May 17 2006

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Re: Protocol for Best Available Retrofit Technology Exemption Modeling: Cedar Springs Mill

Georgia-Pacific Corporation (GP) is pleased to submit this Protocol for Best Available Retrofit Technology (BART) Exemption air modeling for our pulp and paper facility in Cedar Springs, Georgia. BART is required for any eligible source that ‘‘emits any air pollutant which may reasonably be anticipated to cause or contribute to any impairment of visibility” in any mandatory Class I federal area. 40 CFR Part 51 Appendix Y states, “*You can use dispersion modeling to determine that an individual source cannot reasonably be anticipated to cause or contribute to visibility impairment in a Class I area and thus is not subject to BART*.” The enclosed protocol describes our proposal for this dispersion modeling. While many of the components of a protocol for this analysis are thoroughly documented in the VISTAS common protocol, this document provides source-specific information. As we have discussed on the telephone, these analyses will apply the refined (*i.e.*, 4 kilometer) meteorological datasets and iterate emission rate scenarios to correlate a level of impairment below a cause/contribute threshold or otherwise qualify the facility as an exempted source.

We look forward to addressing any questions or concerns you have with this protocol. Please contact me at (404) 652-4293; FAX (404) 654-4706; mjaguila@gapac.com.

Sincerely,

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**Cc: Cliff Chamblee, Cedar Springs Mill**
**Scott Matchett, GP Atlanta**

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# 1.0 INTRODUCTION

## 1.1. Overview of the Regional Haze BART Process

Under regional haze regulations, the Environmental Protection Agency (EPA) has issued final guidelines dated July 6, 2005 for Best Available Retrofit Technology (BART) determinations (70 FR 39104-39172). The regional haze rule includes a requirement for BART for certain large stationary sources, such as our pulp & paper facility in Cedar Springs, Georgia. Sources are BART-eligible if they meet three criteria on potential emissions of visibility-impairing pollutants, the date when the source was put in place and fall within one of the source categories listed in the guidance. The guidance requires a BART engineering evaluation using five statutory factors for any BART-eligible source that can be reasonably expected to cause or contribute to impairment of visibility in any Class I areas protected under the regional haze rule. (Note that, depending on the five factors, the evaluation may result in no control.) Air quality modeling is an important tool available to the States to determine whether a source can be reasonably expected to contribute to visibility impairment in a Class I area.

The process of establishing BART determination consists of four steps:

1) Identify whether a source is "BART-eligible" based on its source category, when it was put in service, and the magnitude of its emissions of one or more "visibility-impairing" air pollutants. The BART guidelines list 26 source categories of stationary sources that are BART-eligible. Sources must have been put in service between August 7, 1962 and August 7, 1977 in order to be BART-eligible. Finally, a source is eligible for BART if potential emissions of visibility-impairing air pollutants are greater than 250 tons per year. Qualifying pollutants include primary particulate matter ($PM_{10}$) and gaseous precursors to secondary fine particulate matter, such as $SO_2$ and $NO_x$. VISTAS has determined that neither ammonia nor volatile organic compounds (VOCs) should be included as visibility-impairing pollutants for BART eligibility.

2) Determine whether a BART-eligible source can be excluded from BART controls by demonstrating that the source cannot be reasonably expected to cause or contribute to visibility impairment in a Class I area. The preferred approach is an assessment with an air quality model such as CALPUFF or other appropriate model followed by comparison of the estimated 24-hr visibility impacts against a threshold above estimated natural conditions to be determined by the States.[1] The threshold to determine whether a single source "causes" visibility impairment is set at 1.0 deciview (dv) change from natural conditions over a 24-hour averaging period in the final BART rule (70 FR 39118). The guidance also states that the proposed threshold at which a source may "contribute" to visibility impairment should not be higher than 0.5 dv although, depending on factors affecting a specific Class I area, it may be set lower than 0.5 dv. The test against the

[1] Guidance to determine the level of the natural conditions baseline for BART modeling purposes is still under development by VISTAS member states and EPA Region IV.

threshold is "driven" by the contribution level, since if a source "causes", by definition it "contributes".

3) Determine BART controls for the source by considering various control options and selecting the "best" alternative, taking into consideration:

a) Any pollution control equipment in use at the source (which affects the availability of options and their impacts),
b) The costs of compliance with control options,
c) The remaining useful life of the facility,
d) The energy and non air-quality environmental impacts of compliance, and
e) The degree of improvement in visibility that may reasonably be anticipated to result from the use of such technology.

Note that if a source agrees to apply the most stringent controls available to BART-eligible units, the BART analysis is essentially complete and no further analysis is necessary (70 FR 39165).

4) Incorporate the BART determination into the State Implementation Plan for Regional Haze, which is due by December 2007.

Step 2 described above reflects 40 CFR Part 51 Appendix Y which states that, "*You can use dispersion modeling to determine that an individual source cannot reasonably be anticipated to cause or contribute to visibility impairment in a Class I area and thus is not subject to BART.*" (70 FR 39162) This "individual source attribution approach" determines if a BART-eligible source (*i.e.*, collection of eligible emission units at a source) is predicted to cause or contribute to visibility impairment in a Class I area. As mentioned above, a predicted impact of 1.0 dv change or more is considered to "cause" visibility impairment, and a predicted impact of 0.5 dv change or more is considered to "contribute". Any source determined to cause or contribute to visibility impairment in any Class I area is subject to BART.

## 1.2. Organization of the Protocol

Section 2 presents facility-specific information. Section 3 presents the contribution by VISTAS for the BART exemption analyses. Section 4 summarizes the exemption process, modeling approach, and model configuration. Section 5 presents the criteria and processing of model results to demonstrate what impairment, if any, the facility is predicted to create in the Class I areas. Section 6 presents the Quality Assurance Plan.

# 2.0 SITE DESCRIPTION

GP operates the Cedar Springs Mill in Cedar Springs (Early County) approximately 30 kilometers east-southeast of Dothan, Alabama along the state border. The facility manufactures corrugated containerboard. The facility is located in a rural area, and few residential areas are near the Mill. The Mill is located along the Chattahoochee River on State Route 273. The area surrounding the facility includes a river floodplain, and slight rises in terrain. Figure 1 depicts the location of the Mill and illustrates the adjacent terrain.

The list of potentially BART-eligible emission units are summarized in Table 1.

Table 1. Model Parameters for Potentially BART-Eligible Sources at GP Cedar Springs

| Permit ID | Source Description | Stack Ht (Ft) | UTM NAD27 Z.16 (m) East | UTM NAD27 Z.16 (m) North | Elevation (Ft) | Stack Diameter (Ft) | Exit Velocity (Ft/Sec) | Exit Temp (deg F) |
|---|---|---|---|---|---|---|---|---|
| R402(a) | Recovery Boiler No. 3 | 246 | 681480 | 3449449 | 140 | 9 | 44.7 | 490 |
| R402(a) | Recovery Boiler No. 3 | 246 | 681480 | 3449445 | 140 | 9 | 44.7 | 490 |
| R406 | Smelt Tank No. 3 | 248 | 681485 | 3449404 | 140 | 6 | 23.1 | 155 |
| CG | Coal Handling (b) | NA | 681470 | 3449330 | 140 | NA | NA | NA |
| U500 | Power Boiler No. 1 | 350 | 681480 | 3449342 | 140 | 12 | 31.4 | 140 |
| U501 | Power Boiler No. 2 | 350 | 681487 | 3449340 | 140 | 12 | 31.4 | 140 |
| L600 | Lime Kiln No. 1 | 82 | 681605 | 3449658 | 140 | 6 | 31.7 | 170 |
| L601 | Lime Kiln No. 2 | 82 | 681591 | 3449668 | 140 | 6 | 31.7 | 170 |
| L636/637 | Lime Handling(LEG2) | 47.8 | 681629 | 3449584 | 140 | 2 | 15 | 70 |
| MOG1 | Paper Machine Nos. 1 -3 (c) | 100 | 681603 | 3449310 | 140 | 5.4 | 47 | 137 |
| The following emission units only emit VOCs and are not included in the CALPUFF analysis | | | | | | | | |
| MEG1 | Stock Chest Sources | NA | NA | NA | 140 | NA | NA | NA |
| WWTS | Wastewater Treatment | NA | NA | NA | 140 | NA | NA | NA |
| POG1 | Pulp Mill Sources | NA | NA | NA | 140 | NA | NA | NA |
| SOG1 | NSSC Process | NA | NA | NA | 140 | 2.5 | 31.1 | 109 |
| LOG1 | Recaust. Area | NA | NA | NA | 140 | NA | NA | NA |

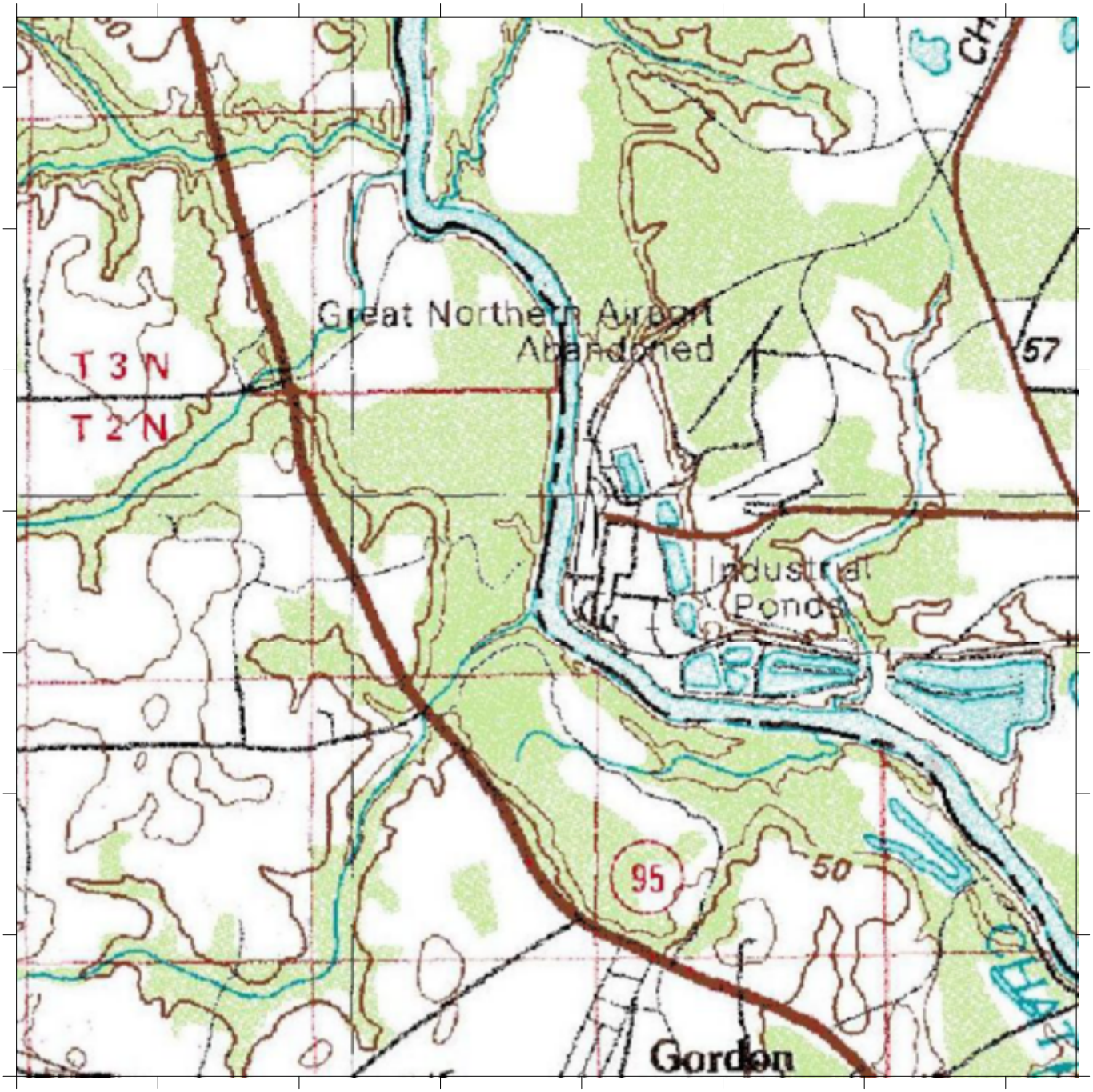
Notes:

(a) Recovery Boiler No. 3 exhausts via two stacks

(b) Coal handing is a fugitive only source with the following parameters 7.6m release height, 1m initial horizontal and lateral dimension (*i.e.,* sigma-y and sigma-z). GP determined these parameters by weighting the individual points by potential PM emission rate

(c) Paper Machines are vented through 36 similar stacks across a common roof. The table lists the center of the building and typical exhaust parameters for an individual point.

Figure 1. Topographic Map of Cedar Springs Mill Vicinity




(Source: USGS)

The two Power Boilers are permitted to burn coal, bark/woodwaste, tire-derived fuel, No. 6 oil, peanut/pecan hulls, used lubrication oil, and natural gas. Because of the various fuel mixtures, the analysis may apply several speciation profiles, based on actual fuel mix practices during the 2002 – 2004 baseline . Table 2 presents the available fuel-specific speciation profiles. The Mill and the Department will further discuss the possible fuel mix scenarios to apply in the model, as appropriate.

Table 2. Maximum 24-hour Average Emissions, Cedar Springs Mill Power Boilers Nos. 1 and 2

| Parameter | | All Fuels combined | |
|---|---|---|---|
| | | Boiler 1 | Boiler 2 |
| SO2 Emissions(a) | lb/hr | 703 | 703 |
| H2SO4 Emissions(a) | lb/hr | 2.9 | 2.9 |
| NOx Emissions (a) | lb/hr | 400 | 400 |
| PM10 Emissions(a) | lb/hr | 55 | 55 |

| | Emission Speciation For Individual Boilers by Fuel With Wet Scrubber | | | |
|---|---|---|---|---|
| | Coal | Oil (b) | Woodwaste | Natural Gas |
| PM Speciated Emissions | | | | |
| Filterable (lb/hr) | -- | 30.5 | -- | 25% |
| Condensable (lb/hr) | -- | 24.5 | -- | 75% |
| Fine Elemental Carbon (lb/hr) | -- | 2.2 | -- | -- |
| Condensible IOR (lb/hr) | -- | 20.8 | -- | -- |
| PM Fine (lb/hr) | -- | 29.3 | -- | -- |

Notes:

(a) Permit 2631-099-0001-V-01-8 issued in November 2005 reduced the potential maximum allowable emission rates below previous permit limits. Listed emissions in this table reflect the new limits. The permit also requires the installation of CEMs to demonstrate compliance. At the time of this protocol, the Mill has completed one CEM installation.

(b) Speciation computed using 55 lbs/hr and a maximum sulfur % in oil of 3%. GP computed the speciation using the spreadsheets (Residual Oil with Wet Scrubber) provided by VISTAS from the USFS.

Table 3 presents emission information for the additional potentially BART-eligible emission units.

Figure 2 presents a regional map showing the Cedar Springs Mill and PSD Class I Areas within 300 km.

Table 3. Emission Rate Information for Additional Potentially BART-Eligible Emission Units at GP Cedar Springs

| | Maximum Actual 24-hr Emissions (lb/hr) | | | | | PM Speciation | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SO2 | H2SO4 | NOx | PM10 | PM2.5 | Filterable | Condensable | EC | Organic Aerosols | NOx | SO4 | PM Fine |
| R402 (a) | 916.1 | 120.8 | 208.3 | 45.7 | 35.5 | 86% | 14% | 0.89% | 8.83% | 0.30% | 9.86% | 80.12% |
| CG (b) | 0 | 0 | 0 | 0.181 | 0.027 | 100 | 0 | -- | -- | -- | -- | -- |
| L600 (c) | <50 | | 52.8 | 20.0 | 17.3 | 98% | 2% | -- | -- | -- | -- | -- |
| L601 (c) | <50 | | 52.8 | 11.1 | 9.6 | 98% | 2% | -- | -- | -- | -- | -- |
| L636/637 | 0 | 0 | 0 | 11.7 | 11.7 | 100 | 0 | -- | -- | -- | -- | -- |
| MOG1(d) | 0 | 0 | 0 | <20 | | | | | | | | |
| R406 (e) | 14.1 | | 2.6 | 15.1 | 15.1 | 84% | 16% | -- | -- | -- | 0.40% | -- |

Notes:

(a ) PM10 and PM2.5 based on PMtotal emissions of 68.19 lb/hr and estimated fractions of 67% and 52% by NCASI, respectively

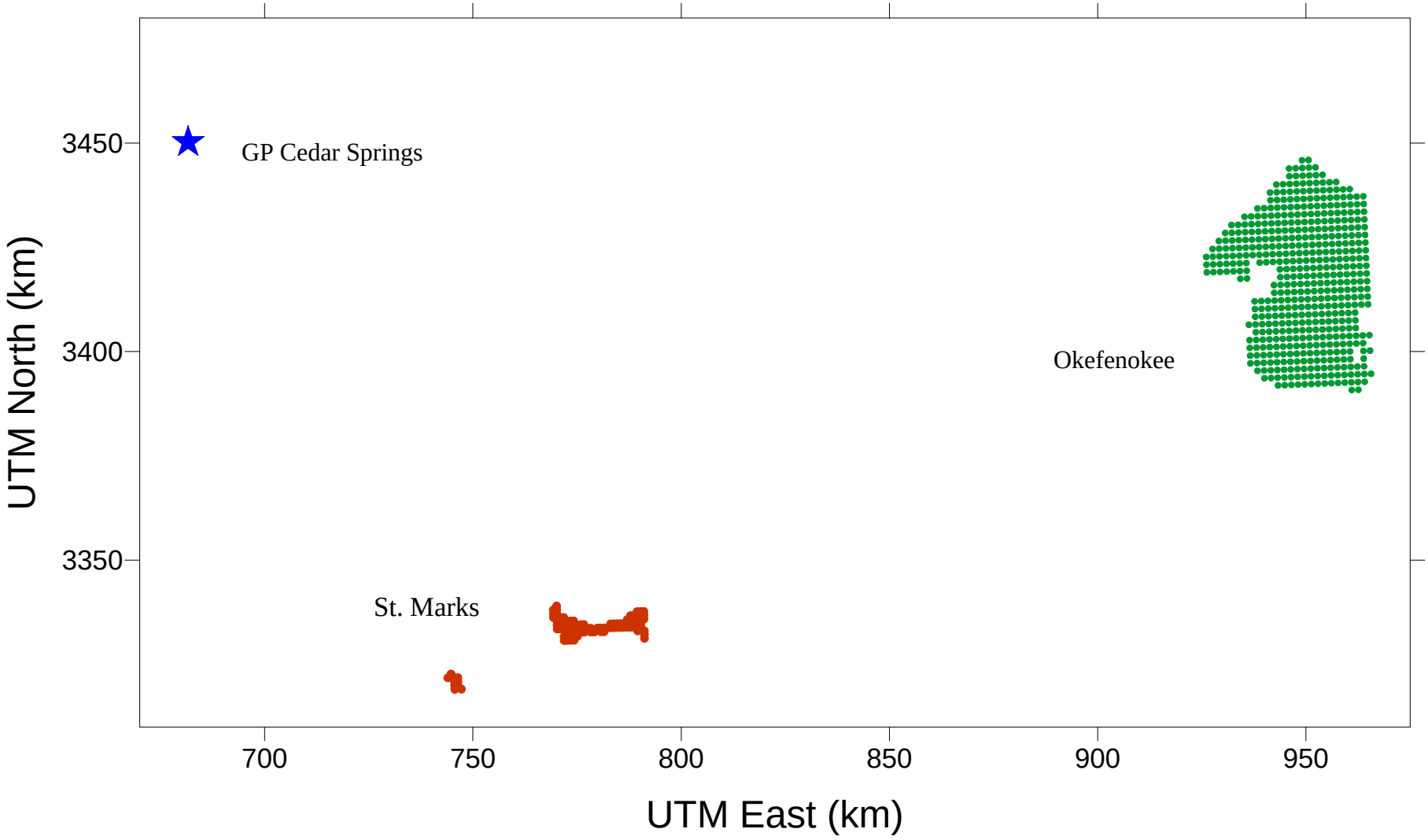
(b) PM2.5 fraction based on DRAFT AP-42 Section 13.2.4 (June 2006) SO2 and H2SO4 emissions reflect potential emission rates

(c) L600 and L601 PM10 emissions reflect the permit limit and the maximum stack test value during 2001-2005, respectively. SO2 emissions reflect historical testing of less than ½ of the current permit limit of 113 lbs/hr for each kiln. Actual emissions have not been measured since before 2002.

(d) The paper machine emissions are fugitive in nature and have not been quantified. The work area exhausts via 30 roof-mounted fans. GP conservatively estimated the emissions as less than 20 lbs/hr

(e) PM10 emission rate of 15.1 lbs/hr reflects the maximum source test result during 2000-2006 and was measured as total PM (Method 5). PM2.5 conservatively assumed to be equal to PM10 and PM total.

Figure 2. Mandatory Class I Area Receptors within 300km of GP Cedar Springs



# 3.0 VISTAS CONTRIBUTION TO CALPUFF MODELING

For this application of BART Exemption Modeling, VISTAS/VDEQ has the following data bases developed by Earth Tech available:

- VISTAS version of the CALPUFF modeling system, maintained on the Earth Tech website.
- 4-km CALMET output files for 2001, 2002, and 2003 produced as described in the VISTAS Common Protocol.
- CALMET with a software modification to allow the meteorological data inputs into CALMET to be used to generate finer grid CALMET files without having to go back to the original MM5 output files
- File with CALPUFF model configuration and settings sufficient to replicate CALPUFF modeling done for VISTAS using 12 km CALMET, including
    - Ozone data used to run CALPUFF
    - Ammonia data used to run CALPUFF and to partition $NO_3$ in POSTUTIL.
    - Background concentrations files for use in POSTUTIL

# 4.0 MODEL DISCUSSION

## 4.1 Exemption Procedures

For determining if this BART-eligible source is subject to a full BART engineering analysis, GP is beginning with the most refined dataset available from VISTAS. The fine grid analyses will use the 98th percentile impact value for the 24-hr average at each Class I area. The analysis will use either the 8th highest day in each year or the 22nd highest day in the 3-year period, whichever is more conservative, for comparison to the exemption threshold.

The analysis uses the same model assumptions for pre-BART visibility impact and for BART options modeling: establish baseline visibility from the pre-BART run; change one control at a time; and evaluate the change in visibility impact, (*i.e.*, the delta-deciview). Note that "no control" may constitute BART.

The VISTAS Common Modeling Protocol consistently recommends conservative assumptions. Individual States ultimately have responsibility to determine which, if any, BART controls are recommended in their State Implementation Plans (SIPs). The VISTAS protocol presents additional detailed information on the meteorological fields, and specific settings for CALPUFF and CALPOST (see section 4.33 of the VISTAS Common Modeling Protocol).

## 4.2 CALPUFF Configuration

Source emissions should be defined using the maximum 24-hour actual emission rate during normal operation for the most recent 3 or 5 years. If maximum 24-hr actual emissions are not available, continuous emissions data, permit allowable emissions, potential emissions, and emissions factors from AP-42 source profiles may be used as available. Specific configuration settings presented in the VISTAS Common Modeling Protocol are listed below:

- Use CMAQ modeling data from 2001-2003 to determine background concentrations of $SO_4$ and total $NO_3$ ($HNO_3$ + $NO_3$). CMAQ data in CALPUFF-ready format will be provided for each Class I area by VISTAS. After running CALPUFF for an individual facility, repartition $NO_3$ in POSTUTIL using the CMAQ background data, including that for $NH_3$. At the time of writing this protocol, hourly ammonia data is available for 2002. VISTAS has not yet made a final recommendation to States for 2001 and 2003. It is possible that 2002 monthly values be applied for the same months for these two years.

- Use ozone data from non-urban monitors as the background ozone input.

- Use the Pasquill-Gifford dispersion method.

- In CALPOST, use Method 6 with monthly average RH for calculating extinction, as recommended by the EPA.

- Use EPA default calculations of light extinction under current and natural background conditions.

The major features and options of the meteorological and dispersion model are summarized and discussed in the VISTAS Common Modeling Protocol (revised through March 9, 2006).

As also discussed in the VISTAS Common Modeling Protocol, CALPUFF is currently not recommended for addressing visibility impacts from VOC because its capability to simulate secondary organic aerosol formation from VOC emissions is not adequately tested, especially for anthropogenic emissions. (Separately, condensable organic carbon can be calculated from PM10.)

EPA has given states the option to address ammonia (NH3) emissions from BART-eligible sources. VISTAS has also contracted with Georgia Tech to perform emissions sensitivities using CMAQ v 4.4 with a refined SOA module and the Jun-Jul and Nov-Dec periods in 2002. At the time of this protocol, GDNR is not requesting the objective treatment of ammonia emissions from the source.

GP intends to begin the analysis with the available 4-km meteorological datasets. Once initial results are determined, we may need to address additional analysis options, including defining coastline information to refine the St. Marks NWA impact analyses.

# 5.0 RESULTS AND DETERMINATION OF IMPAIRMENT

## 5.1 Impact Threshold

The final BART guidance recommends that the threshold value to define whether a source "contributes" to visibility impairment is 0.5 dv change from natural conditions (although states may set a lower threshold). The 98$^{th}$ percentile (8$^{th}$ highest annual) 24-hr average predicted impact at the Class I area, as calculated using CALPOST Method 6 (monthly average relative humidity values), is to be compared to this contribution threshold value. For this comparison, the predicted impact at the Class I area on any day is taken to be the highest 24-hr average impact at any receptor in the Class I area on that day. (Note that the receptor where the highest impact occurs can change from day to day.) According to clarification of the BART guidance received from EPA, for a three-year simulation the modeling values to be compared with the threshold are the greatest of the three annual 8$^{th}$ highest values or the 22$^{nd}$ highest value over all three years combined, whichever is greater.

## 5.2 Presentation of Modeling Results

The CALPOST processing computes the daily maximum change in deciviews. A sample of the summary table produced by CALPOST is shown in Table 3. For evaluating compliance with the VISTAS screening threshold, the highest change in extinction value, located at the bottom of the CALPOST list file is compared to the threshold value (*e.g.,* 0.5 dv). For example, in the sample shown in Table 3, the summary at the bottom shows that the highest visibility impact is 1.219 dv, with 9 days over the year showing values greater than 0.5 dv. Therefore this source would not pass the initial analysis, and finer grid modeling would be required.

In addition to the highest change in deciview value on each day over all the receptors in a particular Class I area, the CALPOST summary table in Table 3 contains the coordinates of the receptor, receptor type (D indicates discrete receptors), the total haze level (background + source, in dv), the background haze in deciviews, the change in haziness (delta dv), the humidity term applied to hygroscopic aerosols (F(RH)), and the contribution of each species to light extinction (in percent of the total source contribution) for SO4, NO3, organics, elemental carbon, coarse and fine particulate matter.

If the maximum predicted impact is above 0.5 dv, then these results will also be presented:

- Number of receptors within a single Class I area with impact > 0.5 dv
- Number of days at all receptors in the Class I area with impact > 0.5 dv
- Number of Class I areas with impacts > 0.5 dv

Section 4 of the VISTAS Common Modeling Protocol presents sample tables for these results.

**Table 4. Example of CALPOST Output, Showing Maximum Daily Impacts of Source and Locations of Those Impacts.**

| YEAR | DAY | HR | RECEPTOR | COORDINATES (km) | | TYPE | DV(Total) | DV(BKG) | DELTA DV | F(RH) | %_SO4 | %_NO3 | %_OC | %_EC | %_PMC | %_PMF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2001 | 2 | 0 | 3 | 20.540 | 79.782 | D | 5.397 | 5.358 | 0.039 | 4.314 | 44.33 | 47.22 | 3.07 | 1.07 | 0.00 | 4.30 |
| 2001 | 3 | 0 | 9 | 31.680 | 79.822 | D | 4.566 | 4.421 | 0.145 | 1.767 | 40.75 | 33.89 | 9.19 | 3.24 | 0.00 | 12.94 |
| 2001 | 4 | 0 | 1 | 24.723 | 77.951 | D | 4.540 | 4.540 | 0.000 | 2.076 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2001 | 5 | 0 | 77 | 30.228 | 94.571 | D | 4.950 | 4.939 | 0.011 | 3.144 | 43.13 | 44.74 | 4.64 | 1.45 | 0.00 | 6.05 |
| 2001 | 6 | 0 | 1 | 24.723 | 77.951 | D | 5.181 | 5.166 | 0.015 | 3.772 | 38.58 | 56.05 | 1.90 | 0.70 | 0.00 | 2.76 |
| 2001 | 7 | 0 | 3 | 20.540 | 79.782 | D | 6.366 | 5.745 | 0.620 | 5.439 | 44.98 | 44.99 | 3.69 | 1.26 | 0.00 | 5.08 |
| . | | | | | | | | | | | | | | | | |
| . | | | | | | | | | | | | | | | | |
| . | | | | | | | | | | | | | | | | |
| 2001 | 363 | 0 | 113 | 27.414 | 103.782 | D | 5.725 | 5.652 | 0.073 | 5.164 | 53.49 | 35.51 | 4.03 | 1.39 | 0.00 | 5.58 |
| 2001 | 364 | 0 | 113 | 27.414 | 103.782 | D | 6.554 | 6.521 | 0.033 | 7.826 | 48.12 | 47.09 | 1.67 | 0.64 | 0.00 | 2.48 |
| 2001 | 365 | 0 | 1 | 24.723 | 77.951 | D | 6.499 | 6.499 | 0.000 | 7.757 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

--- Number of days with Delta-Deciview => 0.50: 9
--- Number of days with Delta-Deciview => 1.00: 2
--- Largest Delta-Deciview = 1.219

# 6.0 QUALITY ASSURANCE PLAN

Air quality modeling covered under this protocol is an important tool for use in determining whether a BART-eligible source can be reasonable expected to cause or contribute to visibility impairment in a Class I area, and therefore whether this source should be subject to BART controls, and if so, to determine the relative benefits of various BART controls. The purpose of the quality assurance (QA) program is to establish procedures for ensuring that products produced by the application of the modeling techniques for BART studies satisfy the regulatory objectives of the BART program. Section 6 of the VISTAS Common Modeling Protocol presents additional detailed information on the QA plan. For any proposed CALMET windfields, GP will continue to work with VDEQ to determine appropriate QA metrics.