Kimberly-Clark

February 4, 1985

Mr. Dean Wilson
U. S. Environmental Protection Agency
Office of Air Quality Planning and Standards
NC Mutual Building, Room 830
411 West Chapel Hill Street
Durham, North Carolina 27701

Re: Proposed Alabama State Implementation Plan Revision for Kimberly-Clark Corporation, Coosa Pines, Alabama

Dear Mr. Wilson:

Thank you for taking the time on January 15, 1985, to meet with Sue Robertson of the Alabama Department of Environmental Management, David Shea of Environmental Research and Technology ("ERT"), and Karen Chopp and me to review Kimberly-Clark's proposed particulate standard revision to the Alabama State Air Implementation Plan ("SIP") involving our Coosa Pines Pulp and Newsprint Mill.

Enclosed please find a Revised Modeling Protocol ("Protocol"), prepared by ERT to assess National Ambient Air Quality Standard Compliance and Prevention of Significant Deterioration Increment Consumption as a result of the proposed SIP revision. The revised Protocol incorporates all the changes discussed and agreed upon at our meeting in your offices. Each of these agreed-upon changes is summarized at pp. 10 of the attached Protocol, a copy of which is also attached to this letter.

As suggested by Tom Helms, please review the Protocol and confirm in writing that the proposed modeling will be sufficient for your evaluation of the air quality impacts of the pending SIP revision. Further, please confirm that a decision regarding approval of the SIP Revision can be made by the Environmental Protection Agency on the basis of these modeling results. We would also appreciate your estimate of how much time will be required by the Office of Air Quality Planning and Standards ("OAQPS") for review of the modeling results.

Kimberly-Clark remains eager to obtain final approval of this SIP proposal. The economic benefit to our company as a result of being able to burn additional wood waste fuel, which will be permitted through this project, is in the range of $2,000 per day (coal displacement) to $5,000 per day (gas displacement). We believe, moreover, that this cost savings can be realized without any significant adverse impacts on ambient air quality and consistent with Kimberly-Clark's long-standing record of environmental compliance.

We greatly appreciated the time and effort of OAQPS personnel in expediting this review process and look forward to your response.

Sincerely,

David C. Anderson

David C. Anderson
Corporate Environmental
and Energy Affairs

DCA/ka
Attachments
cc: Tom Helms - EPA/OAQPS, Durham, NC
Joe Tikvart - EPA/OAQPS, Durham, NC
Archie Lee - EPA/Region IV, Atlanta, GA
Sue Robertson - ADEM/AD, Montgomery, AL
Peter Budd - Coosa
Karen Chopp - KCNorth
Paul Robinson - KCNorth
Ken Strassner - Roswell
Gary Baise/Elizabeth Robinson - Washington, D.C.

ATTACHMENT 1

A REVISED MODELING PROTOCOL TO ASSESS NAAQS
COMPLIANCE AND PSD INCREMENT CONSUMPTION
AT KIMBERLY-CLARK'S COOSA PINES, ALABAMA MILL
(Revisions Based on Comments from Staff at EPA's
Office of Air Quality Planning and Standards, January 15, 1985)

Air quality modeling will be performed for a 5-year meteorological data base (1978 through 1982) to determine ambient total suspended particulate (TSP) concentrations and the level of Prevention of Significant Deterioration (PSD) increment consumption within the significant impact area of Kimberly-Clark's (K-C) Coosa Pines, Alabama Mill. A full field of 360 receptors will be used in the analysis. EPA's Industrial Source Complex (ISC) model will be used with proper options and CRSTER default values. Additional modeling will be performed using EPA's COMPLEX I model to assess compliance on terrain above mill stack tops. The analysis will include major background sources modeled at maximum allowable emissions. Recommendations contained in EPA's Regional Workshops On Air Quality Modeling: A Summary Report (1981, Rev. 1983) will be followed.

Description of Tasks

Task 1 - Preliminary Analyses

Rural/Urban Demonstration

The mill is located in a rural area. A demonstration of this will be made using Auer's method of classifying land use (J. Appl. Meteor., Vol. 17, 1978). Rural dispersion coefficients will be used in all modeling.

Aerodynamic Downwash

Using plot plans, ERT will determine if aerodynamic downwash of airborne emissions is a factor at the mill. Good Engineering Practice (GEP) stack height analyses will be conducted according to EPA's

Guideline for Determination of GEP Stack Height (July 1981) as the means of assessing this phenomenon. If stacks are below GEP height, worst-case building dimensions will be calculated and input to the ISC model in the manner described in an EPA Region I memorandum from Steven Perkins (Attachment 1). Otherwise, ISC will be run assuming there are no building downwash effects.

Proposed Model

A source-specific terrain (SST) version of ISC will be used in this analysis. EPA Region I altered the computer code to the short-term version of ISC to allow the user to input actual terrain elevations into the model runstream. The user no longer has to truncate terrain heights to just below the height of the shortest stack being modeled. The ISC.SST model internally limits terrain heights to just below the height of each stack. For example, let us assume that three stacks are being modeled. The stacks are 100 ft, 150 ft and 200 ft high. (Stack base elevation equals mean sea level). A nearby receptor has an elevation of 175 ft msl. ISC.SST would truncate that receptor height to 100 ft and to 150 ft for the two shorter stacks. No truncation would be performed for the 200 ft stack. Pollutant concentrations would then be calculated in the normal fashion and, although not at the same height, would be added together. This model obviates the need to make separate runs for each stack, which would be a time-consuming and altogether less efficient way of performing the analysis.

Task 2 - Determination of Receptor Ring Distances

ISC will be used in a screening mode using PTPLU type meteorological conditions to determine the ten (10) receptor ring distances to be used in the 5-year sequential modeling. Kimberly-Clark's proposed stack configurations (after the particulate emissions increase at the #3 bark boiler) and locations will be input to the model (see Table 1). Assuming receptor heights are equal to the maximum terrain height within 1 km of the mill, the model will be run to assess plant related impacts along each of 16 radials. The ten receptor ring distances will be chosen using techniques described in EPA's Modeling Workshop (1981, Revised 1983) document. Receptor elevations will then be picked for the 360 receptor (36 radials, 10 rings) grid. Each receptor height will correspond to the maximum elevation at any point within $\pm 5°$ of the radial and within one-half the distance to the nearest ring on either side.

Task 3 - Assessment of PSD Increment Consumption

The particulate emission changes at the Coosa Pines Mill since 1977 are shown in Table 2. The table lists a negative and a positive emission rate for every stack that has not been shut down. The negative rate represents the actual emission rate in 1977. The positive emission rate represents the present allowable rate at maximum load. The mill has achieved a net reduction of 5,746.2 lbs/hour of particulate matter since 1977, the year that the PSD baseline date was set for TSP in Alabama. This figure includes the proposed increase of 105.8 lbs/hour at the #3 bark boiler. The large emission reductions will, most likely, expand the available increment. The most efficient means of assessing incremental consumption/expansion in this case is to run ISC in a screening mode using PTPLU type meteorological conditions and the full 360 receptor radial grid, rather than expend considerable effort on a 5-year sequential modeling analysis of PSD increment consumption. For the screening analysis a total of 36 wind directions corresponding to the receptor grid radials (010°, 020°, 030°, , 360°) will be input to the model to assess maximum PSD increment consumption. The resulting 1-hour average TSP concentrations will be assumed to represent 24-hour average values for comparison with the PSD increments. Comparisons with the 24-hour PSD increment of 37 $\mu g/m^3$ will be made for each meteorological condition modeled. If, for any meteorological condition, a predicted concentration exceeds 37 $\mu g/m^3$, sequential modeling will be performed to assess PSD increment consumption. Annual average PSD increment consumption using a wind rose will be assessed only if there are any positive TSP concentrations predicted for any meteorological condition modeled in the screening analysis.

Task 4 - Develop TSP Background Concentrations

The Alabama Department of Environmental Management (ADEM) has determined from statewide monitoring data that a representative annual average TSP concentration in rural areas like Coosa Pines is 33 $\mu g/m^3$. This value will be added to modeled concentrations from the mill and from background sources for comparison with ambient standards. The ADEM will analyze the same monitoring data to develop a 24-hour background concentration for use in the compliance analysis. The ADEM will supply all pertinent data to EPA for their review.

Task 5 - Screening Modeling to Eliminate Background Sources

The ADEM has identified background sources, Georgia Pacific, Asphalt Products and Alabama Power to be included in the analysis. Georgia Pacific and Asphalt Products are located 30.5 km and 10.7 km, respectively, from the Coosa Pines Mill. Both of these sources emit less than 50 lbs/hour (see Table 1). Because of the distance and relatively low emission rates, these sources may not impact significantly for wind directions which align them with K-C. The ISC model will be used in a screening mode to determine if these sources, when added to K-C impacts plus an ADEM identified background concentration, comply with National and State Ambient Air Quality Standards (NAAQS). In this analysis, 1-hour TSP concentrations will be calculated along a radial downwind of K-C which aligns the latter source with the background source. The 1-hour TSP concentrations will be assumed to represent 24-hour average values. If the background source has insignificant impacts downwind of K-C or, if its impacts when added to K-C impacts plus a background concentration, comply with the AAQS, the background source will be eliminated from any sequential modeling. Both sources will, however, be included in annual average modeling. The Alabama Power Co. stacks will be modeled sequentially for the full five year meteorological period as described in the next task.

Task 6 - Assessment of Compliance with National and State Ambient Air Quality Standards

The ISC model will be run separately for the proposed mill configuration and for the Alabama Power Plant for 1 year of meteorology using the 360 receptor radial grid. Both the mill and Alabama Power will be modeled assuming maximum load/maximum capacity emissions and corresponding stack gas exit parameters. Predicted concentrations from all stacks at the two sources will then be added for each hour at each receptor. An appropriate background concentration identified by the ADEM will then be added to the highest and highest, second-highest predicted 24-hour average and highest annual average TSP concentrations for assessment of National and State AAQS compliance. Assuming compliance is demonstrated, Task 6 will be repeated for each of the remaining four years. Compliance over the 5-year period will be based on the highest, second-highest 24-hour average concentration and upon the highest annual average concentration.

Task 7 - Assessment of Compliance on Elevated Terrain

There are isolated terrain points located beyond 6 km from the mill which exceed all mill stack top elevations. A few receptors located closer than 6 km are also higher than some of the mill's shorter stacks. EPA's Complex I model will be employed to assess 24-hour TSP concentrations at these receptors due to the mill alone and in combination with the other identified background sources in Table 1. EPA's Valley model will be employed to assess compliance for annual average TSP concentrations.

NAAQS Assessment On Elevated Terrain

Complex I will be used in a screening mode to assess compliance with the 24-hour average NAAQS of 150 $\mu g/m^3$. Proposed emissions at the mill as well as emissions from Georgia Pacific, Alabama Power and Asphalt Products will be included in the modeling. A new receptor grid centered at the mill will be developed for the Complex I modeling. Receptors will be selected along radials and at distances at which terrain exceeds 490 ft msl, the lowest stack top at the mill (420 ft msl stack base elevation + 70 ft stack associated with the #2 lime kiln). Worst-case meteorological conditions of F stability (stable atmosphere) and a 2.5 m sec^{-1} stack top wind speed will be assumed. All predicted 1-hour concentrations will be divided by 4 to remain consistent with the Valley model assumption of 6 hours of impact in a 24-hour period. An ADEM identified 24-hour average TSP background concentration will be added to the maximum predicted 24-hour average concentration from the mill alone and from the mill combined with the modeled background sources for comparison with the NAAQS. Complex I cannot calculate annual average pollutant concentrations using a wind rose. Therefore, EPA's Valley model will be employed to calculate annual average TSP concentrations from the mill, Georgia Pacific, Alabama Power and Asphalt Products. A 1-year wind rose developed from the same meteorological data set used in the sequential modeling will be input to the Valley model. Critical receptors identified in the Complex I modeling as well as receptors located in the prevailing downwind direction from the mill will be input to the valley model run. After adding a 35 $\mu g/m^3$ background concentration to the predicted values, compliance with the NAAQS will be assessed.

PSD Assessment On Elevated Terrain

EPA's Complex I model will be employed in a screening mode to assess compliance with the 24-hour average PSD increment of 37 $\mu g/m^3$. The emission changes shown in Table 2 will be input to the model. Using PTPLU type meteorological conditions, net changes in 1-hour TSP concentrations will be calculated for the same receptor grid used in the Complex I modeling for the NAAQS analysis. Compliance with the 37 $\mu g/m^3$ PSD increment will be assessed by comparing the predicted net change in 1-hour TSP concentrations for each meteorological condition modeled to the 37 $\mu g/m^3$ increment.

Compliance will be demonstrated if no concentrations exceed 37 $\mu g/m^3$. An annual average PSD increment assessment will be performed using the Valley model only if any positive net changes in 1-hour TSP concentrations are predicted with Complex I.

Task 8 Documentation of Results

ERT will summarize all analysis assumptions, methods and results in a Draft Technical Support Document to be submitted to Kimberly-Clark for their comments. ERT will incorporate any comments into a final report to be submitted to the appropriate reviewing agencies.

Task 9 Project Management

This task includes management of technical tasks as well as interaction with Kimberly-Clark and appropriate agencies.

TABLE 1

EMISSION INVENTORY

FOR KIMBERLY-CLARK CORPORATION

Point I.D. #	Source Name or Point Description	UTM Coordinates E/W (km)	UTM Coordinates N/S (km)	Present/ Proposed Allowable TSP Emissions (lbs/hr)	Ht (ft)	Dia (ft)	Temp (°F)	Flow (ACFM)	Hours of Operation
309-S002	Georgia Pacific	587.5	3700.7	73	60	6.0	147	57,191	6240
309-0020-Z001	Asphalt Products Asphalt Batch Plant	549.3	3678.8	43.1	45	5	136	39,511	2000
411-0005	Alabama Power Company								
Z001	Unit #1	550.62	3678.32	312	525	23.5	250	833,916	8400
Z002	Unit #2	550.62	3678.32	312	525	23.5	250	833,916	8400
Z003	Unit #3	550.62	3678.32	312	525	23.5	250	833,916	8400
Z004	Unit #4	550.62	3678.32	312	525	23.5	250	833,916	8400
Z005	Unit #5	550.51	3678.17	989	525	30.0	278	3,200,000	8064
309 0006	Kimberly Clark Corp								
Z002	#2 Recovery Boiler	559.820	3687.600	25	130	4.3	334	40,333	7680
Z005	#2 Smelt Tank	559.826	3687.600	5.0	108	3.5	175	8,800	7680
Z024	#3 Bark Boiler	559.800	3687.600	347	170	8	380	231,000	7920
Z025	#1 Coal Boiler	560.400	3687.500	30	150	8	403	104,000	7968
Z026	#2 Coal Boiler	560.400	3687.500	30	150	8	405	91,500	7968
Z027	#3 Coal Boiler	560.400	3687.500	30	150	8	403	106,000	7968
Z028	#4 Coal Boiler	560.400	3687.500	30	150	8	400	95,500	7968
Z011	#2 Lime Kiln	559.835	3687.746	19.6	70	4	171	28,500	8280
No Permit No.	#5 Coal Boiler	560.400	3687.500	30	150	6.8	470	85,500	8760
Z003	#3 Recovery Boiler	559.977	3687.844	64	187	9.8	368	317,000	8400
Z006	#3 Smelt Tank	559.951	3687.844	7	186	5.5	173	22,500	8400
Z032	#3 Lime Kiln	559.844	3687.745	17	90	4.8	174	44,500	8280

TABLE 2

PSD-INCREMENT EMISSION INVENTORY

FOR KIMBERLY-CLARK CORPORATION

Point I.D. #	Source Name or Point Description	UTM Coordinates E/W (km)	UTM Coordinates N/S (km)	Actual TSP Emissions (lb/hr) Annualized	Stack Parameters Ht (ft)	Stack Parameters Dia (ft)	Stack Parameters Temp (°F)	Stack Parameters Flow (ACFM)
309 0006	Kimberly-Clark Corp.							
Z001	#1 Recovery Boiler	559.820	3687.600	-175.2	225	13.4	264	133,000
Z002	#2 Recovery Boiler	559.820	3687.600	-151.7	150	5	347	48,600
Z003	#3 Recovery Boiler	559.977	3687.844	+61.4	187	9.8	368	317,000
Z004	#1 Smelt Tank	559.826	3687.600	-49.9	96	3.5	173	12,000
Z005	#2 Smelt Tank	559.826	3687.600	-46.6	108	3.5	175	8,800
Z006	#3 Smelt Tank	559.951	3687.844	+6.7	186	5.5	173	22,500
Z024	#3 Bark Boiler	559.800	3687.600	+92.9	170	8	380	165,000
Z025	#1 Coal Boiler	560.400	3687.500	-1133.3	150	6.8	470	85,800
Z026	#2 Coal Boiler	560.400	3687.500	-1086.0	150	6.8	470	85,800
Z027	#3 Coal Boiler	560.400	3687.500	-1038.8	150	6.8	470	85,800
Z028	#4 Coal Boiler	560.400	3687.500	-1086.0	150	6.8	470	85,800
No Permit No.	#5 Coal Boiler	560.400	3687.500	-1061.5	150	6.8	470	85,800
Z032	#3 Lime Kiln	559.844	3687.745	+16.1	90	4.8	174	44,500
Z025	#1 Coal Boiler	560.400	3687.500	+7.9	150	8	403	104,000
Z026	#2 Coal Boiler	560.400	3687.500	+8.0	150	8	405	91,500
Z027	#3 Coal Boiler	560.400	3687.500	+9.0	150	8	403	106,000
Z028	#4 Coal Boiler	560.400	3687.500	+4.6	150	8	400	95,500
No Permit No.	#5 Coal Boiler	560.400	3687.500	+30	150	6.8	400	85,817
Z002	#2 Recovery Boiler	559.820	3687.600	6.3	130	4.3	334	40,433
309-0020-Z001	Asphalt Products Asphalt Batch Plant	549.300	3678.800	6.2	45	5	136	39,511

*Annualized means multiplying the emission rate by hours of operation then dividing by 8760 hours.

CHANGES MADE TO THE COOSA PINES MODELING PROTOCOL

BASED ON U.S. EPA COMMENTS AT A

JANUARY 15, 1985 MEETING IN DURHAM, NC

1. Monitored background concentrations have been identified for both annual and 24-hour averaging periods. The following will be used:

   Annual 33 $\mu g/m^3$
   24-hour 72 $\mu g/m^3$

2. Maximum allowable hourly emissions from all background and K-C stacks will be modeled for NAAQS compliance assessment. These emissions are shown in Table 1. For PSD increment assessment, annualized emissions are being used. Annualized emissions were calculated by multiplying actual emission rates by the actual hours of operation and dividing by 8760.

3. The Alabama power plant located in Wilsonville, AL will be modeled sequentially for the 5 year period. Modeled emissions will be maximum hourly allowable rates.

4. More detail is provided describing emission changes at the Coosa Pines mill since the 1977 PSD baseline date (Table 2).

5. Asphalt products has been added to the PSD increment emission inventory.

6. More detail is provided describing the analysis of plume impact in complex terrain.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE June 25, 1981

SUBJECT Worst Case Downwash Inputs to ISC

FROM Stephen S. Perkins SSPerkins
Environmental Systems Group

TO ISC Files

Question: What L, W and H should be input to ISC to get the most conservative results (i.e. worst case downwash effects)?

Step 1 - GEP Analysis

Conduct a GEP analysis refering to EPA's "Guideline for Determination of Good Engineering Practice Stack Height (Technical Support Document for Stack Height Regulations)" (Draft, 9/80). The GEP formula is:

$$Hg = H + 1.5L \qquad (1)$$

where L is the lesser dimension (height or projected width) of the structure. Note that both the height and width of the structure are determined from the frontal area of the structure, projected onto a plane perpendicular to the direction of the wind. This means that the horizontal dimension of the structure depends on the wind angle and does not necessarily correspond to conventional definitions of width or length.

For a rectangular structure, the projected width will vary from a minimum of the shortest side to a maximum of the diagonal. Consider a structure with sides of equal length (20) and slightly larger height (24). The projected width varies between 20 and the diagonal length (28). In the first case, the structure is tall (height>projected width) and the GEP height is 54. In the second case, the structure is squat (projected width>height) and the GEP height is 60. Thus, to get the highest GEP height, L must be the lesser of the height and the maximum projected width. Obviously, if the minumum projected width exceeds the height, the width has no influence on the GEP height, and maximizing the projected width is unnecessary.

In the case of a tiered structure, the GEP analysis must be conducted for each tier individually to determine the controlling tier (i.e. that tier yielding the highest GEP height). Careful attention must be given to the projected width for each tier since it is possible that some tiers will be squat while others will be tall. It is also possible that the tier giving the highest GEP height will not be the tallest one.

Form 1320-6 (Rev. 3-76)

Step 2 - ISC Input

Tall structures. If the GEP analysis indicates that the structure is tall (height>projected width), the maximum projected width will have been used in the calculation. It is therefore important that ISC use this maximum projected width in the downwash calculations. In the case of a tiered structure, it is the maximum projected width of the controlling tier that should be used.

The way the ISC model is constructed, the user inputs a length and width for the structure. The model calculates an area based on this length and width and then determines the diameter of a circle with equal area. This so called "effective diameter(De)" is used in all other calculations as the projected width of the structure. The ISC algorithm assumes the following relationship:

$$WL=\pi/4\ De^2 \qquad (2)$$

Since we have seen above that there is a range of projected widths for any structure, the ISC method will not necessarily compute a De which equals the maximum projected width, and thus produces the worst downwash case. To get ISC to model the worst case, the user can set De equal to the maximum projected width and solve equation 2 assuming W=L. If this value is input as W and L, ISC will then use the correct projected width in the dispersion calculations. The height input to ISC should be the structure height used in the GEP calculation. For tiered structures, input the height of the controlling tier.

If this worst case approach yields predicted violations at certain receptors on certain days, the user should recalculate the height and projected width based on the actual receptor-structure configuration (i.e. use the straight line between the stack and the receptor as the wind direction and maximize the frontal projection perpendicular to this direction). Using this width as De in equation 2, suitable dimensions for input to ISC can be found. The model can then be run for the day and receptor in question to get a more realistic prediction.

Squat Structures. If the GEP analysis indicates that the structure is squat (projected width>height), the projected width will not have been used in the calculation. The choice of input to ISC to model worst case conditions is still important. For squat buildings, σ_y is modified for plumes with plume height to building height ratios (at two building heights downward) less than or equal to 1.2. The modified σ_y is a function of the projected width such that increasing the width increases σ_y. In the squat structure case, minimizing the projected width will produce the worst downwash effects. In the case of a tiered structure where the controlling tier is squat, the projected width of the controlling tier should be minimized (i.e. use the actual width as the minimum projected width). This minimization is subject to the constraint that the projected width cannot be less than the height or the model will think the structure is tall. Therefore, if the actual width is less than the height, use the height as the minimum projected width.

To get ISC to model the worst case, the user should set De equal to the minimum projected width, subject to the constraint mentioned above, and solve equation 2 assuming W=L. If this value is input as W and L, along with the height used in the GEP calculation, ISC will model the worst case structure configuration.

As in the tall building case, if this worst case approach yields predicted violations the user should recalculate the projected width and height based on the actual receptor-structure configuration.

Conclusion. Using the physical building dimensions as input to ISC will not result in the worst case downwash conditions at all receptors. At some receptors the concentration will be underpredicted and at some it will be over-predicted. Using the projected widths described above should result in no under-predictions anywhere, thus insuring that the worst case will be predicted.