-11 and Table 3-12. GP also determined source-specific building information for each Sawmill stack. Plot plans showing the layout of sources and buildings at the Sawmill are presented in Figures App3B-1 and App3B-2, respectively, in Appendix 3B. A summary of the building dimensions at the Sawmill are provided in Table App3B-1.

To reduce the number of model sources, GP first combined sources with identical stack parameters. Second, GP combined stacks at an individual facility using US EPA's method for merging sources (US EPA, 1992). For each stack, the parameter M was computed as:

$$M = (h_s)(V)(T_s)/(Q)$$

where:

- M = merged stack parameter which accounts for the relative influence of stack height, plume rise, and emission rate on concentrations
- h_s = stack height (m)
- V = $(\pi/4)\, d_s^2 v_s$ = stack gas volumetric flow rate (m^3/s)
- d_s = inside stack diameter (m)
- v_s = stack gas exit velocity (m/s)
- T_s = stack gas exit temperature (K)
- Q = pollutant emission rate (g/s)

The stack with the lowest value of M is used as the representative stack. Then, the sum of the emissions from all applicable sources is modeled with the representative stack.

Table 3-13 presents the screening analysis for NOx competing sources. Table 3-14 presents the individual stack parameters for sources at these facilities.

Receptors

For the NAAQS analyses, GP used receptor spacing identical to the spacing for the significant impact analysis. For each pollutant, these receptors extended out to a distance just beyond the respective SID. For PM_{10} and NO_2, receptor distances of 4 and 3 km were used, respectively. All grid receptors have a receptor spacing of 100 m.

3.2.9 PSD CLASS II INCREMENT ANALYSIS

Purpose and Methodology

As discussed in the result section (Section 3.2.10), preliminary modeling of the proposed project indicated a significant impact (*i.e.*, maximum impact at or above the PSD significance levels) for PM_{10} and NO_2. Therefore, PSD review requires GP to perform a full air quality analysis to demonstrate compliance with the allowable PSD Class II Increments for these pollutants. 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 consume increment. The total of these concentrations must be less than the allowable PSD Class II increment, as listed in Table 3-15.

Inventory - GP

For this project, the Increment analysis included all the future paper mill sources that were used in the NAAQS analysis and also all source emissions that occurred at the time of the PSD baseline date. The PSD baseline emissions are set to negative in the model and are subtracted from the future emissions to determine the amount of PSD increment that is consumed.

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. Other types of emission increases, such as increase in utilization, only affect (*i.e.,* consume or expand) PSD increment after the minor source baseline date is set. Table 3-16 summarizes the baseline dates. Therefore, the calculations to determine which GP emissions consume increment will vary by pollutant.

Particulate Matter

The 1974 PSD baseline emissions for the GP Palatka Mill are presented in Table 3-17. The locations and stack parameters for the baseline sources are presented in Table 3-18.

Nitrogen Dioxide

The 1988 PSD baseline emissions for the GP Palatka Mill are presented in Table 3-19. The locations and stack parameters for the baseline sources are presented in Table 3-20.

Inventory – Competing Sources

A full analysis must include the emissions of competing sources. In contrast to the NAAQS analysis, the PSD Increment analysis only includes emissions from competing sources that affect increment. A listing of PSD increment affecting sources was obtained from prior modeling report and from discussions with the FDEP. Table 3-21 presents a summary of the competing facilities in the vicinity of the Palatka Mill that affect PSD increment. Table 3-22 presents the modeling parameters for the PSD-affecting sources that were included in the analysis.

Receptors

For the PM_{10} and NO_2 PSD Increment analyses, GP used the same receptor grids that were used for the PM_{10} and NO_2 NAAQS analyses, respectively.

3.2.10 SOURCE IMPACT ANALYSIS RESULTS

Significant Impact Analysis

Particulate Matter

By modeling the emissions that would result from the project, GP determined that the project will have a significant PM_{10} impact out to 3.6 km. Table 3-23 presents the maximum predicted impacts from the significant impact analysis and Figure 3-5 shows the areas where the project impacts exceed the SIL.

The maximum 24-hour PM_{10} impact due to the contemporaneous project is 10.7 $\mu g/m^3$, which is above the SIL and the monitoring deminimis concentrations of 5 and 10 $\mu g/m^3$, respectively. In addition, the maximum annual impact of 1.1 $\mu g/m^3$ slightly exceeds the annual SIL of 1 $\mu g/m^3$. Therefore, detailed NAAQS and PSD Class II increment analyses are required for PM_{10}.

Nitrogen Dioxide

By modeling the emissions that would result from the project, GP determined that the proposed project will have a significant NO_2 impact out to 2.6 km from the Mill. Table 3-24 presents the maximum predicted impacts from the significant impact analysis.

The maximum annual NO_2 impact due to the project is 1.9 μg/m^3, which is above the SIL of 1 μg/m^3 but below the deminimis monitoring concentration of 14 μg/m^3. Because the project's maximum concentration is above the SIL, detailed NAAQS and PSD Class II increment analyses are required for NO_2.

Summary

The significant impact analyses determined that the project's emission increase would result in maximum impacts that are above the PM_{10} and NO_2 SIL and the PM_{10} EPA deminimis monitoring concentration. Table 3-25 summarizes the significant impact distance for each pollutant.

NAAQS Analysis

Particulate Matter

By modeling the potential Mill and competing source emissions, GP determined that the maximum predicted PM_{10} impacts are 308 and 69 μg/m3, respectively, for the 24-hour and annual averaging times. The maximum impact locations were in an area that did not require additional refined receptor grids. Table 3-26 summarizes the PM_{10} NAAQS modeling results.

Background concentrations of 57 and 27 μg/m^3 were added to the modeling results for the 24-hour and annual averaging periods, respectively. As summarized in Table 3-27, the 24-hour and annual average total concentrations are 365 and 96.5 μg/m^3, respectively, which are above than the respective NAAQS of 150 and 50 μg/m^3. Figures 3-6 and 3-7 indicate that the receptor locations that exceed the annual and 24-hour NAAQS, respectively, are confined to localized areas both within and just outside GP's Sawmill Mill fence line. The maximum impacts presented in Table 3-27 actually occur on the Sawmill property, but the exceeded area extends beyond the fence line. As Figures 3-6 and 3-7 also demonstrate, the proposed contemporaneous project's significant impact area does not interact with any receptors that are predicted to exceed the NAAQS. The contemporaneous project's maximum annual and 24-hour impacts at the receptors that exceed the NAAQS are summarized in Table 3-28. As shown in Table 3-28, the maximum project impacts are below the SIL at these receptors.

Nitrogen Dioxide

By modeling the total potential Mill emissions and competing source emissions, GP determined that the maximum predicted annual NO_2 impact is 11.9 μg/m3. The maximum impact location is in an area that did not require additional refined receptor grids. Table 3-29 summarizes the NO_2 NAAQS modeling results.

GP added a background concentration of 27.5 μg/m^3 to the modeling result. As summarized in Table 3-30, when adding the background concentration, the annual concentration is 39.4 μg/m^3. This impact is less than the respective NAAQS of 100 μg/m^3. Therefore, GP has demonstrated that the Mill's emissions that reflect all project changes will not cause or contribute to a violation of the NAAQS.

PSD Class II Increment Analysis

Particulate Matter

By modeling the potential Mill and competing source emissions, GP determined that the maximum predicted PM_{10} PSD Class II increments are 35.1 and 2.2 µg/m3, respectively, for the 24-hour and annual averaging times. The maximum impact locations were in an area that did not require additional refined receptor grids. Table 3-31 summarizes the PM_{10} Increment modeling results. The maximum predicted 24-hour PSD is above the allowable PSD Class II increment of 30 $\mu g/m^3$, while the maximum predicted annual increment is below allowable PSD Class II increment of 17 $\mu g/m^3$. Figure 3- 8 indicates that the receptor locations that exceed the allowable 24-hour PSD Class II increment are located on the GP's Sawmill property. Figure 3-8 also demonstrates that the proposed contemporaneous project's significant impact area does not interact with any receptors that are predicted to exceed the allowable 24-hour PSD Class II increment. The contemporaneous project's maximum annual and 24-hour impacts at the receptors that exceed the allowable PSD Class II increment are summarized in Table 3-32. As shown in Table 3-32, the maximum project impacts are below the SIL.

Nitrogen Dioxide

By modeling the increment-affecting emissions from the Mill and competing sources, GP determined that the maximum annual mean NO_2 predicted PSD increment is 10.7 $\mu g/m^3$. The maximum impact location is in an area that did not require additional refined receptor grids. Table 3-33 summarizes the NO_2 model results. The maximum predicted impact is less than the allowable PSD Class II increment of 25 $\mu g/m^3$. Therefore, GP has demonstrated that the Mill emissions will not cause or contribute to a violation of the PSD Class II Increment.

3.3. GOOD ENGINEERING PRACTICE STACK HEIGHT ANALYSIS

PSD review rules require that controls required for emission sources using the Best Available Control Technology Analysis cannot be affected by a stack height that exceeds Good Engineering Practice (GEP) or any other dispersion technique. In other words, emissions 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:

(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.

Hg = good engineering practice stack height, measured from the ground-level elevation at the base of the stack
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,

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).

Because the No. 4 Lime Kiln is the only source affected by the proposed project, and building downwash affects do not occur at that source, the project stacks are in accord with GEP regulations.

3. 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 deminimis monitoring concentrations in all areas. The source impact analysis (Section 3.2) for GP Palatka concluded that the maximum impacts from the project for PM_{10} would exceed this concentration in a very small area on the paper mill property line. Therefore, the rule exemption is not applicable.

3.4.1 PRE-APPLICATION ANALYSIS

GP used the existing ambient air monitoring data and the results of the source impact analysis together to assess the total air quality in the area that the project emissions could affect. GP Palatka does not operate any ambient air quality monitors, but the FDEP has operated a PM_{10} monitoring station in Palatka (Site ID 12-107-1008) for many years. To determine if existing data is appropriate, EPA guidance recommends three criteria: monitor location, data quality, and currentness of the data. GP reviewed these factors and selected the highest mean annual concentration reported for the past three years as being representative of the maximum annual background air quality for the proposed project. Additionally, GP selected the 6th-highest 24-hour concentration measured in the last 5 complete years (which excluded 2002) as being representative of the maximum 24-hour background for the proposed project. Therefore, GP proposes to not conduct additional ambient monitoring to satisfy the pre-application analysis. Table 3-1 summarizes the background selections used for the air modeling 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:

1) the NAAQS is threatened, or
2) the modeling databases contain significant uncertainties.

Because these conditions do not exist for this project, GP is proposing to use the existing air monitoring station data to satisfy any post-application requirement.

3.5 ADDITIONAL IMPACT ANALYSIS – CLASS II AREAS

3.5.1 IMPACTS UPON SOILS AND VEGETATION

Soils

Air contaminants can affect soils through fumigation by gaseous forms, accumulation of compounds transformed from the gaseous state, or by the direct deposition of PM or PM to which certain contaminants are absorbed. According to the Putnam County Soil Survey (1990), the soils in the vicinity of the GP Palatka Mill are dominated by Terra Ceia muck, with Cassia fine sand and Pamona fine sand also present.

The dominant soil in the vicinity of the GP facility, Terra Ceia muck, is a highly organic wetland soil and has an extremely high buffering capacity based on the cation exchange capacity, base saturation, and bulk density. Therefore, this soil would be relatively insensitive to atmospheric inputs. The maximum predicted NO_2, PM_{10}, and CO concentrations in the vicinity of the site as a result of the proposed project are below the significant impact levels. The maximum predicted SO_2 concentrations in the vicinity of the site are below the AAQS. Since the AAQS are designed to protect the public welfare, including effects on soils and vegetation, no detrimental effects on soils should occur in the vicinity of the GP Palatka Mill due to the proposed project.

Vegetation

In general, the effects of air pollutants on vegetation occur from NO_2, O_3, and PM. The effects of air pollutants are dependent both on the concentration of the contaminant and the duration of the exposure. The term "injury," as opposed to damage, is commonly used to describe all plant responses to air contaminants and will be used in the context of this analysis. Air contaminants are thought to interact primarily with plant foliage that is considered to be the major pathway of exposure. For purposes of this analysis, it was assumed that 100 percent of each air contaminant of concern is accessible to the plants.

Injury to vegetation from exposure to various levels or air contaminants can be termed acute, physiological, or chronic. Acute injury occurs as a result of a short-term exposure to a high contaminant concentration and is typically manifested by visible injury symptoms ranging from chlorosis (discoloration) to necrosis (dead areas). Physiological or latent injury occurs as the result of a long-term exposure to contaminant concentrations below that which results in acute injury symptoms. Chronic injury results from repeated exposure to low concentrations over extended periods of time, often without any visible symptoms, but with some effect on the overall growth and productivity of the plant. In this assessment, 100 percent of the particular air pollutant in the ambient air was assumed to interact with the vegetation. This is a conservative approach. The following paragraphs address the NO_2, PM, and ozone effects.

A review of the literature indicates great variability in NO_2 dose-response relationship in vegetation. Acute NO_2 injury symptoms are manifested as water-soaked lesions, which first appear on the upper surface, followed by rapid tissue collapse. Low-concentration, long-term exposures as frequently encountered in polluted atmospheres often do not induce the lesions associated with acute exposures but may still result in some growth suppression. Citrus trees exposed to 470 $\mu g/m^3$ of NO_2 for 290 days showed injury (Thompson *et al.*, 1970). Sphagnum exposed for 18 months at an average concentration of 11.7 $\mu g/m^3$ showed reduced growth (Press *et al.*, 1986)

The maximum increase in ground-level annual average NO_2 concentrations predicted to occur in the vicinity of the plant during the operation of the proposed project well below reported effects levels.

Although information pertaining to the effects of particulate matter on plants is scarce, some threshold concentrations are available. Mandoli and Dubey (1998) exposed ten species of native Indian plants to levels of particulate matter ranging from 210 to 366 $\mu g/m^3$ for an 8-hour averaging period. Damage in the form of a higher leaf area/dry weight ratio was observed at varying degrees for most plants tested. Concentrations of particulate matter lower than 163 $\mu g/m^3$ did not appear to be injurious to the tested plants. The maximum predicted 24-hour and annual average PM_{10} concentrations due to the proposed project are well below the injury thresholds reported in the literature.

It is difficult to predict what effect the proposed project's emissions of VOC will have on ambient O_3 concentrations from either a local or regional scale. VOC and NO_x emissions are precursors to the formation of O_3. O_3 is formed down-wind from emission sources when VOC, and NO_x emissions from the facility react in the presence of sunlight.

O_3 can cause various damage to broad-leaved plants including: tissue collapse, interveinal necrosis and markings on the upper surface of leaves known as stippling (pigmented yellow, light tan, red brown, dark brown, red, or purple), flecking (silver or bleached straw white), mottling, chlorosis or bronzing, and bleaching. O_3 can also stunt plant growth and bud formation. On certain plants such as citrus, grape, and tobacco, it is common for leaves to wither and drop early. A literature review suggests that exposure for 4 hours at levels of 0.04 to 11.0 ppm of O_3 will result in plant injury for sensitive plants. The extent of the injury depends on the plant species and environmental conditions prior to and during exposure.

Given that the O_3 measurements in the region comply with the NAAQS and the increase in VOC emissions for the project represents less than a 1-percent change in regional VOC emissions, no adverse effects on vegetation due to the project's VOC emissions are expected.

In summary, GP expects that the project increase in emissions will not adversely impact the soils or vegetation in areas adjacent to the Palatka Mill.

3.5.2 IMPACTS DUE TO ADDITIONAL GROWTH

The proposed project is to repair components of the existing lime kiln. Upon completion of the project, the lime kiln will continue to operate in the same way it currently operates. While the repair is to maintain the integrity and safety of the kiln, the kiln uptime is very high, and will not be significantly changed by the proposed project. Thus, because the project will not increase actual operations or increase personnel, GP expects no air quality impacts due to associated commercial and industrial growth from the proposed project.

3.5.3 IMPACTS ON VISIBILITY

The proposed project only affects and modifies the existing No. 4 Lime Kiln. The Lime Kiln is in compliance with opacity regulations and should remain in compliance after the modification. As a result of the visibility-affecting emission rates being lowered, and no change in opacity, GP does not expect any adverse impacts upon visibility.

3.6 ADDITIONAL IMPACT ANALYSIS – CLASS I AREAS

3.6.1. 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 PSD Class I areas located within 200 km of the Mill are:

- Okefenokee National Wilderness Area (NWA), 108 km north of the Mill;
- Wolf Island NWA, 186 km north of the Mill; and
- Chassahowitzka NWA, 137 km southwest of the Mill.

The maximum predicted impacts due to the No. 4 LK and contemporaneous projects at the Okefenokee, Wolf Island and Chassahowitzka NWAs are compared 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 the Okefenokee and Chassahowitzka NWA PSD Class I areas, the California Puff (CALPUFF) modeling system was used. CALPUFF, Version 5.711a (EPA, 2004), is a Lagrangian puff model that is recommended by the FDEP, in coordination with the Federal Land Manager (FLM) for the NWA, 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.

3.6.2 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

The California Puff (CALPUFF, version 5.711a) air modeling system was used to model to assess the proposed project's impacts at the PSD Class I area for comparison to the PSD Class I significant impact levels. 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 converts 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 3-34. 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 3-35.

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. The grid for the Okefenokee NWA was reduced to 180 receptors, including all boundary receptors and interior receptors with less resolution than the original set. The Chassahowitzka grid was reduced to 58 receptors located on the boundary of the area. Therefore, pollutant concentrations were predicted with an array of 180 discrete receptors located at the Okefenokee NWA, 30 discrete receptors located at the Wolf Island NWA and 58 discrete receptors located at Chassahowitzka NWA.

Meteorological Data

A wind field domain was developed that including all PSD Class I areas that were evaluated in this analysis. A detailed description of the domain is provided in the following sections. Figure 3-9 extents of the wind field domain and the location of the GP Palatka Mill and PSD Class I areas.

Modeling Domain

A rectangular modeling domain extending 448 km in the east-west (x) direction and 684 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 26.25 degrees north latitude and 85.0 degrees west longitude (east and north UTM coordinates of 77 and 2966.0 km, respectively, zone 17 equivalent). This location is in the Gulf of Mexico approximately 250 km west of Naples, Florida. For the processing of meteorological and geophysical data, the domain contains 112 grid cells in the x-direction and 171 grid cells in the y-direction. The domain grid resolution is 4 km. The air modeling analysis was developed in the UTM coordinate system, Zone 17.

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, lacks 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 sixteen NWS stations or Federal Aviation Administration (FAA) Flight Service stations for Charleston in South Carolina; Columbus, Macon, Savannah, Augusta, Athens, and Atlanta in Georgia; and Tampa, Jacksonville, Daytona Beach, Tallahassee, Vero Beach, Fort Myers, Orlando, Pensacola and Gainesville in Florida. A summary of the surface station information and locations are presented in Table 3-36. 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.

Because the modeling domain extends over water, up to 10 sea surface stations were incorporated in the analysis. Data were obtained from C-Man stations and NOAA buoys. These data were processed into an over-water surface station format (i.e., SEA*.DAT) for input to CALMET. The over-water station data include wind direction, wind speed and air temperature.

Upper Air Data Stations and Processing

Upper air data from the following NWS stations, based on the availability of the upper air data, were used in the modeling analysis:

- Waycross, Georgia (1990, 1992);
- Athens, Georgia (1990, 1992);
- Charleston, South Carolina (1990, 1992, 1996);
- Cape Canaveral (1996)
- Miami (1996)
- Apalachicola, Florida (1990);
- Ruskin, Florida (1990, 1992, 1996);
- Tallahassee, Florida (1992, 1996);
- West Palm Beach (1990, 1992)
- Jacksonville, Florida (1996); and
- Peachtree City, Georgia (1996).

Table 3-36 presents the data and locations for the upper air stations.

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 82 stations in Alabama, Georgia and Florida 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.

3.6.3 METHODOLOGY AND MODEL RESULTS

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

Deposition

As part of the AQRV analyses, total nitrogen (N) 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. The total N deposition is estimated in units of kilogram per hectare per year (kg/ha/yr). The CALPUFF model is used to predict wet and dry deposition fluxes of various oxides of these elements.

For N deposition, the species include:

- Particulate ammonium nitrate (from species NO_3), wet and dry deposition;
- Nitric acid (species HNO_3), wet and dry deposition;
- NO_x dry deposition; and
- Ammonium sulfate (species SO_4), wet and dry deposition.

The CALPUFF model produces results in units of micrograms per square meter per second ($\mu g/m^2/s$). The modeled deposition rates are then converted to N deposition in kilograms per hectare, respectively, by using a multiplier equal to the ratio of the molecular weights of the substances (refer to the IWAQM Phase 2 report, Section 3.3).

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

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:

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

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. For the Okefenokee NWA, the hygroscopic and non-hygroscopic components are 0.9 and 8.5 inverse megameter (Mm^{-1}). CALPOST then calculates the percent extinction change for each day of the year. Impacts for the proposed project only were compared to both the proposed EPA PSD Class I significance levels for SO_2 and NO_2, the regional haze degradation criteria of 5 percent, and the N deposition criteria of 0.01 kilograms per hectare per year (kg/ha/yr).

Table 3-37 compares the maximum PM_{10} and NO_2 concentrations predicted for the proposed LK4 and contemporaneous projects at each evaluated PSD Class I area as compared with the EPA's proposed PSD Class I significance levels. The maximum PM_{10} and NO_2 concentrations were predicted to be below the significant impact levels at each PSD Class I areas. Therefore, a full PSD Class I increment analysis was not required for these pollutants.

Table 3-38 compares the maximum visibility impairment predicted for the proposed project at each evaluated PSD Class I area. The predicted impacts are all below the criteria of 5 percent..

Table 3-39 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 criteria of 0.01 kg/ha/yr.

3.6.4. ADDITIONAL IMPACTS ANALYSIS FOR NATIONAL WILDLIFE AREAS

The analysis addresses the potential impacts on vegetation, soils, and wildlife of the Okefenokee and Chassahowitzka NWAs Class I area due to the proposed project. In addition, potential impacts upon visibility resulting from the proposed project are assessed. The Okefenokee NWA Class I area is located approximately 108 km north of the GP Palatka Mill. Although the Wolf Island NWA Class I area is located approximately 186 km north of the GP Palatka Mill, only the Okefenokee NWA Class I area was evaluated for this analysis, since it is much closer to the Mill than Wolf Island, and both have similar AQRVs.

Ambient Impact

The maximum pollutant concentrations predicted for the project in the NWAs are presented above. These results were compared with effect threshold limits for both vegetation and wildlife as reported in the scientific literature. While the literature search focused on such species as cabbage palm, eastern red cedar, lichens, and species of the hardwood swamplands and mangrove forest, no specific citations that addressed these species were found. 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 soils of the Okefenokee NWA are generally classified as histosols. Histosols (peat soils) are organic and have extremely high buffering capacities based on their CEC, base saturation, and bulk density. Therefore, they would be relatively insensitive to atmospheric inputs.

The soils of the Chassahowitzka NWA are also generally classified as histosols. According to the U.S. Department of Agriculture (USDA) Soil Surveys of Citrus and Hernando Counties, nine soil complexes are found in the Chassahowitzka NWA. These include Aripeka fine sand, Aripeka-Okeelanta-Lauderhill, Hallendale-Rock outcrop, Homosassa mucky fine sandy loam, Lacooche, Okeelanta mucks, Okeelanta-Lauderdale-Terra Ceia mucks, Rock outcrop-Homosassa-Lacoochee, and Weekiwachee-Durbin mucks (Porter, 1996). The majority of the soil complexes found in the Chassahowitzka NWA is inundated by tidal waters, contain a relatively high organic matter content, and have high buffering capacities based on their CEC, base saturation, and bulk density. The regular flooding of these soils by the Gulf of Mexico regulates the pH and any change in acidity in the soil would be buffered by this activity. Therefore, they would be relatively insensitive to atmospheric inputs. However, Terra Ceia, Okeelanta, and Lauderdale freshwater mucks are present along the eastern border of the Chassahowitzka NWA, and may be more sensitive to atmospheric sulfur deposition (Porter, 1996). Although not tidally influenced, these freshwater mucks are highly organic and, therefore, have a relatively high intrinsic buffering capacity.

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

Impacts to Vegetation

In summary, 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, GP 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 very 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 extremely unlikely.

3.6.5 SUMMARY

The analysis demonstrates that the increase in impacts due to the proposed project is extremely low. Regardless of the existing conditions in the vicinity of the Class I areas, the proposed LK4 and contemporaneous projects will not cause any significant adverse effects due to the predicted low impacts upon that area.

SELECTED REFERENCES

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

Table 3-1. Summary of Background Concentrations for NO_x, PM_{10}, and Ozone

Pollutant	Monitor Description	Averaging Period	Background Concentration ($\mu g/m^3$)
Ozone	12-001-3011 Alachua County, 200 Savannah – 2003	1-hour	175 [a]
		8-hour	145 [b]
NOx	12-031-0032 Duval County, 2900 Bennett St – (2002 to 2004)	Annual	27.5
PM10	12-107-1008 Putnam County, Palatka – (1999-2001, 2003-2004)	24-hour	57[c]
		Annual	27[d]

Notes

[a] High-Second-Highest

[b] 3-year average

[c] high, 6^{th}-highest in 5 years

[d] highest, 2002-2004

Source: Florida Department of Environmental Protection. Quick Look Reports. 1999-2004.

Table 3-2. Structure Dimensions Used in the Modeling Analysis, GP Palatka Paper Mill						
	Height		Length		Width	
Structure	(ft)	(m)	(ft)	(m)	(ft)	(m)
RB4 Precipitator	85	25.9	123	37.5	58	17.6
RB4 Boiler Building	193.7	59.0	104	31.7	90	27.4
Power Plant Building	107.6	32.8	101	30.8	92	28.0
Pulp Dryer No. 3	84.5	25.8	275	83.7	157	47.9
Pulp Dryer No. 5	70.5	21.5	328	99.9	99	30.3
Pulp Dryer No. 4	73	22.3	265	80.7	125	38.2
Roll Storage Building	52	15.8	464	141.4	346	105.5
Tissue Converting & Finishing (White)	84	25.6	298	90.8	207	63.1
Towel & Napkin Warehouse (Green)	33.5	10.2	434	132.3	424	129.2
Towel & Napkin Converting & Finishing (Yellow)	48	14.6	377	114.9	422	128.6
Towel & Napkin Warehouse (Blue)	40	12.2	464	141.4	641	195.4
Towel & Napkin Warehouse (Gray)	28	8.5	434	132.3	481	146.6
Converting Operations	48	14.6	47	14.3	65	19.8
Building 63	40	12.2	134	40.8	148	45.1
Warehouse Complex 1	62.67	19.1	1,394	424.9	377	114.8
Warehouse Complex 2	46.8	14.3	924	281.5	425	129.5
Nos. 1 and 2 Machines Storage	71.16	21.7	225	68.6	407	124.2
Kraft Converting and Storage	60.75	18.5	310	94.4	524	159.9
Kraft Warehouse and Multi-Wall	56.7	17.3	290	88.4	521	158.7
Digester	62.2	19.0	264	80.4	33	10.1
No. 3 RB Building [a]	100	30.5	61	18.6	34	10.4
No. 2 RB Building [a]	100	30.5	58	17.7	73	22.3

[a] 1974 Baseline Only

Table 3-3. Significant Impact Levels and De Minimis Concentrations for Modeled Pollutants

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_x	Annual	1	14

Table 3-4. Summary of Emissions Increases/Decreases Due to LK4 and Contemporaneous Projects, GP Palatka Power Mill

			Emission Rates											
			Baseline				Potential				Project			
			Annual		Maximum		Annual		Maximum		Annual		Maximum	
Pollutant/Project	Model ID	Source Description	(tons/yr)	(g/s)	(lb/hr)	(g/s)	(tons/yr)	(g/s)	(lb/hr)	(g/s)	(TPY)	(g/s)	(lb/hr)	(g/s)
PM10														
No. 4 Lime Kiln	LK4	No. 4 Lime Kiln (EU17)	36.60	1.05	8.36	1.05	164.80	4.74	37.6	4.74	128.20	3.69	29.27	3.69
MACT I Compliance	TOX	New Thermal Oxidizer		--		--	30.7	--	7.00	--	30.7	0.882	7.00	0.882
	TRSB	Old TRS Incinerator	20.6	-	4.7	-		--		--	-20.6	-0.592	-4.7	-0.592
New Package Boiler	PB7	No. 7 Power Boiler		--		--	1.5	--	1.9	--	1.5	0.043	1.90	0.239
	PB6B	No. 6 Power Boiler	0.15	--	0.18	--		--		--	-0.15	-0.0043	-0.18	-0.023
Bark Hog Replacement	FUG	Fugitives		--		--	3.26	--	0.74	--	3.26	0.094	0.74	0.094
NOx														
No. 4 Lime Kiln	LK4	No. 4 Lime Kiln (EU17)	100.60	2.89	32.0	4.03	467.20	13.44	106.7	13.44	366.60	10.55	74.67	--
MACT I Compliance	TOX	New Thermal Oxidizer		--	--	--	39.4	--	--	--	39.4	1.133	--	--
	TRSB	Old TRS Incinerator	9.2	--	--	--		--	--	--	-9.2	-0.265	--	--
SO_2 (For AQRV Visibility Analysis Only)														
No. 4 Lime Kiln	LK4	No. 4 Lime Kiln (EU17)	--	--	4.30	--	--	--	9.1	--	--	--	4.80	0.60
SAM (For AQRV Visibility Analysis Only)														
No. 4 Lime Kiln	LK4	No. 4 Lime Kiln (EU17)	--	--	0.21	--	--	--	0.45	--	--	--	0.24	0.03

Note: Maximum potential and current emission rates for NOX, SO_2 and SAM were used for AQRV Visibility Analysis

Table 3-5. Source Locations and Source Parameter Data Used for the Significant Impact Analysis, GP Palatka LK4 and Contemporaneous Projects

				Stack Parameters							
		UTM NAD27		Physical				Operating			
Source	Model	East	North	Height		Diameter		Temperature		Velocity	
Description	ID	(m)	(m)	(ft)	(m)	(ft)	(m)	(oF)	(K)	(fps)	(m/s)
No. 4 Lime Kiln	LK4	434106.73	3283246.93	131	39.9	4.4	1.35	164	346.5	70.6	21.51
New Themal Oxidizer	TOX	433981.56	3283380.12	250	76.2	3.6	1.10	160	344.3	13.4	4.09
Old TRS Incinerator	TRSB	434083.59	3283347.55	250	76.2	3.1	0.94	533	551.5	105.1	32.03
No. 7 Power Boiler	PB7	433986.18	3283465.92	60	18.3	7.0	2.13	750	672.0	43.5	13.25
No. 6 Power Boiler	PB6B	433992.76	3283466.42	60	18.3	6.0	1.83	660	622.0	57.2	17.43

		UTM NAD27		Area Source Parameters			
Source	Model	East	North	Release Height		Initial Sigma-z	
Description	ID	(m)	(m)	(ft)	(m)	(ft)	(m)
Bark Pile Fugitives	BARKF	433967.81	3283305.26	30	9.1	14.0	4.25

Table 3-6. State and National Ambient Air Quality Standards for Modeled Pollutants, GP Palatka

Pollutant	Averaging Time	NAAQS/AAQS ($\mu g/m^3$)	Form of Standard
PM_{10}	24-hour	150	High-sixth-highest for 5 years
	Annual	50	Annual Mean
NO_2	Annual	100	Annual Mean

Table 3-7. Summary of Maximum Potential Emissions for PM_{10}, GP Palatka Paper Mill

Emission Pt ID	Model ID	Source Description	Emission Rates (lb/hr)	(g/s)
014	PB4	# 4 Power Boiler	34.57	4.36
015	PB5	# 5 Power Boiler	56.89	7.17
016	CB4	# 4 Combination Boiler	38.00	4.79
018	RB4	# 4 Recovery Boiler	75.6	9.53
019	SDT4	# 4 Smelt Dissolving Tanks	10.8	1.36
044	PB7	# 7 Package Boiler	1.90	0.24
017	LK4	# 4 Lime Kiln	37.60	4.74
039	BCYCL	Bark Handling Cyclone	2.0	0.252
039	BARKF	Chip Mill Fugitives	1.2	0.15
No. 5 Tissue Machine Sources				
043	TM5_3	[3] Stock Prep Area Exhaust Fan (FM1)	0.30	0.037
043	TM5_4	[4] Roof Exhaust Fan 776	0.30	0.037
043	TM5_9	[9] Former Area Exhaust Fan 2042	0.30	0.037
043	TM5_5	[5] AirCap Roof Exhaust Fan 2041(FM2)	0.08	0.010
043	TM5_10	[10] Roof Exhaust Fan 902	0.24	0.030
043	TM5_11	[11] Fan 778	0.35	0.045
043	TM5_12	[12] Roof Exhaust Fan 905	0.24	0.030
043	TM5_16	[16] Burner Area Exhaust Fan	0.35	0.045
043	TM5_7	[7] Winder Area Roof Exhaust Fan 2039	0.88	0.111
043	TM5_6	[6] Reel Roof Exhaust Fan 2040 (WND)	0.88	0.111
043	TM5_15	[15] Existing Wet & Dry Yankee Hood (YKD)-burner	1.20	0.151
043	TM5_14	[14] Afterdryer Hood Exhaust (MND)	0.33	0.042
045	CONV1	Converting Operations	0.5667	0.0714
045	CONV2	Converting Operations	0.5667	0.0714
045	CONV3	Converting Operations	0.5667	0.0714
045	TRIM1	Converting Operations	3.6	0.4536
045	TRIM2	Converting Operations	3.6	0.4536
045	TRIM3	Converting Operations	3.8	0.4788
	TM4	No. 4 Tissue Machine Combined Source	0.55	0.0693
	TM3	No. 3 Tissue Machine Combined Source	0.55	0.0693
Roads				
	GATE1***	Traffic Through Gate 1 (1.31 lb/day - 64 sources)	0.05458	0.00688
	GATE2***	Traffic Through Gate 2 (2.83 lb/day - 29 sources)	0.11792	0.01486
	GATE3***	Traffic Through Gate 3 (0.55 lb/day - 41 sources)	0.02292	0.00289
	GATE4***	Traffic Through Gate 4 (23.56 lb/day - 102 sources)	0.98167	0.12369
	GATE5***	Traffic Through Gate 5 (0.55 lb/day - 51 sources)	0.02292	0.00289
Total All Sources:			279.01	35.16

Table 3-8. Summary of Maximum Potential Emissions for NOx, GP Palatka Paper Mill				
			Emission Rates	
Emission Pt ID	Model ID	Source Description	(TPY)	(g/s)
014	PB4	# 4 Power Boiler	184.00	5.29
015	PB5	# 5 Power Boiler	781.00	22.47
016	CB4	# 4 Combination Boiler	522.90	15.04
018	RB4	# 4 Recovery Boiler	738.1	21.23
019	SDT4	# 4 Smelt Dissolving Tanks	69.6	2.00
044	PB7	# 7 Package Boiler	39.40	1.13
017	LK4	# 4 Lime Kiln	467.90	13.46
043	TM5_15	[15] Existing Wet & Dry Yankee Hood (YKD)-burner	23.65	0.68
	TM4	No. 4 Tissue Machine Combined Source	10.80	0.31
	TM3	No. 3 Tissue Machine Combined Source	10.80	0.31
	TOX	Thermal Oxidizer	151.36	4.35
Total All Sources:			2999.51	81.93

Table 3-9. Locations and Stack Parameters for Point Sources at GP Palatka Paper Mill for Future NAAQS Impact Analysis

		Stack Parameters									
		Source Location UTM		Stack Height		Stack Exit Temp		Stack Velocity		Stack Diameter	
Model ID	Description	East (m)	North (m)	(ft)	(m)	F	K	(fps)	(m/s)	(ft)	(m)
PB4	# 4 Power Boiler	433998.01	3283481.49	200	61.0	395	475	71.6	21.83	4	1.22
PB5	# 5 Power Boiler	433977.26	3283447.19	237	72.2	413	485	85.9	26.19	8	2.44
CB4	# 4 Combination Boiler	433982.43	3283450.46	237	72.2	466	514	92.3	28.14	8	2.44
RB4	# 4 Recovery Boiler	433882.28	3283437.93	230	70.1	425	491	65.9	20.08	12	3.66
SDT4	# 4 Smelt Dissolving Tanks	433934.67	3283477.55	206	62.8	180	355	34.0	10.35	5	1.52
PB7	# 7 Package Boiler	433986.18	3283465.92	60	18.3	750	672	43.5	13.25	7	2.13
LK4	# 4 Lime Kiln	434106.73	3283246.93	131	39.9	170	350	70.6	21.51	4.42	1.35
TOX	Thermal Oxidizer	433981.56	3283380.12	250	76.2	160	344	18.0	5.49	3.6	1.10
BCYCL	Bark Handling Cyclone	433966.62	3283485.19	117.6	35.85	77	298	23.6	7.20	3	0.91
TM5_3	TM-5 Stock Prep Area Exhaust Fan (FM1)	434234.62	3283507.73	94	28.65	115	319	39.2	11.94	5.7	1.74
TM5_4	TM-5 Roof Exhaust Fan 776	434245.04	3283495.24	94	28.65	115	319	39.2	11.94	5.7	1.74
TM5_9	TM-5 Former Area Exhaust Fan 2042	434245.04	3283486.71	94	28.65	120	322	39.2	11.94	5.7	1.74
TM5_5	TM-5 AirCap Roof Exhaust Fan 2041(FM2)	434256.99	3283477.82	94	28.65	115	319	39.2	11.94	5.7	1.74
TM5_10	TM-5 Roof Exhaust Fan 902	434255.09	3283473.87	94	28.65	115	319	38.4	11.71	4.7	1.43
TM5_11	TM-5 Fan 778	434258.43	3283468.66	94	28.65	115	319	39.2	11.94	5.7	1.74
TM5_12	TM-5 Roof Exhaust Fan 905	434261.04	3283465.13	94	28.65	115	319	38.4	11.71	4.7	1.43
TM5_16	TM-5 Burner Area Exhaust Fan	434251.74	3283469.22	84	25.60	115	319	39.2	11.94	5.7	1.74
TM5_7	TM-5 Winder Area Roof Exhaust Fan 2039	434280.95	3283445.22	94	28.65	115	319	38.4	11.71	4.7	1.43
TM5_6	TM-5 Reel Roof Exhaust Fan 2040 (WND)	434270.53	3283459.73	94	28.65	115	319	47.1	14.35	5.2	1.58
TM5_15	TM-5 Existing Wet & Dry Yankee Hood (YKD)-burner	434264.95	3283462.34	94	28.65	450	505	64.5	19.66	5	1.52
TM5_14	TM-5 Afterdryer Hood Exhaust (MND)	434266.06	3283458.25	94	28.65	180	355	56.7	17.29	3.8	1.16
CONV1	Converting Operations	434383.27	3283544.38	55.3	16.86	90	305	147.2	44.87	3.1	0.94
CONV2	Converting Operations	434389.22	3283548.48	55.3	16.86	90	305	147.2	44.87	3.1	0.94
CONV3	Converting Operations	434395.36	3283552.94	55.3	16.86	90	305	147.2	44.87	3.1	0.94
TRIM1	Converting Operations	434286.17	3283423.52	67	20.42	90	305	81.2	24.75	2.8	0.85
TRIM2	Converting Operations	434288.13	3283427.44	67	20.42	90	305	81.2	24.75	2.8	0.85
TRIM3	Converting Operations	434282.89	3283423.52	70.3	21.43	90	305	85.72	26.13	2.8	0.85
TM4	No. 4 Tissue Machine Combined Source	434302.09	3283502.61	94	28.65	450	505	64.5	19.66	5	1.52
TM3	No. 3 Tissue Machine Combined Source	434220.66	3283432.68	94	28.65	450	505	64.5	19.66	5	1.52

Table 3-10. Summary of Model Parameters for Fugitive Sources, GP Palatka Paper Mill

Model ID	Source Description	Source Location UTM (m)		Release Ht (m)	Computed Initial Dispersion Coefficients (a)	
		East	North		Horizontal	Vertical
BARKF(a)	Chip Mill Fugitives	433967.81	3283305.26	9.14	NA	4.25
GATE....	All Paved Roads	Varies	Varies	4.572	6.57	2.13

(a) Areapoly Source

Table 3-11. North Carolina Technique Screening Analysis for Competing Sources of Particulate.

AIRS Number	Owner	Facility	Distance to GP (km)	Threshold (tpy)	Include in PM_{10} NAAQS? Emissions (tpy)	Emission > Threshold?
1070022	Florida Rock Industries, Inc. Putnam	Florida Rock -Comfort Rd	2.3	SIA	0.88	YES
1070030	Georgia-Pacific Corporation	Georgia-Pacific Corp. Palatka Chipnsaw	2.7	SIA	90.47	YES
1070031	Cdr Systems Corporation	Cdr Systems Corporation	2.9	SIA	0.00	NO
1070028	Tarmac Florida, Inc. Palatka	Tarmac Florida, Inc. Palatka	3.0	SIA	0.00	NO
1070043	Price Brothers Company	Palatka Plant	4.0	8.0	39.90	NO
1070025	Seminole Electric Cooperative, Inc.	Seminole Power Plant	7.5	78.6	1884.80	YES
1070039	Lafarge North America, Inc.	Lafarge North America, Inc.	7.7	82.4	221.65	YES
1070014	Florida Power & Light (Ppn)	Putnam Power Plant	10.9	145.1	40.56	NO
1070029	Southern Crematory, Inc.	Watts Funeral Home	12.9	186.8	0.70	NO
0190007	Iluka Resources Inc.	Green Cove Springs	20.9	345.2	209.24	NO
1070038	Johnson-Overturf Funeral Home, Inc.	Johnson-Overturf Funeral Homes Inc	21.6	359.3	1.30	NO
1070041	Masters Funeral Home, P.A.	Palatka Facility	21.7	361.9	1.43	NO
1070007	Florida Rock Industries, Inc. Keuka Plt	Florida Rock Industries, Inc. Keuka Plt	24.5	417.9	21.46	NO
1070001	Feldspar Corp/Edgar Plastic Kaolin Div	Feldspar Corp/Edgar Plastic Kaolin Div	27.7	482.9	38.96	NO
0190027	Florida Rock Industries, Inc. Clay	Florida Rock Industries, Inc. Clay	31.7	562.2	0.00	NO
7775007	Hanson Pipe & Products, Inc.	Hanson Pipe & Products, Inc.	32.2	572.1	0.00	NO
0190031	Vac-Con	Vac-Con	32.7	582.3	0.01	NO
1070040	Delray Stake And Shavings, Inc.	Crescent City Mill	32.8	583.2	53.29	NO
0190068	Mobro Marine, Inc	Green Cove Springs	33.3	594.5	49.90	NO
0190019	Tamko Roofing Products, Inc.	Tamko Roofing Products, Inc.	33.4	596.4	63.06	NO
0190069	Redd Team Manufacturing, Inc.	Keystone Heights	33.4	596.9	24.00	NO
0190056	New Ngc, Inc.	Unifix Usa - National Gypsum Co. - Clay	33.5	598.1	0.02	NO
1090450	Tarmac America, Llc	St. Augustine Ii	33.6	599.1	0.00	NO
0190021	Pyramid Mouldings	Pyramid Mouldings	34.3	614.1	8.92	NO
0190070	Coastal Marine, Inc.	Coastal Marine Inc	34.4	616.2	7.80	NO
1090446	Hicks Trucking & Land Clearing	Hicks Trucking & Land Clearing	34.5	618.5	16.38	NO
7770007	Anderson Columbia, Inc. #9	#9 Ashpalt Plant	34.6	620.3	10.11	NO
1070015	Georgia-Pacific Corp. Plywood Plant	Georgia-Pacific Corp. Plywood Plant	35.7	642.3	232.45	NO
7775083	Pave-Tec, Inc.	Pave-Tec, Inc.	36.7	662.3	7.50	NO
1090037	V.J. Usina Contracting, Inc.	V.J.Usina Contracting, Inc.	37.8	683.6	41.60	NO
1090036	Lakeview Dirt Company, Inc.	Lakeview Dirt Company, Inc.	38.9	705.7	0.00	NO
1090019	Tarmac America, Inc. St. Augustine	Tarmac America, Inc. St. Augustine	38.9	706.4	0.00	NO
1090035	Masters Land Clearing, Inc.	Masters Land Clearing, Inc.	39.0	708.0	0.00	NO
1090444	St. Augustine Memorial Park & Crematory	St. Augustine Memorial Park & Crematory	39.2	711.3	0.75	NO
1090447	Halna, Inc.	Hydro Aluminum Of North America - St. Au	39.4	715.0	19.11	NO
1090018	Florida Rock Industries, Inc. St. Johns	Florida Rock Industries, Inc. St. Johns	39.9	726.0	29.65	NO
7775056	Apac-Southeast, Inc. - First Coast Div.	Apac-Southeast, Inc. -Plant No. 4	40.2	732.9	48.97	NO
0190032	Florida Army National Guard - Camp Blndg	Florida Army National Guard - Camp Blndg	40.7	742.5	7.49	NO
1090011	W.J. Development Corporation	St. Augustine Marine	41.8	763.6	0.00	NO
0190011	E.I. Dupont De Nemours & Co - Trailridge	E.I. Dupont De Nemours & Co - Trailridge	42.1	770.5	153.52	NO
1090015	Florida School For The Deaf & The Blind	Florida School For The Deaf & The Blind	43.7	802.9	3.17	NO
7775261	Florida Rock Industries, Inc.	Portable Redi-Mix	43.8	803.1	0.00	NO
0350002	Tarmac America, Inc. Bunnell	Tarmac America, Inc. Bunnell	44.4	815.0	0.00	NO
0830070	Florida Gas Transmission Company	Fgtc Station 17, Marion County	45.1	830.7	5.62	NO
7770037	Apac-Southeast, Inc. - First Coast Div.	Apac-Southeast Inc., First Coast Div.	45.3	833.3	24.25	NO
0190059	W.W.Carter Contracting	W.W.Carter Contractmasters Road Property	45.7	842.4	4.80	NO
0350004	Rinker Materials Corporation - Bunnell	Rinker Materials Corporation - Bunnell	45.8	844.1	0.00	NO
1090040	Rinker Materials Corporation	Rinker Materials #1 Plant	46.1	850.2	0.00	NO
7775001	American Concrete Products L.C.	American Concrete Products L.C.	47.1	870.1	2.12	NO
0070016	Owen Joist Corporation	Smi Joist Of Florida	49.8	923.0	1.46	NO
0070011	Florida Rock Industries, Inc. Bradford	Florida Rock Industries, Inc. Bradford	50.5	938.9	109.85	NO
0070004	Griffin Industries Of Florida	Griffin Industries Of Florida	50.7	942.8	116.43	NO
0190026	Tarmac Florida, Inc. Orange Park	Tarmac Florida, Inc. Orange Park	50.9	946.2	0.00	NO
0830094	Bedrock Resources	Bedrock Resources/Citra Mine	51.3	953.3	2.50	NO
0310225	Southern Culvert Division/Wheeler Cnsl.	Southern Culvert Division/Wheeler Cnsl.	53.0	987.6	0.01	NO

Table 3-11. North Carolina Technique Screening Analysis for Competing Sources of Particulate.

AIRS Number	Owner	Facility	Distance to GP (km)	Threshold (tpy)	Include in PM_{10} NAAQS? Emissions (tpy)	Emission > Threshold?
7775240	Apac-Southeast, Inc. First Coast Divisi	Gainesville Asphalt Plant	53.5	997.6	3.94	NO
0070001	E.I. Dupont De Nemours & Co Inc Highland	E.I. Dupont De Nemours & Co Inc Highland	54.6	1019.2	145.42	NO
0310462	First Coast Technology & Repair	First Coast Technology & Repair	54.6	1020.0	0.00	NO
7775041	Apac- Southeast, Inc.	Apac-Southeast, Inc.	55.0	1028.5	60.80	NO
1270096	Falcon Industries, Inc.	Falcon Industries, Inc.	55.0	1028.8	0.41	NO
0310208	Standard Precast, Inc.	Standard Precast, Inc.	55.4	1036.7	0.07	NO
0310250	Tarmac America, Inc.	Tarmac America, Inc.	55.5	1037.4	0.37	NO
0830045	Standard Sand & Silica Co	Standard Sand & Silica Co	56.3	1053.7	47.70	NO
0830062	Tru Balance Wheel Weights, Inc.	Tru Balance Wheel Weights, Inc.	56.3	1053.9	0.00	NO
0310277	Rinker Materials Corp.	Rinker Materials Corp.	57.1	1069.0	20.10	NO
0310043	Duval Asphalt Products	Phillips Highway Plant	57.1	1070.6	8.12	NO
0310223	Cemex, Inc.	Cemex, Inc.(Florida Mining Blvd.)	57.6	1079.6	0.91	NO
0310293	Jaxson Brown, Inc.	Sunbeam Road Landfill	58.3	1094.7	0.00	NO
0310026	Atlantic Coast Asphalt, Inc.	Shad Asphalt Plant	58.4	1095.4	23.84	NO
0310171	Florida Rock Industries, Inc.	Capitol Concrete Plant # 3	58.7	1101.5	2.33	NO
0830051	Seilers Concrete	Seilers Concrete	59.0	1107.7	0.05	NO
0310341	Chancey Metal Products, Inc.	Chancey Metal Products, Inc.	59.0	1108.8	0.93	NO
0310215	United States Navy	Nas-Jacksonville	59.4	1116.0	104.01	NO
0010117	Garden Of Love Pet Memorial Park	Micanopy Facility	59.5	1118.8	1.14	NO
7775181	Anderson Materials Company Inc.	Concrete Plant No. 7	60.2	1132.0	15.00	NO
0190005	Gilman Building Products Co.	Gilman Building Products Co.	62.3	1174.3	13.72	NO
0830017	Mfm Industries Inc	Lowell Processing Plant	62.5	1177.3	87.60	NO
0830016	Franklin Industrial Minerals	Franklin Industrial/Lowell	63.0	1187.7	323.40	NO
1250007	Pride Enterprises	Pride - Union Metal	65.4	1236.0	0.00	NO
0830091	Dixie Lime & Stone	Cummer Limestone Mine	65.6	1239.3	10.50	NO
0830145	United States Plastic Lumber	Uspl	65.9	1246.2	0.00	NO
0830069	Delta Laboratories	Delta Laboratories/Ocala	66.8	1264.0	5.70	NO
0830059	Steven Counts, Inc. Fka Harlis Ellington	Steven Counts, Inc. Plant #1	67.0	1267.9	6.05	NO
0830064	Gmp Industries Inc	Aaa Ready Mix	67.0	1268.7	0.14	NO
0310503	Trend Offset Printing Services, Inc.	Trend Offset Printing Services, Inc.	67.5	1278.2	0.18	NO
0830093	Southeastern Mfg	Semco	67.7	1283.0	0.00	NO
0830134	Mickey Body Company	Mickey Body Company/Ocala	68.0	1288.7	0.42	NO
0830039	The Brewer Company	The Brewer Company	68.1	1289.3	147.70	NO
1270161	Prestige Gunite Inc	Prestige Gunite Of Ormond Beach	68.4	1295.2	0.00	NO
1270165	Set Materials Inc	Set Materials Inc	68.4	1295.6	0.88	NO
7770088	Steven Counts, Inc.	Clifton Mine	68.4	1296.2	12.80	NO
0830135	Anderson Columbia Company	Anderson Columbia Co Plant # 8	68.5	1297.8	8.09	NO
1270031	Halifax Paving, Inc.	Halifax Paving/Ormond Beach	68.5	1299.0	74.24	NO
1250008	New River Solid Waste Association	New River Regional Landfill	68.6	1300.1	4.60	NO
0830140	Ocala Lumber Sales Company	Ocala Lumber Sales	69.0	1308.9	0.00	NO
1270102	Florida Production Engineering, Inc.	Florida Production Engineering, Inc.	69.3	1314.2	2.60	NO
0830056	Hiers Funeral Home	Hiers Funeral Home/Ocala	69.7	1322.6	0.00	NO
0830131	Branch Properties Inc	Seminole Stores	69.8	1324.9	19.50	NO
1270090	Imperial Foam & Insulation Mfg. Co.	Imperial Foam & Insulation Mfg	69.9	1326.0	0.00	NO
0830010	Royal Oak Enterprises	Royal Oak Enterprises	70.0	1327.6	101.88	NO
0830007	Dayco Products Inc	Mark Iv Dayco	70.2	1332.0	105.06	NO
0830155	Florida Cremation Society	Florida Cremation Society	70.2	1332.2	2.00	NO
0830001	Counts Construction Company, Inc.	Counts Construction Company, Inc.	70.8	1344.7	0.36	NO
0830026	Cemex, Inc. Fka Southdown	Southdown/Ocala Plant	70.9	1346.2	4.47	NO
0830101	Skyline Corportation	Skyline/Hornette # 535	71.0	1348.9	0.34	NO
0830004	Stewart Enterprises Inc	Roberts Funeral Home	71.1	1349.8	2.00	NO
0830103	Lippert Components Inc	Lippert Components	71.5	1358.9	0.00	NO
0830128	Damar Manufacturing Inc	Damar Manufacturing	71.8	1363.2	1.00	NO
0830102	Skyline Corporation	Skyline/Cameron Homes # 538	71.9	1365.3	13.60	NO
0830100	Skyline Corporation	Skyline/Oak Springs # 531	71.9	1366.4	18.90	NO
0830027	Rinker Materials Corp	Rinker/Ocala	72.1	1370.1	2.29	NO
0830052	Closetmaid Fka Clairson Intl	Closetmaid	72.5	1377.8	21.15	NO
0830043	Golden Flake Snack Foods	Golden Flake Snack Foods	72.7	1381.8	25.72	NO
0830137	Merillat Corp	Merillat/Ocala	73.7	1401.8	1.20	NO
0830132	Florida Rock Industries	Florida Rock/Ocala	74.1	1410.7	0.00	NO
1270016	Rinker Materials Corp	Rinker/Ormond Beach	74.5	1417.2	88.08	NO

Table 3-11. North Carolina Technique Screening Analysis for Competing Sources of Particulate.						
					Include in PM_{10} NAAQS?	
AIRS Number	Owner	Facility	Distance to GP (km)	Threshold (tpy)	Emissions (tpy)	Emission > Threshold?
0830066	Emergency One, Inc.	Emergency One, Inc. - Body Plant	74.6	1420.5	0.00	NO
0830084	Flair Manufacturing	Flair Manufacturing	76.5	1458.2	0.10	NO
1270074	Crane Cams Inc	Crane Cams	77.7	1481.8	0.00	NO
0830082	Emergency One, Inc.	Emergency One, Inc. - Svo Facility	78.1	1489.1	0.00	NO
0830068	Evans Septic Tank & Ready Mix, Inc.	Evans Septic Tank & Ready Mix	79.0	1508.6	0.00	NO

Notes:

GP Palatka Paper Mill is located at UTM zone 17 coordinates (km): East 434.0, North 3283.4

Significant Impact Distance = 3.6 km

Table 3-12. PM_{10} NAAQS Analysis Modeling Parameters for Competing Sources

Facility Description	Model ID	PM_{10} Emission	Release Height		Stack Diameter		Exit Temperature		Exit Velocity		Volume Source Dimensions (m)	
Stack Description	ID Name	Rate (g/s)	(ft)	(m)	(ft)	(m)	(F)	(K)	(fps)	(m/s)	Sig y	Sig z
1070022 Florida Rock -Comfort Rd												
Concrete Batch Plant (Ready Mix) W/Baghouse	FLROCK	0.025[a]	13	3.96	2	0.55	77	298.2	63	19.20	--	--
1070030 Georgia-Pacific Corp. Palatka Chipnsaw												
Planer Mill Cyclone	CNS04	0.751	80	24.38	7	2.04	68	293.2	18	5.49	--	--
Planer Mill Trim Hog Cyclone	CNS05	0.112	30	9.14	3	0.82	68	293.2	43	13.11	--	--
Chip Bin Cyclone	CNS08	0.066	63	19.2	1	0.40	68	293.2	101	30.66	--	--
Fuel Silo Cyclone	CNS03	0.517	80	24.38	2	0.67	80	299.8	12	3.66	--	--
Kiln 2 Source Vent 1	KILN2_1	0.0231	33	10.14	3	0.80	240	388.7	38.9	11.84	--	--
Kiln 2 Source Vent 2	KILN2_2	0.0231	33	10.14	3	0.80	240	388.7	38.9	11.84	--	--
Kiln 2 Source Vent 3	KILN2_3	0.0231	33	10.14	3	0.80	240	388.7	38.9	11.84	--	--
Kiln 2 Source Vent 4	KILN2_4	0.0231	33	10.14	3	0.80	240	388.7	38.9	11.84	--	--
Kiln 2 Source Vent 5	KILN2_5	0.0231	33	10.14	3	0.80	240	388.7	38.9	11.84	--	--
Kiln 2 Source Vent 6	KILN2_6	0.0231	33	10.14	3	0.80	240	388.7	38.9	11.84	--	--
Kiln 1 Source Vent 1	KILN1_1	0.0231	33	10.14	3	0.80	240	388.7	38.9	11.84	--	--
Kiln 1 Source Vent 2	KILN1_2	0.0231	33	10.14	3	0.80	240	388.7	38.9	11.84	--	--
Kiln 1 Source Vent 3	KILN1_3	0.0231	33	10.14	3	0.80	240	388.7	38.9	11.84	--	--
Kiln 1 Source Vent 4	KILN1_4	0.0231	33	10.14	3	0.80	240	388.7	38.9	11.84	--	--
Kiln 1 Source Vent 5	KILN1_5	0.0231	33	10.14	3	0.80	240	388.7	38.9	11.84	--	--
Kiln 1 Source Vent 6	KILN1_6	0.0231	33	10.14	3	0.80	240	388.7	38.9	11.84	--	--
Sawmill Fugitives	SAWFUG	0.7156	15	4.57	--	--	--	--	--	--	24.19	4.25
Planer Mill Fugitives	PLANRFUG	0.1638	15	4.57	--	--	--	--	--	--	11.163	4.25
1070025 Seminole Electic - Seminole Power Plant												
Steam Electric Generators No. 1 and 2	SEMELECT	54.220	675	205.74	36	10.97	128	326.5	26	7.92	--	--
1070039 Lafarge North America, Inc.												
FGD Surge Bin (55-ton Bin)		0.007	50	15.24	1	0.15	68	293.2	42	12.92	--	--
Imp Mill Feed Silo A		0.007	60	18.29	1	0.15	130	327.6	42	12.92	--	--
Stucco Silo A		0.010	--	--		--	--	--	--	--	--	--
STARCH SILO		0.020	52	15.85	1	0.15	68	293.2	53	16.03	--	--
Norba Grinder and Hammermill System		0.065	50	15.24	1	0.30	68	293.2	64	19.42	--	--
Wallboard Dryer (4 Natural Gas Burners)		0.001	46	14.02	7	2.19	165	347.0	71	21.49	--	--
Ball Mills		0.024	--	--	--	--	--	--	--	--	--	--
Landplaster Bin		0.518	--	--	--	--	--	--	--	--	--	--
Additives System and Pin Mixer		0.259	--	--	--	--	--	--	--	--	--	--
IMP Mill Feed Silo B		0.007	--	--	--	--	--	--	--	--	--	--
Stucco Silo B		0.007	--	--	--	--	120	322.0	--	--	--	--
Cage Mill Flash Dryer System		1.404	--	--	--	--	--	--	--	--	--	--
Composite Stack 1	LNA1	2.327	50	15.24	1	0.15	68	293.2	42	12.92	--	--
Cage mill dryer system		1.404	130	39.62	5	1.55	190	360.9	54	16.43	--	--
Imp Mill Flash Calciner System A		0.281	130	39.62	4	1.22	325	435.9	23	7.10	--	--
Air Cooling System A		1.037	130	39.62	4	1.22	150	338.7	42	12.92	--	--
Imp Mill Flash Calciner System B		0.281	130	39.62	4	1.10	320	433.2	--	--	--	--
Air Cooling System B		1.037	130	39.62	4	1.22	155	341.5	--	--	--	--
Composite Stack 2	LNA2	4.039	130	39.62	4	1.22	325	435.9	23	7.10	--	--

[a] Maximum Potential Emissions

Table 3-13. North Carolina Technique Screening Analysis for Competing Sources of NO_x.

AIRS Number	Owner	Facility	Distance to GP (km)	Threshold (tpy)	Include in NO_x NAAQS? Emissions (tpy)	Emission > Threshold?
1070022	Florida Rock Industries, Inc. Putnam	Florida Rock -Comfort Rd	2.3	SIA	0	NO
1070030	Georgia-Pacific Corporation	Georgia-Pacific Corp. Palatka Chipnsaw	2.6	SIA	17	YES
1070031	Cdr Systems Corporation	Cdr Systems Corporation	2.9	7	0	NO
1070028	Tarmac Florida, Inc. Palatka	Tarmac Florida, Inc. Palatka	3.0	7	0	NO
1070043	Price Brothers Company	Palatka Plant	4.0	28	0	NO
1070025	Seminole Electric Cooperative, Inc.	Seminole Power Plant	7.5	99	37696	YES
1070039	Lafarge North America, Inc.	Lafarge North America, Inc.	7.7	102	163	YES
1070014	Florida Power & Light (Ppn)	Putnam Power Plant	10.9	165	876	YES
1070029	Southern Crematory, Inc.	Watts Funeral Home	12.9	207	0	NO
0190007	Iluka Resources Inc.	Green Cove Springs	20.9	365	67	NO
1070038	Johnson-Overturf Funeral Home, Inc.	Johnson-Overturf Funeral Homes Inc	21.6	379	3	NO
1070041	Masters Funeral Home, P.A.	Palatka Facility	21.7	382	0	NO
1070007	Florida Rock Industries, Inc. Keuka Plt	Florida Rock Industries, Inc. Keuka Plt	24.5	438	0	NO
1070001	Feldspar Corp/Edgar Plastic Kaolin Div	Feldspar Corp/Edgar Plastic Kaolin Div	27.7	503	0	NO
0190027	Florida Rock Industries, Inc. Clay	Florida Rock Industries, Inc. Clay	31.7	582	0	NO
7775007	Hanson Pipe & Products, Inc.	Hanson Pipe & Products, Inc.	32.2	592	0	NO
0190031	Vac-Con	Vac-Con	32.7	602	0	NO
1070040	Delray Stake And Shavings, Inc.	Crescent City Mill	32.8	603	0	NO
0190068	Mobro Marine, Inc	Green Cove Springs	33.3	614	0	NO
0190019	Tamko Roofing Products, Inc.	Tamko Roofing Products, Inc.	33.4	616	0	NO
0190069	Redd Team Manufacturing, Inc.	Keystone Heights	33.4	617	0	NO
0190056	New Ngc, Inc.	Unifix Usa - National Gypsum Co. - Clay	33.5	618	0	NO
1090450	Tarmac America, Llc	St. Augustine Ii	33.6	619	0	NO
0190021	Pyramid Mouldings	Pyramid Mouldings	34.3	634	0	NO
0190070	Coastal Marine, Inc.	Coastal Marine Inc	34.4	636	0	NO
1090446	Hicks Trucking & Land Clearing	Hicks Trucking & Land Clearing	34.5	639	0	NO
7770007	Anderson Columbia, Inc. #9	#9 Ashpalt Plant	34.6	640	0	NO
1070015	Georgia-Pacific Corp. Plywood Plant	Georgia-Pacific Corp. Plywood Plant	35.7	662	0	NO
7775083	Pave-Tec, Inc.	Pave-Tec, Inc.	36.7	682	0	NO
1090037	V.J. Usina Contracting, Inc.	V.J.Usina Contracting, Inc.	37.8	704	0	NO
1090036	Lakeview Dirt Company, Inc.	Lakeview Dirt Company, Inc.	38.9	726	0	NO
1090019	Tarmac America, Inc. St. Augustine	Tarmac America, Inc. St. Augustine	38.9	726	0	NO
1090035	Masters Land Clearing, Inc.	Masters Land Clearing, Inc.	39.0	728	0	NO
1090444	St. Augustine Memorial Park & Crematory	St. Augustine Memorial Park & Crematory	39.2	731	0	NO
1090447	Halna, Inc.	Hydro Aluminum Of North America - St. Au	39.4	735	0	NO
1090018	Florida Rock Industries, Inc. St. Johns	Florida Rock Industries, Inc. St. Johns	39.9	746	0	NO
7775056	Apac-Southeast, Inc. - First Coast Div.	Apac-Southeast, Inc. -Plant No. 4	40.2	753	61	NO
0190032	Florida Army National Guard - Camp Blndg	Florida Army National Guard - Camp Blndg	40.7	762	0	NO
1090011	W.J. Development Corporation	St. Augustine Marine	41.8	784	0	NO
0190011	E.I. Dupont De Nemours & Co - Trailridge	E.I. Dupont De Nemours & Co - Trailridge	42.1	790	34	NO
1090015	Florida School For The Deaf & The Blind	Florida School For The Deaf & The Blind	43.7	823	0	NO
7775261	Florida Rock Industries, Inc.	Portable Redi-Mix	43.8	823	0	NO
0350002	Tarmac America, Inc. Bunnell	Tarmac America, Inc. Bunnell	44.4	835	0	NO
0830070	Florida Gas Transmission Company	Fgtc Station 17, Marion County	45.1	851	900	YES
7770037	Apac-Southeast, Inc. - First Coast Div.	Apac-Southeast Inc., First Coast Div.	45.3	853	14	NO
0190059	W.W.Carter Contracting	W.W.Carter Contractmasters Road Property	45.7	862	0	NO
0350004	Rinker Materials Corporation - Bunnell	Rinker Materials Corporation - Bunnell	45.8	864	0	NO
1090040	Rinker Materials Corporation	Rinker Materials #1 Plant	46.1	870	0	NO
7775001	American Concrete Products L.C.	American Concrete Products L.C.	47.1	890	0	NO
0070016	Owen Joist Corporation	Smi Joist Of Florida	49.8	943	0	NO
0070011	Florida Rock Industries, Inc. Bradford	Florida Rock Industries, Inc. Bradford	50.5	959	0	NO
0070004	Griffin Industries Of Florida	Griffin Industries Of Florida	50.7	963	48	NO
0190026	Tarmac Florida, Inc. Orange Park	Tarmac Florida, Inc. Orange Park	50.9	966	0	NO
0830094	Bedrock Resources	Bedrock Resources/Citra Mine	51.3	973	23	NO
0310225	Southern Culvert Division/Wheeler Cnsl.	Southern Culvert Division/Wheeler Cnsl.	53.0	1008	0	NO
7775240	Apac-Southeast, Inc. First Coast Divisi	Gainesville Asphalt Plant	53.5	1018	9	NO

Table 3-13. North Carolina Technique Screening Analysis for Competing Sources of NO_x.

AIRS Number	Owner	Facility	Distance to GP (km)	Threshold (tpy)	Include in NO_x NAAQS? Emissions (tpy)	Emission > Threshold?
0070001	E.I. Dupont De Nemours & Co Inc Highland	E.I. Dupont De Nemours & Co Inc Highland	54.6	1039	0	NO
0310462	First Coast Technology & Repair	First Coast Technology & Repair	54.6	1040	0	NO
7775041	Apac- Southeast, Inc.	Apac-Southeast, Inc.	55.0	1049	48	NO
1270096	Falcon Industries, Inc.	Falcon Industries, Inc.	55.0	1049	0	NO
0310208	Standard Precast, Inc.	Standard Precast, Inc.	55.4	1057	0	NO
0310250	Tarmac America, Inc.	Tarmac America, Inc.	55.5	1057	0	NO
0830045	Standard Sand & Silica Co	Standard Sand & Silica Co	56.3	1074	87	NO
0830062	Tru Balance Wheel Weights, Inc.	Tru Balance Wheel Weights, Inc.	56.3	1074	0	NO
0310277	Rinker Materials Corp.	Rinker Materials Corp.	57.1	1089	0	NO
0310043	Duval Asphalt Products	Phillips Highway Plant	57.1	1091	18	NO
0310223	Cemex, Inc.	Cemex, Inc.(Florida Mining Blvd.)	57.6	1100	0	NO
0310293	Jaxson Brown, Inc.	Sunbeam Road Landfill	58.3	1115	4	NO
0310026	Atlantic Coast Asphalt, Inc.	Shad Asphalt Plant	58.4	1115	45	NO
0310171	Florida Rock Industries, Inc.	Capitol Concrete Plant # 3	58.7	1122	0	NO
0830051	Seilers Concrete	Seilers Concrete	59.0	1128	0	NO
0310341	Chancey Metal Products, Inc.	Chancey Metal Products, Inc.	59.0	1129	0	NO
0310215	United States Navy	Nas-Jacksonville	59.4	1136	120	NO
0010117	Garden Of Love Pet Memorial Park	Micanopy Facility	59.5	1139	0	NO
7775181	Anderson Materials Company Inc.	Concrete Plant No. 7	60.2	1152	0	NO
0190005	Gilman Building Products Co.	Gilman Building Products Co.	62.3	1194	6	NO
0830017	Mfm Industries Inc	Lowell Processing Plant	62.5	1197	36	NO
0830016	Franklin Industrial Minerals	Franklin Industrial/Lowell	63.0	1208	110	NO
1250007	Pride Enterprises	Pride - Union Metal	65.4	1256	0	NO
0830091	Dixie Lime & Stone	Cummer Limestone Mine	65.6	1259	0	NO
0830145	United States Plastic Lumber	Uspl	65.9	1266	0	NO
0830069	Delta Laboratories	Delta Laboratories/Ocala	66.8	1284	0	NO
0830059	Steven Counts, Inc. Fka Harlis Ellington	Steven Counts, Inc. Plant #1	67.0	1288	4	NO
0830064	Gmp Industries Inc	Aaa Ready Mix	67.0	1289	0	NO
0310503	Trend Offset Printing Services, Inc.	Trend Offset Printing Services, Inc.	67.5	1298	6	NO
0830093	Southeastern Mfg	Semco	67.7	1303	4	NO
0830134	Mickey Body Company	Mickey Body Company/Ocala	68.0	1309	4	NO
0830039	The Brewer Company	The Brewer Company	68.1	1309	0	NO
1270161	Prestige Gunite Inc	Prestige Gunite Of Ormond Beach	68.4	1315	0	NO
1270165	Set Materials Inc	Set Materials Inc	68.4	1316	0	NO
7770088	Steven Counts, Inc.	Clifton Mine	68.4	1316	17	NO
0830135	Anderson Columbia Company	Anderson Columbia Co Plant # 8	68.5	1318	0	NO
1270031	Halifax Paving, Inc.	Halifax Paving/Ormond Beach	68.5	1319	78	NO
1250008	New River Solid Waste Association	New River Regional Landfill	68.6	1320	11	NO
0830140	Ocala Lumber Sales Company	Ocala Lumber Sales	69.0	1329	0	NO
1270102	Florida Production Engineering, Inc.	Florida Production Engineering, Inc.	69.3	1334	0	NO
0830056	Hiers Funeral Home	Hiers Funeral Home/Ocala	69.7	1343	0	NO
0830131	Branch Properties Inc	Seminole Stores	69.8	1345	0	NO
1270090	Imperial Foam & Insulation Mfg. Co.	Imperial Foam & Insulation Mfg	69.9	1346	1	NO
0830010	Royal Oak Enterprises	Royal Oak Enterprises	70.0	1348	90	NO
0830007	Dayco Products Inc	Mark Iv Dayco	70.2	1352	18	NO
0830155	Florida Cremation Society	Florida Cremation Society	70.2	1352	3	NO
0830001	Counts Construction Company, Inc.	Counts Construction Company, Inc.	70.8	1365	8	NO
0830026	Cemex, Inc. Fka Southdown	Southdown/Ocala Plant	70.9	1366	0	NO
0830101	Skyline Corportation	Skyline/Homette # 535	71.0	1369	0	NO
0830004	Stewart Enterprises Inc	Roberts Funeral Home	71.1	1370	3	NO
0830103	Lippert Components Inc	Lippert Components	71.5	1379	0	NO
0830128	Damar Manufacturing Inc	Damar Manufacturing	71.8	1383	0	NO
0830102	Skyline Corporation	Skyline/Cameron Homes # 538	71.9	1385	0	NO
0830100	Skyline Corporation	Skyline/Oak Springs # 531	71.9	1386	0	NO
0830027	Rinker Materials Corp	Rinker/Ocala	72.1	1390	0	NO
0830052	Closetmaid Fka Clairson Intl	Closetmaid	72.5	1398	17	NO

Table 3-13. North Carolina Technique Screening Analysis for Competing Sources of NO_x.						
					Include in NO_x NAAQS?	
AIRS Number	Owner	Facility	Distance to GP (km)	Threshold (tpy)	Emissions (tpy)	Emission > Threshold?
0830043	Golden Flake Snack Foods	Golden Flake Snack Foods	72.7	1402	5	NO
0830137	Merillat Corp	Merillat/Ocala	73.7	1422	0	NO
0830132	Florida Rock Industries	Florida Rock/Ocala	74.1	1431	0	NO
1270016	Rinker Materials Corp	Rinker/Ormond Beach	74.5	1437	0	NO
0830066	Emergency One, Inc.	Emergency One, Inc. - Body Plant	74.6	1441	15	NO
0830084	Flair Manufacturing	Flair Manufacturing	76.5	1478	0	NO
1270074	Crane Cams Inc	Crane Cams	77.7	1502	0	NO
0830082	Emergency One, Inc.	Emergency One, Inc. - Svo Facility	78.1	1509	0	NO
0830068	Evans Septic Tank & Ready Mix, Inc.	Evans Septic Tank & Ready Mix	79.0	1529	0	NO

Notes:

GP Palatka Paper Mill is located at UTM zone 17 coordinates (km): East 434.0, North 3283.4

Significant Impact Distance = 2.6 km

Table 3-14. NO_x NAAQS Analysis Modeling Parameters for Competing Sources

Facility Description		Model ID	NO_x Emission	Release Height		Stack Diameter		Exit Temperature		Exit Velocity	
Stack Description		ID Name	Rate (g/s)	(ft)	(m)	(ft)	(m)	(F)	(K)	(fps)	(m/s)
1070030 Georgia-Pacific Corp. Palatka Chipnsaw											
	Kiln 2 Source Vent 1	KILN2_1	0.0412	33	10.14	3	0.80	240	388.7	38.9	11.84
	Kiln 2 Source Vent 2	KILN2_2	0.0412	33	10.14	3	0.80	240	388.7	38.9	11.84
	Kiln 2 Source Vent 3	KILN2_3	0.0412	33	10.14	3	0.80	240	388.7	38.9	11.84
	Kiln 2 Source Vent 4	KILN2_4	0.0412	33	10.14	3	0.80	240	388.7	38.9	11.84
	Kiln 2 Source Vent 5	KILN2_5	0.0412	33	10.14	3	0.80	240	388.7	38.9	11.84
	Kiln 2 Source Vent 6	KILN2_6	0.0412	33	10.14	3	0.80	240	388.7	38.9	11.84
	Kiln 1 Source Vent 1	KILN1_1	0.0412	33	10.14	3	0.80	240	388.7	38.9	11.84
	Kiln 1 Source Vent 2	KILN1_2	0.0412	33	10.14	3	0.80	240	388.7	38.9	11.84
	Kiln 1 Source Vent 3	KILN1_3	0.0412	33	10.14	3	0.80	240	388.7	38.9	11.84
	Kiln 1 Source Vent 4	KILN1_4	0.0412	33	10.14	3	0.80	240	388.7	38.9	11.84
	Kiln 1 Source Vent 5	KILN1_5	0.0412	33	10.14	3	0.80	240	388.7	38.9	11.84
	Kiln 1 Source Vent 6	KILN1_6	0.0412	33	10.14	3	0.80	240	388.7	38.9	11.84
1070025 Seminole Power Plant											
	Steam Electric Generator No. 1	SEMELECT	1084.40	675	205.74	36	10.97	128	326.5	26	7.92
1070039 Lafarge North America, Inc.											
	Burners)		2.34	46	14.02	7	2.19	165	347.0	71	21.49
	Cage Mill Flash Dryer System		0.83	46	14.02	7	2.19	165	347.0	71	21.49
	Combined Stack 1	LNA1	3.17	46	14.02	7	2.19	165	347.0	71	21.49
	Cage mill dryer system		0.76	130	39.62	5	1.55	190	360.9	54	16.43
	Imp Mill Flash Calciner System A		0.38	130	39.62	4	1.22	325	435.9	23	7.10
	Imp Mill Flash Calciner System B		0.38	130	39.62	4	1.10	320	433.2	23	7.10
	Combined Stack 2	LNA2	1.51	130	39.62	4	1.10	325	435.9	23	7.10
1070014 FPL Putnam Power Plant											
	II Acid Rain Unit		6.30	73	22.25	10	3.15	328	437.6	192	58.61
	II Acid Rain Unit		6.30	73	22.25	10	3.15	328	437.6	200	61.08
	II Acid Rain Unit		6.30	73	22.25	10	3.15	328	437.6	192	58.61
	II Acid Rain Unit		6.30	73	22.25	10	3.15	328	437.6	200	61.08
	Combined Stack	FPLPUT	25.20	73	22.25	10	3.15	328	437.6	192	58.61
0830070 FGTC Station 17, Marion County											
	RICE compressor engine		6.11	28	8.53	1	0.40	875	741.5	147	44.81
	RICE compressor engine		6.11	28	8.53	1	0.40	875	741.5	147	44.81
	RICE compressor engine		6.11	28	8.53	1	0.40	875	741.5	147	44.81
	RICE compressor engine		4.45	28	8.53	1	0.40	875	741.5	147	44.81
	Combined Stack	FGTC1_4	22.78	28	8.53	1	0.40	875	741.5	147	44.81
	RICE compressor engine	FGTC5	1.33	40	12.19	1	0.40	695	641.5	180	54.86
	turbine compressor engine	FGTC8	1.78	61	18.59	8	2.32	910	760.9	79	24.11

Table 3-15. PSD Class II Increments for Modeled Pollutants, GP Palatka			
Pollutant	Averaging Time	Allowable PSD Increment ($\mu g/m^3$)	Form of Standard
PM_{10}	24-hour	30	High-second-highest for each year
	Annual	17	Annual Mean
NO_2	Annual	25	Annual Mean

Table 3-16. Summary of PSD Class II Increment Baseline Dates		
Pollutant	Major Source Baseline Date	Minor Source Baseline Date
PM_{10}	January 6, 1975	December 27, 1977
NO_2	February 8, 1988	March 28, 1988

Table 3-17. Summary of 1974 PM_{10} Baseline Emissions, GP Palatka Paper Mill

Model ID	Source Description	Emission Rates (lb/hr)	Emission Rates (g/s)
RB1B	# 1 Recovery Boiler	67.80	8.54
RB2B	# 2 Recovery Boiler	86.60	10.91
RB3B	# 3 Recovery Boiler	93.70	11.81
RB4B	# 4 Recovery Boiler	143.20	18.04
SDT1B	# 1 Smelt Dissolving Tanks	2.10	0.26
SDT2B	# 2 Smelt Dissolving Tanks	3.10	0.39
SDT3B	# 3 Smelt Dissolving Tanks	2.80	0.35
SDT4B	# 4 Smelt Dissolving Tanks	35.10	4.42
LK1B	# 1 Lime Kiln	154.80	19.50
LK2B	# 2 Lime Kiln	81.70	10.29
LK3B	# 3 Lime Kiln	80.00	10.08
LK4B	# 4 Lime Kiln	27.20	3.43
PB4B	# 4 Power Boiler	100.60	12.68
PB5B	# 5 Power Boiler	43.90	5.53
CB4B	# 4 Combination Boiler	612.10	77.12
TM3B	# 3 Tissue Machine Combined Source	1.74	0.219
TM5B	# 5 Tissue Machine Combined Source	1.69	0.213
Roads			
GATE1***	Traffic Through Gate 1 (1.86 lb/day - 64 sources)	0.07750	0.00977
GATE2***	Traffic Through Gate 2 (4.0 lb/day - 29 sources)	0.16667	0.02100
GATE3***	Traffic Through Gate 3 (0.78 lb/day - 41 sources)	0.03250	0.00410
GATE4***	Traffic Through Gate 4 (33.38 lb/day - 102 sources)	1.39083	0.17525
GATE5***	Traffic Through Gate 5 (0.78 lb/day - 51 sources)	0.03250	0.00410
Total Emissions		1539.83	194.02

Note: PM10 assumed 86 percent of total particulates for point source 1974 PSD Baseline emissions
PSD Baseline road emissions are 40.8 lb/day

Table 3-18. Locations and Stack Parameters for 1974 PM_{10} PSD Baseline Point Sources, GP Palatka Paper Mill

Model ID	Description	Stack Parameters									
		Source Location UTM		Stack Height		Stack Exit Temp		Stack Velocity		Stack Diameter	
		East (m)	North (m)	(ft)	(m)	F	K	(fps)	(m/s)	(ft)	(m)
RB1B	# 1 Recovery Boiler	434053.59	3283407.35	250	76.2	188	360	28.9	8.80	12.0	3.66
RB2B	# 2 Recovery Boiler	434053.59	3283407.35	250	76.2	210	372	28.9	8.80	12.0	3.66
RB3B	# 3 Recovery Boiler	434019.49	3283384.85	133	40.5	210	372	23.9	7.28	11.2	3.41
RB4B	# 4 Recovery Boiler	433882.28	3283437.93	230	70.1	394	474	55.3	16.86	12.0	3.66
SDT1B	# 1 Smelt Dissolving Tanks	434059.29	3283411.15	100	30.5	199	366	24.7	7.53	2.5	0.76
SDT2B	# 2 Smelt Dissolving Tanks	434059.29	3283411.15	100	30.5	215	375	31.2	9.51	3.0	0.91
SDT3B	# 3 Smelt Dissolving Tanks	434025.29	3283388.55	109	33.2	205	369	11.7	3.57	2.5	0.76
SDT4B	# 4 Smelt Dissolving Tanks	433934.67	3283477.55	206	62.8	163	346	27.1	8.26	5.0	1.52
LK1B	# 1 Lime Kiln	434121.89	3283301.05	50	15.2	262	401	17.2	5.24	4.2	1.28
LK2B	# 2 Lime Kiln	434117.39	3283298.85	52	15.8	154	341	35	10.67	5.6	1.71
LK3B	# 3 Lime Kiln	434119.29	3283270.45	52	15.8	156	342	27.8	8.47	5.6	1.71
LK4B	# 4 Lime Kiln	434106.73	3283246.93	149	45.4	172	351	54.0	16.46	4.3	1.31
PB4B	# 4 Power Boiler	433998.01	3283481.49	122	37.2	399	477	47.7	14.54	4.0	1.22
PB5B	# 5 Power Boiler	433977.26	3283447.19	232	70.7	476	520	52.4	15.97	9.0	2.74
CB4B	# 4 Combination Boiler	433982.43	3283450.46	237	72.2	399	477	34.5	10.52	10.0	3.05
TM3B	# 3 Tissue Machine Combined Source	434220.66	3283432.68	94	28.65	450	505	64.5	19.66	5.0	1.52
TM5B	# 5 Tissue Machine Combined Source	434264.95	3283462.34	94	28.65	450	505	64.5	19.66	5.0	1.52

Table 3-19. Summary of 1988 PSD Baseline NO_x Emissions, GP Palatka Paper Mill

Model ID	Source Description	Emission Rates (lb/hr)	Emission Rates (g/s)
RB4B	# 4 Recovery Boiler	117.40	14.80
SDT4B	# 4 Smelt Dissolving Tanks	2.66	0.34
LK4B	# 4 Lime Kiln	47.44	5.98
PB4B	# 4 Power Boiler	21.77	2.74
PB5B	# 5 Power Boiler	108.02	13.62
CB4B	# 4 Combination Boiler	56.40	7.11
TM3B	# 3 Tissue Machine Combined Source	10.77	1.36
TM4B	# 4 Tissue Machine Combined Source	10.77	1.36
TM5B	# 5 Tissue Machine Combined Source	7.57	0.95
Total-Emissions		382.80	48.27

Table 3-20. Locations and Stack Parameters for 1988 NO_x PSD Baseline Sources, GP Palatka Paper Mill

Model ID	Description	Stack Parameters									
		Source Location UTM		Stack Height		Stack Exit Temp		Stack Velocity		Stack Diameter	
		East (m)	North (m)	(ft)	(m)	F	K	(fps)	(m/s)	(ft)	(m)
RB4B	# 4 Recovery Boiler	433882.28	3283437.93	230	70.1	400	478	63.7	19.42	12.0	3.66
SDT4B	# 4 Smelt Dissolving Tanks	433934.67	3283477.55	206	62.8	160	344	21.2	6.46	5.0	1.52
LK4B	# 4 Lime Kiln	434106.73	3283246.93	131	39.9	150	339	60.8	18.53	4.3	1.31
PB4B	# 4 Power Boiler	433998.01	3283481.49	122	37.2	395	475	71.6	21.82	4.0	1.22
PB5B	# 5 Power Boiler	433977.26	3283447.19	232	70.7	445	503	60.6	18.47	9.0	2.74
CB4B	# 4 Combination Boiler	433982.43	3283450.46	237	72.2	440	500	71.8	21.88	10.0	3.05
TM3B	# 3 Tissue Machine Combined Source	434220.66	3283432.68	94	28.65	450	505	64.5	19.66	5.0	1.52
TM5B	# 5 Tissue Machine Combined Source	434264.95	3283462.34	94	28.65	450	505	64.5	19.66	5.0	1.52
TM4B	No. 4 Tissue Machine Combined Source	434302.09	3283502.61	94	28.65	450	505	64.5	19.66	5.0	1.52

Table 3-21. Summary of PSD-Consuming Emissions from Competing Sources

AIRS Number	Owner	Facility	Emissions Affecting Increment (tpy)	
			PM_{10}	NO_x
1070022	Florida Rock Industries, Inc. Putnam	Florida Rock -Comfort Rd	0.9	-
1070030	Georgia-Pacific Corporation	Georgia-Pacific Corp. Palatka Chipnsaw	62.3	17.2
1070025	Seminole Electric Cooperative, Inc.	Seminole Power Plant	1884.8	37695.8
1070039	Lafarge North America, Inc.	Lafarge North America, Inc.	221.4	162.7

Table 3-22. PSD Increment Analyses Modeling Parameters for Competing Sources

Facility Description	Model ID	Emission Rate (g/s)		Release Height		Stack Diameter		Exit Temperature		Exit Velocity		Volume Source Dimensions (m)	
Stack Description	ID Name	PM_{10}	NO_x	(ft)	(m)	(ft)	(m)	(F)	(K)	(fps)	(m/s)	Sig y	Sig Z
1070022 Florida Rock -Comfort Rd													
Concrete Batch Plant (Ready Mix) W/Baghouse	FLROCK	0.025	--	13	3.96	2	0.55	77	298.2	63	19.20	--	--
1070030 Georgia-Pacific Corp. Palatka Chipnsaw													
Planer Mill Cyclone	CNS04	0.751	--	80	24.38	7	2.04	68	293.15	18	5.49	--	--
Planer Mill Trim Hog Cyclone	CNS05	0.112	--	30	9.14	3	0.82	68	293.15	43	13.11	--	--
Chip Bin Cyclone	CNS08	0.066	--	63	19.2	1	0.4	68	293.15	101	30.66	--	--
Fuel Silo Cyclone	CNS03	0.517	--	80	24.38	2	0.67	80	299.82	12	3.66	--	--
Kiln 2 Source Vent 1	KILN2_1	0.0231	0.0412	33	10.14	3	0.8	240	388.7	38.9	11.84	--	--
Kiln 2 Source Vent 2	KILN2_2	0.0231	0.0412	33	10.14	3	0.8	240	388.7	38.9	11.84	--	--
Kiln 2 Source Vent 3	KILN2_3	0.0231	0.0412	33	10.14	3	0.8	240	388.7	38.9	11.84	--	--
Kiln 2 Source Vent 4	KILN2_4	0.0231	0.0412	33	10.14	3	0.8	240	388.7	38.9	11.84	--	--
Kiln 2 Source Vent 5	KILN2_5	0.0231	0.0412	33	10.14	3	0.8	240	388.7	38.9	11.84	--	--
Kiln 2 Source Vent 6	KILN2_6	0.0231	0.0412	33	10.14	3	0.8	240	388.7	38.9	11.84	--	--
Kiln 1 Source Vent 1	KILN1_1	0.0231	0.0412	33	10.14	3	0.8	240	388.7	38.9	11.84	--	--
Kiln 1 Source Vent 2	KILN1_2	0.0231	0.0412	33	10.14	3	0.8	240	388.7	38.9	11.84	--	--
Kiln 1 Source Vent 3	KILN1_3	0.0231	0.0412	33	10.14	3	0.8	240	388.7	38.9	11.84	--	--
Kiln 1 Source Vent 4	KILN1_4	0.0231	0.0412	33	10.14	3	0.8	240	388.7	38.9	11.84	--	--
Kiln 1 Source Vent 5	KILN1_5	0.0231	0.0412	33	10.14	3	0.8	240	388.7	38.9	11.84	--	--
Kiln 1 Source Vent 6	KILN1_6	0.0231	0.0412	33	10.14	3	0.8	240	388.7	38.9	11.84	--	--
Sawmill Fugitives	SAWFUG	0.069	--	15	4.57	--	--	--	--	--	--	24.19	4.25
Planer Mill Fugitives	PLANRFUG	0	--	15	4.57	--	--	--	--	--	--	11.163	4.25
1070025 Seminole Electic - Seminole Power Plant													
Steam Electric Generators No. 1 and 2	SEMELECT	54.220	1084.400	675	205.74	36	10.97	128	326.5	26	7.92	--	--
1070039 Lafarge North America, Inc.													
Composite Stack 1	LNA1	2.330	3.170	50	15.24	1	0.15	68	293.2	42	12.92	--	--
Composite Stack 2	LNA2	4.040	1.510	130	39.62	4	1.22	325	435.9	23	7.10	--	--

Table 3-23. Significant Impact Analysis Results, PM10 GP Palatka Paper Mill

Averaging Period	Year	Maximum Predicted Impact (µg/m³)	Receptor Location (a) East (m)	Receptor Location (a) North (m)	Period Ending (YYMMDDHH)	Significant Impact Level (µg/m³)	Monitoring De minimis Concentration (µg/m³)
24-hour High 1st High	1984	9.6	434300.2	3282948.8	84111324	5	10
	1985	10.7	434583.6	3283047.5	85070824		
	1986	7.9	434583.6	3282947.5	86082424		
	1987	8.8	434380.3	3283008.5	87040124		
	1988	8.6	434183.6	3282547.5	88011124		
Annual	1984	0.9	434380.3	3283008.5	--	1	--
	1985	0.7	434380.3	3283008.5	--		
	1986	0.8	434380.3	3283008.5	--		
	1987	1.1	434380.3	3283008.5	--		
	1988	1.0	434380.3	3283008.5	--		

Note:
(a) UTM coordinates in Zone 17
YY =Year, MM=Month, DD=Day, HH=Hour

Table 3-24. Significant Impact Analysis Results, NO_2 GP Palatka Paper Mill						
Averaging Period	Year	Maximum Predicted Impact (μg/m³)	Receptor Location (a)		Significant Impact Level (μg/m³)	Monitoring De minimis Concentration (μg/m³)
			East (m)	North (m)		
Annual	1984	1.46	434883.6	3282747.5	1	14
	1985	1.35	434780.5	3283308.3		
	1986	1.43	434683.6	3283147.5		
	1987	1.89	434883.6	3282747.5		
	1988	1.46	434783.6	3282847.5		

Note:
(a) UTM coordinates in Zone 17

Table 3-25. Summary Significant Impact Distance Results, GP Palatka Paper Mill

Pollutant	Significant Impact Distance(km)
NO_2	2.6
PM_{10}	3.6

Table 3-26 PM_{10} NAAQS Screening Analysis Results, GP Palatka Paper Mill					
Averaging Period	Year	Maximum Predicted Impact (µg/m³)	Receptor Location (a)		Period Ending (YYMMDDHH)
			East (m)	North (m)	
Annual	1984	61.29	436383.59	3284247.5	--
	1985	62.53	436383.59	3284247.5	--
	1986	60.45	436383.59	3284247.5	--
	1987	68.95	436383.59	3284247.5	--
	1988	63.80	436383.59	3284247.5	--
24-Hour High 6th High	1988	308.18	436383.59	3284247.5	88110224

Note:
(a) UTM coordinates in Zone 17
YY =Year, MM=Month, DD=Day, HH=Hour

Table 3-27 PM_{10} NAAQS Total Results, GP Palatka Paper Mill				
Averaging Period	**Maximum Predicted Impact (μg/m³)**	**Background Concentration (μg/m³)**	**Total Concentration (μg/m³)**	**NAAQS (μg/m³)**
Annual	69	27	96.5	50
24-Hour High 6th High	308	57	365	150

Table 3-28. Maximum Predicted PM_{10} Concentrations Due to the Proposed LK4 Project at Receptors Predicted to Exceed the NAAQS, GP Palatka Paper Mill

Averaging Period	Year	Maximum Predicted Impact (μg/m³)	Receptor Location (a)		Period Ending (YYMMDDHH)	Significant Impact Level (μg/m³)
			East (m)	North (m)		
24-hour High 1st High	1984	3.3	436283.6	3284047.5	84082324	5
	1985	2.7	436383.6	3284047.5	85010724	
	1986	3.6	436183.6	3284447.5	86022624	
	1987	3.2	436183.6	3284147.5	87030924	
	1988	3.0	436183.6	3284547.5	88022724	
Annual	1984	0.3	436183.6	3284447.5	--	1
	1985	0.3	436183.6	3284247.5	--	
	1986	0.3	436183.6	3284247.5	--	
	1987	0.3	436183.6	3284247.5	--	
	1988	0.2	436183.6	3284447.5	--	

Note:
(a) UTM coordinates in Zone 17
YY =Year, MM=Month, DD=Day, HH=Hour

Table 3-29. NO_2 NAAQS Analysis Results, GP Palatka Paper Mill

Averaging Period	Year	Maximum Predicted Impact ($\mu g/m^3$)	Receptor Location (a)	
			East (m)	North (m)
Annual	1984	11.1	436383.6	3284347.5
	1985	11.5	436383.6	3284347.5
	1986	10.2	436383.6	3284347.5
	1987	12.0	436383.6	3284347.5
	1988	11.8	436383.6	3284347.5

Note:
(a) UTM coordinates in Zone 17

Table 3-30. NO_2 NAAQS Total Results GP Palatka Paper Mill				
Averaging Period	**Maximum Predicted Impact (μg/m^3)**	**Background Concentration (μg/m^3)**	**Total Concentration (μg/m^3)**	**NAAQS (μg/m^3)**
Annual	12	27.5	39.5	100

Table 3-31 PM_{10} PSD Class II Increment Analysis Results, GP Palatka Paper Mill						
Averaging Period	Year	Maximum Predicted Impact (μg/m³)	Receptor Location (a) East (m)	Receptor Location (a) North (m)	Period Ending (YYMMDDHH)	Allowable Increment (μg/m³)
Annual	1984	1.3	436383.6	3284347.5	--	17
	1985	0.60	436383.6	3284347.5	--	
	1986	<0	0	0	--	
	1987	1.40	436383.6	3284347.5	--	
	1988	2.20	436383.6	3284347.5	--	
24-Hour High 2nd High	1984	33.50	436483.6	3284347.5	84040524	30
	1985	35.10	436483.6	3284347.5	85110424	
	1986	28.60	436383.6	3284347.5	86050424	
	1987	30.20	436483.6	3284347.5	87010224	
	1988	29.30	436383.6	3284347.5	88122724	

Note:
(a) UTM coordinates in Zone 17
YY =Year, MM=Month, DD=Day, HH=Hour

Table 3-32. Maximum Predicted PM_{10} Project Impacts at Receptors Exceeding the Allowable PSD Class II Increment, GP Palatka Paper Mill						
Averaging Period	Year	Maximum Predicted Impact (µg/m^3)	Receptor Location (a)		Period Ending (YYMMDDHH)	Significant Impact Level (µg/m^3)
			East (m)	North (m)		
24-hour High 1st High	1984	2.3	436483.6	3284347.5	84011824	5
	1985	2.4	436383.6	3284347.5	85061724	
	1986	2.7	436383.6	3284347.5	86022224	
	1987	2.8	436383.6	3284347.5	87061424	
	1988	2.1	436383.6	3284347.5	88063024	
Annual	1984	0.3	436383.6	3284347.5	--	1
	1985	0.3	436383.6	3284347.5	--	
	1986	0.3	436383.6	3284347.5	--	
	1987	0.3	436383.6	3284347.5	--	
	1988	0.2	436383.6	3284347.5	--	

Note:
(a) UTM coordinates in Zone 17
YY =Year, MM=Month, DD=Day, HH=Hour

Table 3-33 NO_2 PSD Class II Increment Analysis Results, GP Palatka Paper Mill

Averaging Period	Year	Maximum Predicted Impact (μg/m³)	Receptor Location (a)		Allowable Increment (μg/m³)
			East (m)	North (m)	
Annual	1984	9.8	436383.6	3284347.5	25
	1985	10.2	436383.6	3284347.5	
	1986	8.7	436383.6	3284347.5	
	1987	10.7	436383.6	3284347.5	
	1988	10.7	436383.6	3284347.5	

Note:
(a) UTM coordinates in Zone 17

Table 3-34. Refined Modeling Analyses Recommendations [a]

Model Input/Output	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 for the situation.
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 3-35. 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

Table 3-36. Surface and Upper Air Stations Used in the North Central Florida – South Georgia Domain

			UTM Coordinates			
Station Name	**Station Symbol**	**WBAN Number**	**Easting (km)**	**Northing (km)**	**UTM Zone**	**Anemometer Height (m)**
Surface Stations						
Tampa, FL	TPA	12842	349.195	3094.289	17	10
Jacksonville, FL	JAX	13889	432.809	3374.192	17	10
Daytona Beach, FL	DAB	12834	495.118	3228.056	17	10
Tallahassee, FL	TLH	93805	176.408[a]	3365.835	16	10
Fort Myers. F L	FMY	12835	413.644	2940.405	17	10
Orlando, FL	MCO	12815	468.942	3146.889	17	10
Pensacola, FL	PNS	13899	-95.74	3386.714	16	10
Vero Beach, FL	VRB	12843	557.487	3058.363	17	10
Columbus, GA	CSG	93842	128.871[a]	3604.422	16	10
Charleston, SC	CHS	13880	590.422	3640.405	17	10
Macon, GA	MCN	3813	251.562	3620.929	17	10
Savannah, GA	SAV	3822	481.12	3554.985	17	10
Gainesville, FL	GNV	12816	377.39	3284.126	17	10
Augusta, GA	AGS	3820	410.024	3692.184	17	10
Athens, GA	AHN	13873	285.867	3758.824	17	10
Atlanta, GA	ATL	13874	181.588[a]	3728.434	16	10
Sea Surface Stations						
Venice, FL	VENF1	-	356.24	2995.05	17	--
Cape Canaveral, FL	41009	-	380.25	3152.87	17	--
Tampa West, FL	42036	-	156.41	3158.73	16	--
Cedar Key, FL	CDRF1	-	302.52	3225.2	17	--
Cape San Blas, FL	CSBF1	-	77.89	3290.18	16	--
Folly Island, SC	FBIS1	-	604.09	3616.38	17	--
Keaton Beach, FL	KTNF1	-	249.71	3301.66	17	--
Lake Worth, FL	LKWF1	-	596.57	2943.61	17	--
Savannah, GA	SVLS1	-	530.24	3534.94	17	--
St. Augustine, FL	SAUF1	-	474.89	3303.3	17	--
Upper Air Stations						
Ruskin, FL	TPA	12842	361.961	3064.616	17	NA
Waycross, GA	AYS	13861	366.674	3457.945	17	NA
Athens, GA	AHN	13873	285.866	3758.824	17	NA
Charleston, SC	CHS	13880	590.421	3640.405	17	NA
Cape Canaveral	XMR	12868	544.048	3150.459	17	NA
Miami -FIU	MFL	92803	562.181	2847.983	17	NA
Apalachicola, FL	AQQ	12832	109.807[a]	3295.816	16	NA
Tallahassee, FL	TLH	93805	176.4072	3365.835	16	NA
Jacksonville, FL	JAX	13889	432.808	3374.192	17	NA
Peachtree, GA	FFC	53819	155.6372	3696.207	16	NA

[a] Equivalent coordinate for Zone 17.

Table 3-37. Summary of Maximum Pollutant Concentrations Predicted for the LK4 and Contemporaneous Projects at the Okefenokee, Wolf Island, and Chassahowitzka NWA PSD Class I Areas

Pollutant	Averaging Time	Concentrations [a] (μg/m³)									EPA Class I Significant Impact Levels (μg/m3)
		Okefenokee NWA			Wolf Island NWA			Chassahowitzka NWA			
		1990	1992	1996	1990	1992	1996	1990	1992	1996	
PM_{10}	Annual	0.0021	0.0014	0.0021	0.0007	0.0008	0.0007	0.0014	0.0013	0.0012	0.2
	24-Hour	0.077	0.030	0.045	0.015	0.029	0.016	0.012	0.032	0.030	0.3
	8-Hour	0.128	0.084	0.125	0.031	0.054	0.018	0.051	0.072	0.066	
	3-Hour	0.189	0.156	0.208	0.047	0.059	0.035	0.068	0.123	0.106	
	1-Hour	0.200	0.246	0.254	0.069	0.066	0.068	0.076	0.130	0.128	
NO_2	Annual	0.0020	0.0014	0.0027	0.0004	0.0005	0.0005	0.0011	0.0013	0.0012	0.1
	24-Hour	0.1082	0.0672	0.079	0.0122	0.0178	0.019	0.0415	0.0582	0.0739	
	8-Hour	0.2169	0.1915	0.230	0.0263	0.0508	0.046	0.1119	0.1745	0.1818	
	3-Hour	0.3017	0.2918	0.397	0.0755	0.0807	0.072	0.1540	0.2764	0.2854	
	1-Hour	0.3491	0.3859	0.542	0.1155	0.0972	0.113	0.1725	0.3005	0.3211	

NWA= National Wilderness Area

[a] Concentrations are the highest impacts predicted with the CALPUFF model and 1990, 1992, and 1996 CALMET Wind Fields.

Table 3-38. Maximum 24-hour Average Visibility Impairment Predicted for the LK4 and Contemporaneous Project Emissions at the Okefenokee, Wolf Island and Chassahowitzka NWA PSD Class I Areas

Area	Visibility Impairment (%) [a]			Visibility Impairment Criteria (%)
	1990	1992	1996	
Okefenokee NWA	3.41	1.64	2.79	5.0
Wolf Island NWA	0.86	1.00	0.75	5.0
Chassahowitzka NWA	0.87	0.97	2.83	5.0

[a] Concentrations are highest predicted using CALPUFF model and CALMET wind fields for N. FL-S. GA, 1990, 1992 and 1996. Background extinctions calculated using FLAG Document (December 2000) values and hourly relative humidity data.
NWA = National Wilderness Area

Table 3-39. Annual Nitrogen Deposition Rates Predicted at the Okefenokee, Wolf Island, and Chassahowitzka NWA PSD Class I Areas - GP Palatka LK4 and Contemporaneous Projects

	Total Deposition (Wet & Dry)						Deposition Analysis Threshold[b]
	1990		1992		1996		
PSD Class I Area	($g/m^2/s$)	(kg/ha/yr)	($g/m^2/s$)	(kg/ha/yr)	($g/m^2/s$)	(kg/ha/yr)	(kg/ha/yr)
Okefenokee NWA	3.988E-12	0.0013	4.611E-12	0.0015	4.131E-12	0.0013	0.01
Wolf Island NWA	1.336E-12	0.0004	1.865E-12	0.0006	1.928E-12	0.0006	0.01
Chassahowitzka NWA	1.505E-12	0.0005	1.627E-12	0.0005	1.321E-12	0.0004	0.01

[a] Conversion factor is used to convert $g/m^2/s$ to kg/hectare (ha)/yr using following units:

$g/m^2/s$ x 0.001 kg/g
x 10000 m^2/hectare
x 3600 sec/hr
x 8760 hr/yr =kg/ha/yr
or
$g/m^2/s$ x 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. A DAT is the additional amount of N or S deposition within a Class I area, below which estimated impacts from a proposed new or modified source are considered insignificant.