Exhibit 1

AERMOD Modeling of SO2 Impacts of the Luminant Big Brown Coal Plant

Final Report

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Prepared for

Sierra Club
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Prepared by
Mr. Khanh T. Tran
Principal

AMI Environmental
206 Black Eagle Ave
Henderson, NV 89002
Tel. (714)679-7363

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I. INTRODUCTION

This document presents the methodologies and results of an application of the AERMOD model to predict the air quality impacts of sulfur dioxide (SO2) emitted by the Big Brown Steam Station. Big Brown is a coal-fired power plant operated by Luminant near Fairfield, in Freestone County, Texas (Figure 1). It consists of two coal-fired boilers with a total electric generating capacity of 1,187 MW (gross). SO2 impacts predicted by the AERMOD model will be compared against the 1-hour SO2 ambient air quality standard (AAQS) of 75 ppb (or 196 ug/m3) which has been promulgated in June 2010 by the U.S. Environmental Protection Agency (EPA).

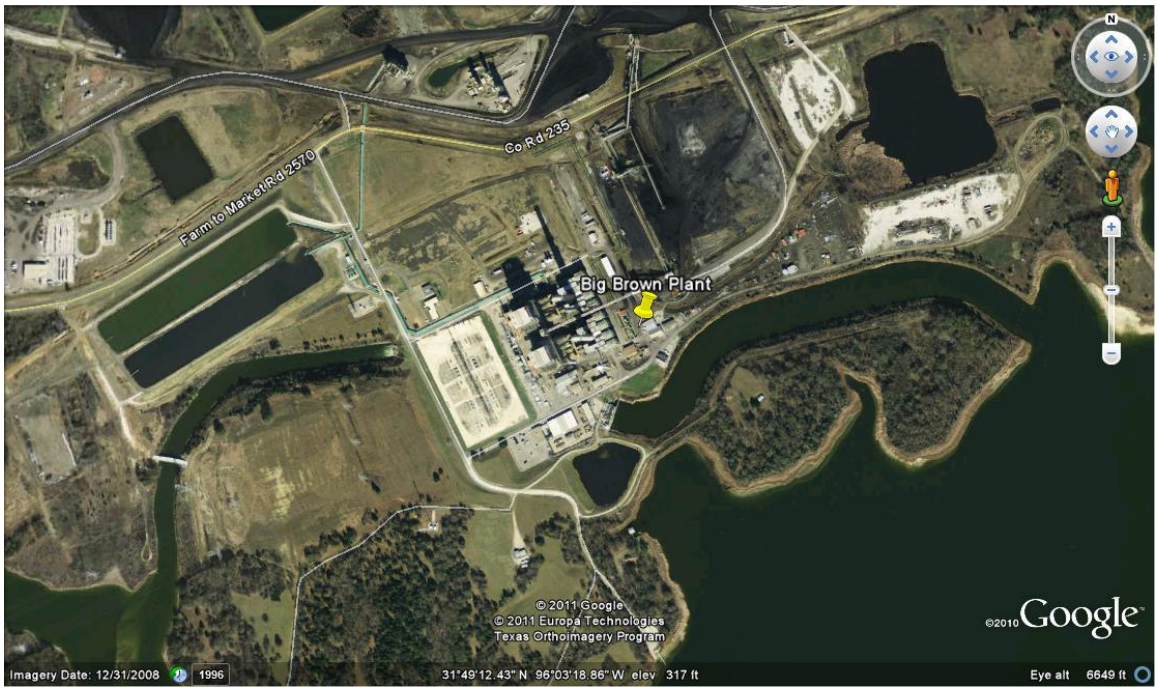

Figure 1. Luminant Big Brown Coal Plant

II. MODELING METHODOLOGIES

This section documents the methodologies and assumptions used in the generation of modeling inputs such as source emissions, stack parameters, receptors and meteorological data.

A. Model Version

The version 11103 of the AERMOD model has been used in the modeling study. It is currently the latest version of the model that has been approved by the US Environmental Protection Agency (USEPA, 2011). It predicts the 1-hour SO2 concentrations that can be compared against the 1-hour AAQS which is attained when the 3-year average of the 99th

percentile of the daily maximum 1-hour concentrations does not exceed 75 ppb (or 196 ug/m3) at each monitor within an area (USEPA, 2010a; 2010b).

B. Source Emissions

Coal-fired boilers at the plant are major sources of SO2. The US EPA Clean Air Market database shows that, from 2003 to 2010, the year 2006 has the highest emission total of 96,221.3 tons per year (tpy).
http://camddataandmaps.epa.gov/gdm/index.cfm?fuseaction=emissions.wizard

Emissions by boiler are as follows: 49,777.2 tpy for Unit 1 and 46,444.1 tpy for Unit 2. These emissions have been converted to grams per second (g/s) in Table 1 as required by the AERMOD model by assuming that the boilers operate continuously, i.e. 8760 hours per year. U.S. EPA's guidance on modeling 1-hour SO2 impacts and the Modeling Guideline require using the maximum 1-hour emission rate. There are no 1-hour limits in the permit for the coal-fired boilers. Therefore, the maximum theoretical emissions during a 1-hour period should be used. The emission rates used for this model are lower than the 1-hour maximum theoretical emissions and, hence, the modeled impacts are underestimated. The purpose of this modeling is to show that even when using emission rates lower than the 1-hour maximum, the facility causes violations of the NAAQS. Using the 1-hour maximum, as required by U.S. EPA and the Modeling Guidelines, should result in even higher modeled concentrations.

C. Stack Parameters

Stack parameters (stack height, diameter, temperature and exit velocity) for the boilers are shown in Table 1. They have been obtained from CENRAP point source data used in a previous photochemical modeling study (AMI, 2010).

Table 1. Plant SO2 Emissions & Stack Parameters

Stack	SO2 (g/s)	Height (m)	Diameter (m)	Temperature (K)	Velocity (m/s)
Stack 1	1,431.9468	122	6.77	459	23.7
Stack 2	1,336.0631	122	6.77	459	23.7

D. Receptors

The AERMOD modeling uses a grid of discrete receptors that are located within a radius of 50 km around the plant. The receptor grid has varying resolutions: 50 m on the plant boundaries, 100 m within the first 5 km, 250 m between 5 km and 10 km, 500 m between 10 km and 20 km, and 1000 m between 20 km and 50 km. Receptors located on-site have

been removed from consideration and a total of 33,380 receptors have been used in the AERMOD modeling. The preprocessor AERMAP has been employed to obtain terrain elevations at these receptors using the NED data.

E. Meteorological Data

The AERMOD modeling uses a 5-year meteorological dataset that has been processed and recommended by TCEQ. It is comprised of surface observations at Waco (Station No. 13959) and upper-air data from the Longview site (Station No. 03951). Meteorological data processed by TCEQ for the years 1987 through 1991 have been used in the AERMOD modeling. The pre-processed data from TCEQ was used here to be consistent with TCEQ practices, even though the TCEQ practices are, themselves, inconsistent with best modeling practices.

F. Background Concentrations

For comparing against the SO2 1-hour NAAQS, background concentrations at a monitoring station are added to the concentrations predicted by the AERMOD model. Maximum 1-hour SO2 measurements in Dallas, Longview and Waco for 2006-2008 are shown in Table 2. The Longview measurements are the highest and exceed the NAAQS and, hence, they are not suitable as background. The Waco measurements are much lower than those in Dallas; they are more representative as background since Waco is a much smaller city and less polluted than Dallas, and there is less chance for a "double counting" for an existing source such as the Luminant plant. Thus, a background of 21 ug/m3 is used in comparing modeled SO2 impacts against the NAAQS.

Table 2. Maximum Ambient 1-Hour SO2 Concentrations in Dallas, Longview and Waco

Year	1-Hour SO2 in Dallas	1-Hour SO2 in Longview	1-Hour SO2 in Waco
2008	23 ppb (60 ug/m3)	96 ppb (251 ug/m3)	8 ppb (21 ug/m3)
2007	14 ppb (45 ug/m3)	168 ppb (440 ug/m3)	8 ppb (21 ug/m3)
2006	16 ppb (42 ug/m3)	111 ppb (291 ug/m3)	Not available

Source: US EPA AirData
http://iaspub.epa.gov/airsdata/adaqs.monvals?geotype=st&geocode=TX&geoinfo=st~TX~Texas&pol=SO2&year=2008&fld=monid&fld=siteid&fld=address&fld=city&fld=county&fld=stabbr&fld=regn&rpp=25

III. MODELING RESULTS

In June 2010, US EPA has announced a new 1-hour AAQS which is attained when the 3-year average of the 99th percentile of the daily maximum 1-hour concentrations does not exceed 75 ppb (or 196 ug/m3) at each monitor within an area. Subsequently, US EPA has issued in August 2010 a modeling guidance for using the AERMOD model with 5-year of meteorological data (USEPA, 2010b). According to the US EPA, the 4th highest maximum daily 1-hour concentrations averaged over five years should be used in the NAAQS comparison.

Five runs of the AERMOD model have been performed. SO2 modeling results are summarized in Appendix A and presented in Table 3. According to the US EPA recommendations, modeled impacts in Table 3 have been averaged over five years of modeled meteorological data. The AERMOD model has predicted a maximum 1-hour concentration of 507.6 ug/m3 and a 4th highest (99th percentile) concentration of 496.1 ug/m3 from the plant emissions alone. Both these concentrations largely exceed (by more than a factor of 2) the NAAQS of 196 ug/m3: 159% by the maximum 1-hour concentration and 153% by the 4th highest concentration. With the background of 21 ug/m3, the maximum total 1-hour concentration is 528.6 ug/m3 which is 170% over the NAAQS, and the maximum total 4th highest concentration is 517.1 ug/m3 which is 164% above the 1-hour NAAQS of 196 ug/m3. A plot of the contour of 196 ug/m3 is shown in Figure 2. The area with concentrations exceeding 196 ug/m3, i.e. violating the 1-hr NAAQS, due to the plant emissions alone has a radius of about 5 miles around the plant. With the addition of the background of 21 ug/m3, the impact area represented by the 180 ug/m3 contour reaches 10 miles in the south.

Table 3. Predicted 1-Hour SO2 Impacts by the Luminant Big Brown Plant (averaged over 5 years)

Pollutant	Project Conc. (ug/m3)	Background Conc. (ug/m3)	Total Conc. (ug/m3)	NAAQS (ug/m3)	NAAQS Exceed	Percent Over NAAQS
1-hour SO2 (max)	507.6	21	528.6	196	**YES**	**170%**
1-hour SO2 (4th highest)	496.1	21	517.1	196	**YES**	**164%**

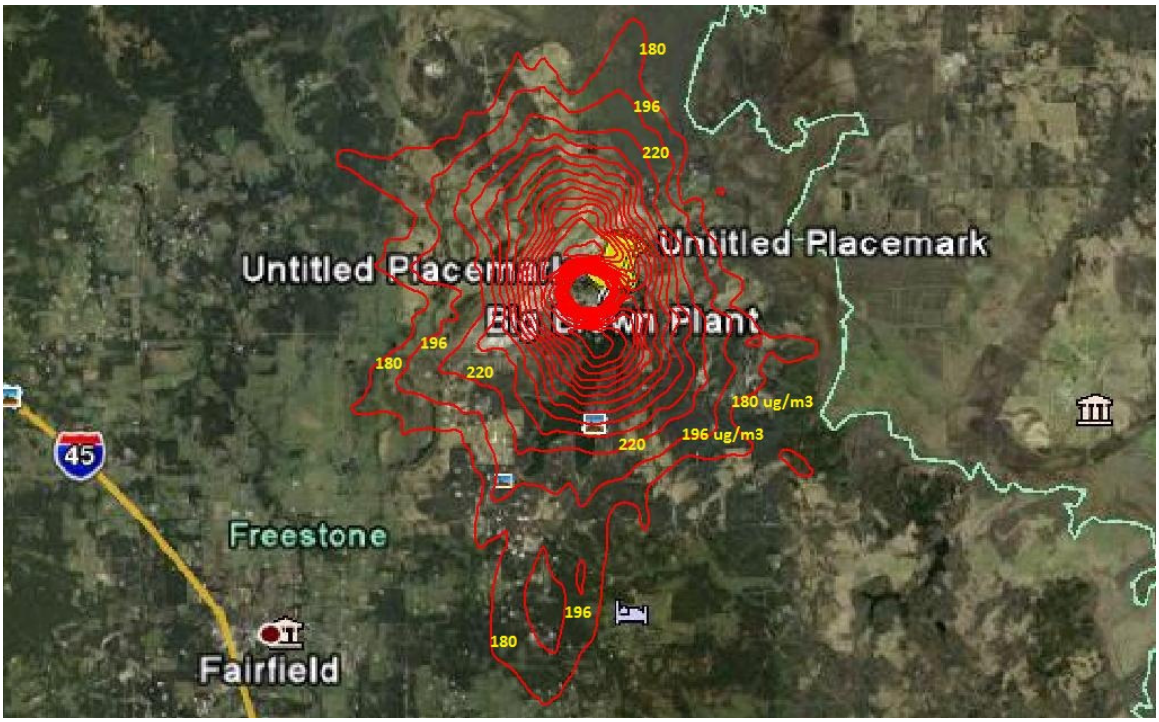

Figure 2. Area with 4th Highest 5-yr Averaged SO2 Concentrations Exceeding the 1-Hour NAAQS of 196 ug/m3 by Plant Emissions Alone

IV. CONCLUSIONS

Air quality impacts of SO2 emissions from the Luminant Big Brown facility have been analyzed with the AERMOD model. Using 2006 actual emissions, five years of meteorological data and the latest US EPA modeling guidance, the AERMOD model has predicted large exceedances (more than a factor of 2) of the recent 1-hour NAAQS of 196 ug/m3. The plant alone has also been shown to cause a large area with a radius of about 6 miles where the concentrations exceed this NAAQS. Thus, SO2 impacts from the Big Brown coal plant are very adverse since its SO2 emissions alone cause large exceedances of the 1-hour NAAQS and a large area of NAAQS violations. It should be noted that the predicted NAAQS exceedances are understated since annual-averaged emissions that are less than maximum hourly emissions have been used in the modeling

V. REFERENCES

AMI, 2010. Photochemical Modeling of Ozone, PM2.5 and Visibility Impacts in Arkansas from Texas Existing and Planned Coal-Fired Power Plants. Report prepared for Sierra Club by AMI Environmental, September 2010.

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U.S. EPA, 2010a. *Guidance Concerning the Implementation of the 1-hour SO2 NAAQS for the Prevention of Significant Deterioration Program*. Memorandum issued on August 23, 2010 from Stephen D. Page, Director of OAQPS. Available at http://www.epa.gov/region07/air/nsr/nsrmemos/appwso2.pdf

U.S. EPA, 2010b. *Applicability of Appendix W Modeling Guidance for the 1-hour SO2 NAAQS*. Memorandum issued on August 23, 2010 from Tyler Fox, Leader of Air Quality Modeling Group, OAQPS. Available at http://www.epa.gov/region07/air/nsr/nsrmemos/appwso2.pdf
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Appendix A

Summary of AERMOD Modeling Results

**MODELOPTs: RegDFAULT CONC ELEV
MULTYR

*** THE SUMMARY OF MAXIMUM 1ST-HIGHEST MAX DAILY 1-HR RESULTS
AVERAGED OVER 5 YEARS ***

** CONC OF SO2 IN MICROGRAMS/M**3 **

GROUP ID		AVERAGE CONC	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	NETWORK OF TYPE GRID-ID
ALL	1ST HIGHEST VALUE IS	507.61542	AT (778950.00, 3525550.00, 97.97, 97.97, 0.00)	DC
	2ND HIGHEST VALUE IS	506.91454	AT (778800.00, 3525600.00, 98.22, 98.22, 0.00)	DC
	3RD HIGHEST VALUE IS	505.11206	AT (778450.00, 3525550.00, 97.51, 97.51, 0.00)	DC
	4TH HIGHEST VALUE IS	504.34776	AT (778400.00, 3525500.00, 97.53, 97.53, 0.00)	DC
	5TH HIGHEST VALUE IS	502.63979	AT (778400.00, 3525600.00, 97.77, 97.77, 0.00)	DC
	6TH HIGHEST VALUE IS	502.33292	AT (778900.00, 3525500.00, 97.39, 97.39, 0.00)	DC
	7TH HIGHEST VALUE IS	502.30230	AT (778300.00, 3525500.00, 98.18, 98.18, 0.00)	DC
	8TH HIGHEST VALUE IS	502.12094	AT (778700.00, 3525500.00, 94.44, 94.44, 0.00)	DC
	9TH HIGHEST VALUE IS	501.60334	AT (779000.00, 3525500.00, 97.76, 97.76, 0.00)	DC
	10TH HIGHEST VALUE IS	501.52012	AT (778900.00, 3525600.00, 98.87, 98.87, 0.00)	DC

**MODELOPTs: RegDFAULT CONC ELEV
MULTYR

*** THE SUMMARY OF MAXIMUM 2ND-HIGHEST MAX DAILY 1-HR RESULTS
AVERAGED OVER 5 YEARS ***

** CONC OF SO2 IN MICROGRAMS/M**3 **

GROUP ID		AVERAGE CONC	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	NETWORK OF TYPE GRID-ID
ALL	1ST HIGHEST VALUE IS	502.13021	AT (778800.00, 3525600.00, 98.22, 98.22, 0.00)	DC
	2ND HIGHEST VALUE IS	500.41246	AT (778950.00, 3525550.00, 97.97, 97.97, 0.00)	DC
	3RD HIGHEST VALUE IS	499.48276	AT (778400.00, 3525500.00, 97.53, 97.53, 0.00)	DC
	4TH HIGHEST VALUE IS	498.96391	AT (778400.00, 3525600.00, 97.77, 97.77, 0.00)	DC
	5TH HIGHEST VALUE IS	498.56972	AT (778900.00, 3525500.00, 97.39, 97.39, 0.00)	DC
	6TH HIGHEST VALUE IS	498.01424	AT (778450.00, 3525550.00, 97.51, 97.51, 0.00)	DC
	7TH HIGHEST VALUE IS	497.48710	AT (779000.00, 3525600.00, 98.02, 98.02, 0.00)	DC
	8TH HIGHEST VALUE IS	497.04936	AT (778900.00, 3525600.00, 98.87, 98.87, 0.00)	DC
	9TH HIGHEST VALUE IS	496.61637	AT (779000.00, 3525500.00, 97.76, 97.76, 0.00)	DC
	10TH HIGHEST VALUE IS	495.99575	AT (779100.00, 3525500.00, 98.25, 98.25, 0.00)	DC

**MODELOPTs: RegDFAULT CONC ELEV
MULTYR

*** THE SUMMARY OF MAXIMUM 4TH-HIGHEST MAX DAILY 1-HR RESULTS
AVERAGED OVER 5 YEARS ***

** CONC OF SO2 IN MICROGRAMS/M**3 **

GROUP ID		AVERAGE CONC	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	NETWORK OF TYPE GRID-ID
ALL	1ST HIGHEST VALUE IS	496.08508	AT (778800.00, 3525600.00, 98.22, 98.22, 0.00)	DC
	2ND HIGHEST VALUE IS	493.85750	AT (778900.00, 3525600.00, 98.87, 98.87, 0.00)	DC
	3RD HIGHEST VALUE IS	492.49927	AT (779000.00, 3525500.00, 97.76, 97.76, 0.00)	DC
	4TH HIGHEST VALUE IS	492.35445	AT (778900.00, 3525500.00, 97.39, 97.39, 0.00)	DC
	5TH HIGHEST VALUE IS	492.32315	AT (778450.00, 3525550.00, 97.51, 97.51, 0.00)	DC
	6TH HIGHEST VALUE IS	492.26252	AT (779000.00, 3525600.00, 98.02, 98.02, 0.00)	DC
	7TH HIGHEST VALUE IS	490.53922	AT (778950.00, 3525550.00, 97.97, 97.97, 0.00)	DC
	8TH HIGHEST VALUE IS	489.92547	AT (778500.00, 3525600.00, 97.71, 97.71, 0.00)	DC
	9TH HIGHEST VALUE IS	488.90832	AT (778400.00, 3525500.00, 97.53, 97.53, 0.00)	DC
	10TH HIGHEST VALUE IS	488.65418	AT (778800.00, 3525700.00, 98.03, 98.03, 0.00)	DC

Exhibit 2

AERMOD Modeling of SO2 Impacts of the Luminant Martin Lake Coal Plant

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I. INTRODUCTION

This document presents the methodologies and results of an application of the AERMOD model to predict the air quality impacts of sulfur dioxide (SO2) emitted by the Martin Lake Steam Station. Martin Lake is a coal-fired power plant operated by Luminant near Henderson in Rusk County, Texas (Figure 1). It consists of three coal-fired boilers with a total electric generating capacity of 2,380 MW (gross). SO2 impacts predicted by the AERMOD model will be compared against the 1-hour SO2 ambient air quality standard (AAQS) of 75 ppb (or 196 ug/m3) which has been promulgated in June 2010 by the U.S. Environmental Protection Agency (EPA).

Figure 1. Luminant Martin Lake Coal Plant

II. MODELING METHODOLOGIES

This section documents the methodologies and assumptions used in the generation of modeling inputs such as source emissions, stack parameters, receptors and meteorological data.

A. Model Version

The version 11103 of the AERMOD model has been used in the modeling study. It is currently the latest version of the model that has been approved by the US Environmental Protection Agency (USEPA, 2011). It predicts the 1-hour SO2 concentrations that can be compared against the 1-hour AAQS which is attained when the 3-year average of the 99th

percentile of the daily maximum 1-hour concentrations does not exceed 75 ppb (or 196 ug/m3) at each monitor within an area (USEPA, 2010a; 2010b).

B. Source Emissions

Coal-fired boilers at the plant are major sources of SO2. The Phase II Acid Rain Permit, as part of the plant Title V permit, shows a total of 98,870 tons per year (tpy). Emissions by boiler are as follows: 33, 220 tpy for Unit 1, 32,225 tpy for Unit 2 and 33,425 tpy for Unit 3. These emissions have been converted to grams per second (g/s) in Table 1 as required by the AERMOD model by assuming that the boilers operate continuously, i.e. 8760 hours per year. U.S. EPA's guidance on modeling 1-hour SO2 impacts and the Modeling Guideline require using the maximum 1-hour emission rate. There are no 1-hour limits in the permit for the coal fired boilers. Therefore, the maximum theoretical emissions during a 1-hour period should be used. The emission rates used for this model are lower than the 1-hour maximum theoretical emissions and, hence, the modeled impacts are underestimated. The purpose of this modeling is to show that even when using emission rates lower than the 1-hour maximum, the facility causes violations of the NAAQS. Using the 1-hour maximum, as required by U.S. EPA and the Modeling Guidelines, should result in even higher modeled concentrations.

C. Stack Parameters

Stack parameters (stack height, diameter, temperature and exit velocity) for the boilers are shown in Table 1. They have been obtained from CENRAP point source data used in a previous photochemical modeling study (AMI, 2010).

Table 1. Plant SO2 Emissions & Stack Parameters

Stack	SO2 (g/s)	Height (m)	Diameter (m)	Temperature (K)	Velocity (m/s)
Stack 1	955.6438	137.8	7.01	373	27.2
Stack 2	927.0205	137.8	7.01	370	31.7
Stack 3	961.5411	137.8	7.01	370	32.9

D. Receptors

The AERMOD modeling uses a grid of discrete receptors that are located within a radius of 50 km around the plant. The receptor grid has varying resolutions: 50 m on the plant boundaries, 100 m within the first 5 km, 250 m between 5 km and 10 km, 500 m between 10 km and 20 km, and 1000 m between 20 km and 50 km. Receptors located on-site have been removed from consideration and a total of 33,381 receptors have been used in the AERMOD modeling. The preprocessor AERMAP has been employed to obtain terrain elevations at these receptors using the NED data.

E. Meteorological Data

The AERMOD modeling uses a 5-year meteorological dataset that has been processed and recommended by TCEQ. It is comprised of surface observations at Shreveport (Station No. 13957) and upper-air data from the Longview site (Station No. 03951). Meteorological data processed by TCEQ for the years 1989 through 1993 have been used in the AERMOD modeling. It should be noted that these TCEQ-recommended data may not be the best available data, since more accurate wind data can be derived from 1-minute measurements at ASOS stations in recent years. The pre-processed data from TCEQ was used here to be consistent with TCEQ practices, even though the TCEQ practices are, themselves, inconsistent with best modeling practices.

F. Background Concentrations

For comparing against the SO2 1-hour NAAQS, background concentrations at a monitoring station are added to the concentrations predicted by the AERMOD model. Maximum 1-hour SO2 measurements in Dallas, Longview and Waco for 2006-2008 are shown in Table 2. The Longview measurements are the highest and exceed the NAAQS since Longview is the closest monitor to the Luminant plants and, hence, they are not suitable as background. The Waco measurements are much lower than those in Dallas; they are more representative as background since Waco is a much smaller city and less polluted than Dallas, and there is less chance for a "double counting" for an existing source such as the Luminant plant. Thus, a background of 21 ug/m3 is used in comparing modeled SO2 impacts against the NAAQS.

Table 2. Maximum Ambient 1-Hour SO2 Concentrations in Dallas, Longview and Waco

Year	1-Hour SO2 in Dallas	1-Hour SO2 in Longview	1-Hour SO2 in Waco
2008	23 ppb (60 ug/m3)	96 ppb (251 ug/m3)	8 ppb (21 ug/m3)
2007	14 ppb (45 ug/m3)	168 ppb (440 ug/m3)	8 ppb (21 ug/m3)
2006	16 ppb (42 ug/m3)	111 ppb (291 ug/m3)	Not available

Source: US EPA AirData
http://iaspub.epa.gov/airsdata/adaqs.monvals?geotype=st&geocode=TX&geoinfo=st~TX~Texas&pol=SO2&year=2008&fld=monid&fld=siteid&fld=address&fld=city&fld=county&fld=stabbr&fld=regn&rpp=25

III. MODELING RESULTS

In June 2010, US EPA has announced a new 1-hour AAQS which is attained when the 3-year average of the 99th percentile of the daily maximum 1-hour concentrations does not exceed 75 ppb (or 196 ug/m3) at each monitor within an area. Subsequently, US EPA has issued in August 2010 a modeling guidance for using the AERMOD model with 5-year of meteorological data (USEPA, 2010b). According to the US EPA, the 4th highest maximum daily 1-hour concentrations averaged over five years should be used in the NAAQS comparison.

Five runs of the AERMOD model have been performed. SO2 modeling results are summarized in Appendix A and presented in Table 3. According to the US EPA recommendations, modeled impacts in Table 3 have been averaged over five years of modeled meteorological data. The AERMOD model has predicted a maximum 1-hour concentration of 544.7 ug/m3 and a 4th highest (99th percentile) concentration of 442.5 ug/m3 from the plant emissions alone. Both these concentrations largely exceed (more than a factor of 2) the NAAQS of 196 ug/m3: 178% by the maximum 1-hour concentration and 126% by the 4th highest concentration. With the background of 21 ug/m3, the maximum total 1-hour concentration is 565.7 ug/m3 which is 189% over the NAAQS, and the maximum total 4th highest concentration is 463.5 ug/m3 which is 136% above the 1-hour NAAQS of 196 ug/m3. A plot of the contour of 196 ug/m3 is shown in Figure 2. The area with concentrations exceeding 196 ug/m3, i.e. violating the 1-hr NAAQS, due to the plant emissions alone has a radius of about 10 miles around the plant. Located about 6 miles NE of the Martin Lake plant, Tatum lies on the contour line of 220 ug/m3.

Table 3. Predicted 1-Hour SO2 Impacts by the Luminant Martin Lake Plant (averaged over 5 years)

Pollutant	Project Conc. (ug/m3)	Background Conc. (ug/m3)	Total Conc. (ug/m3)	NAAQS (ug/m3)	NAAQS Exceed	Percent Over NAAQS
1-hour SO2 (max)	544.7	21	565.7	196	**YES**	**189%**
1-hour SO2 (4th highest)	442.5	21	463.5	196	**YES**	**136%**

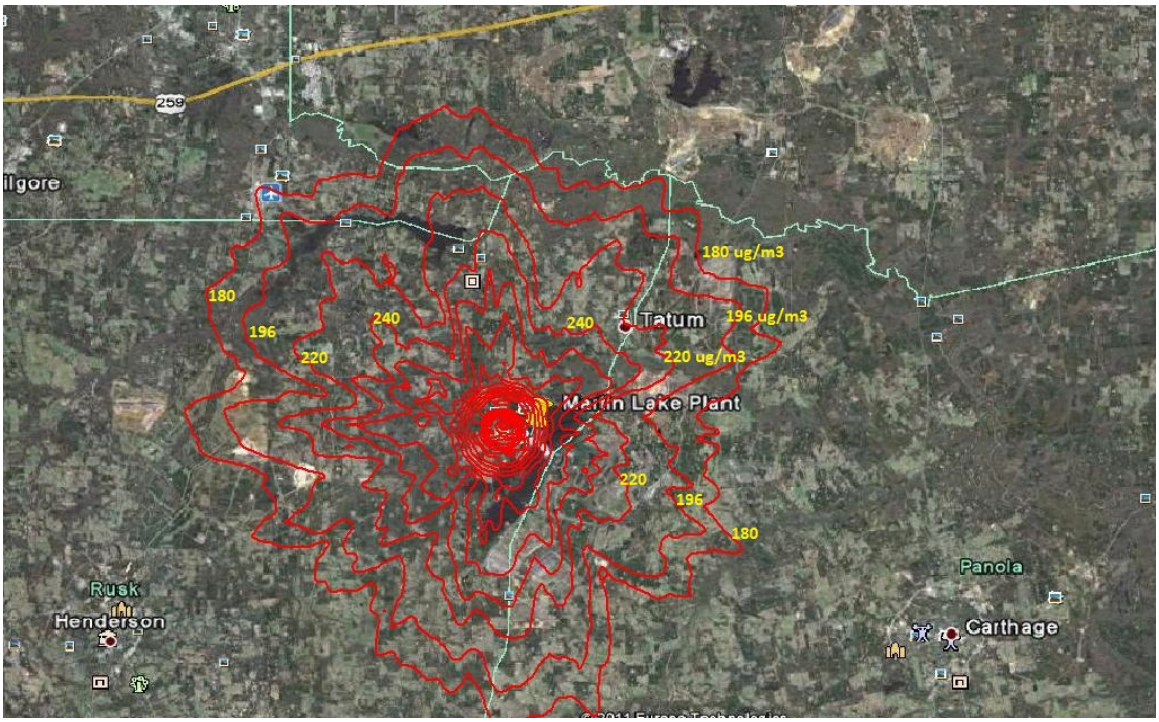

Figure 2. Area with 4th Highest 5-yr Averaged SO2 Concentrations Exceeding the 1-Hour NAAQS of 196 ug/m3 by Plant Emissions Alone

IV. CONCLUSIONS

Air quality impacts of SO2 emissions from the Luminant Martin Lake facility have been analyzed with the AERMOD model. Using permitted emissions, five years of meteorological data and the latest US EPA modeling guidance, the AERMOD model has predicted large exceedances (more than a factor of 2) of the recent 1-hour NAAQS of 196 ug/m3. The plant alone has also been shown to cause a large area with a radius of about 10 miles where the concentrations exceed this NAAQS. Thus, SO2 impacts from the Martin Lake coal plant are very adverse since its SO2 emissions alone cause large exceedances of the 1-hour NAAQS and a large area of NAAQS violations. It should be noted that the predicted NAAQS exceedances are understated since annual-averaged emissions that are less than maximum hourly emissions have been used in the modeling.

V. REFERENCES

AMI, 2010. Photochemical Modeling of Ozone, PM2.5 and Visibility Impacts in Arkansas from Texas Existing and Planned Coal-Fired Power Plants. Report prepared for Sierra Club by AMI Environmental, September 2010.

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Appendix A

Summary of AERMOD Modeling Results

**MODELOPTs: RegDFAULT CONC ELEV
MULTYR

*** THE SUMMARY OF MAXIMUM 1ST-HIGHEST MAX DAILY 1-HR RESULTS AVERAGED OVER 5 YEARS ***

** CONC OF SO2 IN MICROGRAMS/M**3 **

GROUP ID		AVERAGE CONC	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	NETWORK OF TYPE GRID-ID
ALL	1ST HIGHEST VALUE IS	544.66935	AT (349000.00, 3570300.00, 106.64, 106.64, 0.00)	DC
	2ND HIGHEST VALUE IS	544.40763	AT (349000.00, 3570200.00, 109.76, 109.76, 0.00)	DC
	3RD HIGHEST VALUE IS	544.07522	AT (348900.00, 3570200.00, 109.30, 109.30, 0.00)	DC
	4TH HIGHEST VALUE IS	543.92996	AT (348900.00, 3570300.00, 108.61, 134.45, 0.00)	DC
	5TH HIGHEST VALUE IS	543.80517	AT (349100.00, 3570300.00, 110.37, 110.37, 0.00)	DC
	6TH HIGHEST VALUE IS	543.80517	AT (349100.00, 3570300.00, 110.37, 110.37, 0.00)	DC
	7TH HIGHEST VALUE IS	543.80517	AT (349100.00, 3570300.00, 110.37, 110.37, 0.00)	DC
	8TH HIGHEST VALUE IS	543.80517	AT (349100.00, 3570300.00, 110.37, 110.37, 0.00)	DC
	9TH HIGHEST VALUE IS	543.35347	AT (349100.00, 3570200.00, 113.52, 113.52, 0.00)	DC
	10TH HIGHEST VALUE IS	543.08167	AT (348850.00, 3570300.00, 111.53, 134.77, 0.00)	DC

**MODELOPTs: RegDFAULT CONC ELEV
MULTYR

*** THE SUMMARY OF MAXIMUM 2ND-HIGHEST MAX DAILY 1-HR RESULTS AVERAGED OVER 5 YEARS ***

** CONC OF SO2 IN MICROGRAMS/M**3 **

GROUP ID		AVERAGE CONC	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	NETWORK OF TYPE GRID-ID
ALL	1ST HIGHEST VALUE IS	452.72731	AT (352000.00, 3571700.00, 93.24, 93.24, 0.00)	DC
	2ND HIGHEST VALUE IS	452.08342	AT (352100.00, 3571700.00, 94.34, 94.34, 0.00)	DC
	3RD HIGHEST VALUE IS	451.49987	AT (352000.00, 3571600.00, 93.24, 93.24, 0.00)	DC
	4TH HIGHEST VALUE IS	448.87098	AT (352100.00, 3571600.00, 93.24, 93.24, 0.00)	DC
	5TH HIGHEST VALUE IS	447.74698	AT (352000.00, 3571800.00, 93.24, 93.24, 0.00)	DC
	6TH HIGHEST VALUE IS	445.75721	AT (352200.00, 3571700.00, 94.45, 94.45, 0.00)	DC
	7TH HIGHEST VALUE IS	445.71810	AT (352100.00, 3571800.00, 93.96, 93.96, 0.00)	DC
	8TH HIGHEST VALUE IS	445.71810	AT (352100.00, 3571800.00, 93.96, 93.96, 0.00)	DC
	9TH HIGHEST VALUE IS	445.71810	AT (352100.00, 3571800.00, 93.96, 93.96, 0.00)	DC
	10TH HIGHEST VALUE IS	445.48663	AT (351700.00, 3571600.00, 93.24, 93.24, 0.00)	DC

**MODELOPTs: RegDFAULT CONC ELEV
MULTYR

*** THE SUMMARY OF MAXIMUM 4TH-HIGHEST MAX DAILY 1-HR RESULTS AVERAGED OVER 5 YEARS ***

** CONC OF SO2 IN MICROGRAMS/M**3 **

GROUP ID	AVERAGE CONC	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	NETWORK OF TYPE GRID-ID
ALL	1ST HIGHEST VALUE IS	442.52318 AT (352000.00, 3571700.00, 93.24, 93.24, 0.00)	DC
	2ND HIGHEST VALUE IS	441.27352 AT (352000.00, 3571600.00, 93.24, 93.24, 0.00)	DC
	3RD HIGHEST VALUE IS	439.57203 AT (352100.00, 3571700.00, 94.34, 94.34, 0.00)	DC
	4TH HIGHEST VALUE IS	439.18890 AT (352200.00, 3571700.00, 94.45, 94.45, 0.00)	DC
	5TH HIGHEST VALUE IS	437.19365 AT (352000.00, 3571800.00, 93.24, 93.24, 0.00)	DC
	6TH HIGHEST VALUE IS	436.30430 AT (351900.00, 3571700.00, 93.24, 93.24, 0.00)	DC
	7TH HIGHEST VALUE IS	436.27488 AT (352100.00, 3571800.00, 93.96, 93.96, 0.00)	DC
	8TH HIGHEST VALUE IS	436.27488 AT (352100.00, 3571800.00, 93.96, 93.96, 0.00)	DC
	9TH HIGHEST VALUE IS	436.27488 AT (352100.00, 3571800.00, 93.96, 93.96, 0.00)	DC
	10TH HIGHEST VALUE IS	435.91821 AT (351700.00, 3571700.00, 93.24, 93.24, 0.00)	DC

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

Exhibit 3

AERMOD Modeling of SO2 Impacts of the Luminant Monticello Coal Plant

Final Report

June 2011

Prepared for

Sierra Club
San Francisco, California

Prepared by
Mr. Khanh T. Tran
Principal

AMI Environmental
206 Black Eagle Ave
Henderson, NV 89002
Tel. (714)679-7363

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I. INTRODUCTION

This document presents the methodologies and results of an application of the AERMOD model to predict the air quality impacts of sulfur dioxide (SO2) emitted by the Monticello Steam Station. Monticello is a coal-fired power plant operated by Luminant in Titus County, Texas (Figure 1). It consists of three coal-fired boilers with a total electric generating capacity of 1,980 MW (gross). SO2 impacts predicted by the AERMOD model will be compared against the 1-hour SO2 ambient air quality standard (AAQS) of 75 ppb (or 196 ug/m3) which has been promulgated in June 2010 by the U.S. Environmental Protection Agency (EPA).

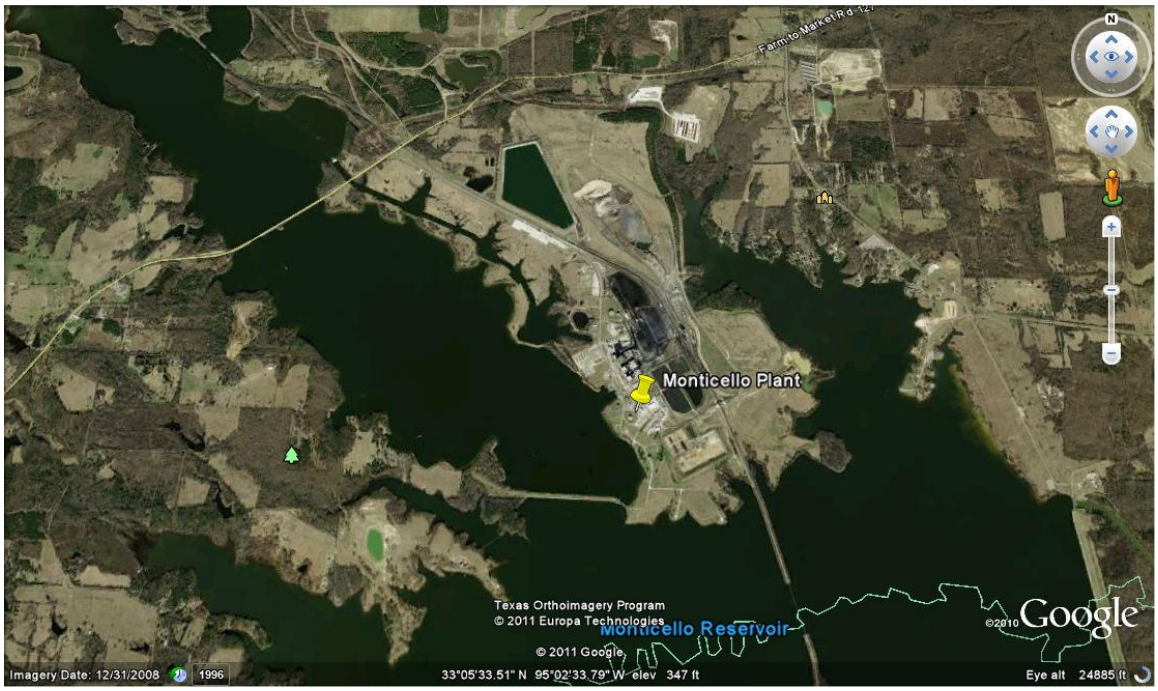

Figure 1. Luminant Monticello Coal Plant

II. MODELING METHODOLOGIES

This section documents the methodologies and assumptions used in the generation of modeling inputs such as source emissions, stack parameters, receptors and meteorological data.

A. Model Version

The version 11103 of the AERMOD model has been used in the modeling study. It is currently the latest version of the model that has been approved by the US Environmental Protection Agency (USEPA, 2011). It predicts the 1-hour SO2 concentrations that can be compared against the 1-hour AAQS which is attained when the 3-year average of the 99th

percentile of the daily maximum 1-hour concentrations does not exceed 75 ppb (or 196 ug/m3) at each monitor within an area (USEPA, 2010a; 2010b).

B. Source Emissions

Coal-fired boilers at the plant are major sources of SO2. The US EPA Clean Air Market database shows that, from 2003 to 2010, the year 2003 has the highest emission total of 82,440.6 tons per year (tpy).
http://camddataandmaps.epa.gov/gdm/index.cfm?fuseaction=emissions.wizard

Emissions by boiler are as follows: 30,515.4 tpy for Unit 1, 29,905.5 tpy for Unit 2 and 22,019.6 tpy for Unit 3. These emissions have been converted to grams per second (g/s) in Table 1 as required by the AERMOD model by assuming that the boilers operate continuously, i.e. 8760 hours per year. U.S. EPA's guidance on modeling 1-hour SO2 impacts and the Modeling Guideline require using the maximum 1-hour emission rate. There are no 1-hour limits in the permit for the coal-fired boilers. Therefore, the maximum theoretical emissions during a 1-hour period should be used. The emission rates used for this model are lower than the 1-hour maximum theoretical emissions and, hence, the modeled impacts are underestimated. The purpose of this modeling is to show that even when using emission rates lower than the 1-hour maximum, the facility causes violations of the NAAQS. Using the 1-hour maximum, as required by U.S. EPA and the Modeling Guidelines, should result in even higher modeled concentrations.

C. Stack Parameters

Stack parameters (stack height, diameter, temperature and exit velocity) for the boilers are shown in Table 1. They have been obtained from CENRAP point source data used in a previous photochemical modeling study (AMI, 2010).

Table 1. Plant SO2 Emissions & Stack Parameters

Stack	SO2 (g/s)	Height (m)	Diameter (m)	Temperature (K)	Velocity (m/s)
Stack 1	877.84027	121.9	6.55	453	32.5
Stack 2	860.29520	121.9	6.55	453	32.5
Stack 3	633.43479	140.2	7.77	354	26.5

D. Receptors

The AERMOD modeling uses a grid of discrete receptors that are located within a radius of 50 km around the plant. The receptor grid has varying resolutions: 50 m on the plant

boundaries, 100 m within the first 5 km, 250 m between 5 km and 10 km, 500 m between 10 km and 20 km, and 1000 m between 20 km and 50 km. Receptors located on-site have been removed from consideration and a total of 33,381 receptors have been used in the AERMOD modeling. The preprocessor AERMAP has been employed to obtain terrain elevations at these receptors using the NED data.

E. Meteorological Data

The AERMOD modeling uses a 5-year meteorological dataset that has been processed and recommended by TCEQ. It is comprised of surface observations at Shreveport (Station No. 13957) and upper-air data from the Longview site (Station No. 03951). Meteorological data processed by TCEQ for the years 1989 through 1993 have been used in the AERMOD modeling. The pre-processed data from TCEQ was used here to be consistent with TCEQ practices, even though the TCEQ practices are, themselves, inconsistent with best modeling practices.

F. Background Concentrations

For comparing against the SO2 1-hour NAAQS, background concentrations at a monitoring station are added to the concentrations predicted by the AERMOD model. Maximum 1-hour SO2 measurements in Dallas, Longview and Waco for 2006-2008 are shown in Table 2. The Longview measurements are the highest and exceed the NAAQS since Longview is the closest monitor to the Luminant plants and, hence, they are not suitable as background. The Waco measurements are much lower than those in Dallas; they are more representative as background since Waco is a much smaller city and less polluted than Dallas, and there is less chance for a "double counting" for an existing source such as the Luminant plant. Thus, a background of 21 ug/m3 is used in comparing modeled SO2 impacts against the NAAQS.

Table 2. Maximum Ambient 1-Hour SO2 Concentrations in Dallas, Longview and Waco

Year	1-Hour SO2 in Dallas	1-Hour SO2 in Longview	1-Hour SO2 in Waco
2008	23 ppb (60 ug/m3)	96 ppb (251 ug/m3)	8 ppb (21 ug/m3)
2007	14 ppb (45 ug/m3)	168 ppb (440 ug/m3)	8 ppb (21 ug/m3)
2006	16 ppb (42 ug/m3)	111 ppb (291 ug/m3)	Not available

Source: US EPA AirData
http://iaspub.epa.gov/airsdata/adaqs.monvals?geotype=st&geocode=TX&geoinfo=st~TX~Texas&pol=SO2&year=2008&fld=monid&fld=siteid&fld=address&fld=city&fld=county&fld=stabbr&fld=regn&rpp=25

III. MODELING RESULTS

In June 2010, US EPA has announced a new 1-hour AAQS which is attained when the 3-year average of the 99th percentile of the daily maximum 1-hour concentrations does not exceed 75 ppb (or 196 ug/m3) at each monitor within an area. Subsequently, US EPA has issued in August 2010 a modeling guidance for using the AERMOD model with 5-year of meteorological data (USEPA, 2010b). According to the US EPA, the 4th highest maximum daily 1-hour concentrations averaged over five years should be used in the NAAQS comparison.

Five runs of the AERMOD model have been performed. SO2 modeling results are summarized in Appendix A and presented in Table 3. According to the US EPA recommendations, modeled impacts in Table 3 have been averaged over five years of modeled meteorological data. The AERMOD model has predicted a maximum 1-hour concentration of 413.4 ug/m3 and a 4th highest (99th percentile) concentration of 336.3 ug/m3 from the plant emissions alone. Both these concentrations largely exceed the NAAQS of 196 ug/m3: 110% by the maximum 1-hour concentration and 72% by the 4th highest concentration. With the background of 21 ug/m3, the maximum total 1-hour concentration is 434.4 ug/m3 which is 122% over the NAAQS, and the maximum total 4th highest concentration is 357.3 ug/m3 which is 82% above the 1-hour NAAQS of 196 ug/m3. A plot of the contour of 196 ug/m3 is shown in Figure 2. The area with concentrations exceeding 196 ug/m3, i.e. violating the 1-hr NAAQS, due to the plant emissions alone has a radius of about 6 miles around the plant. Located about 6 miles NE of the Monticello plant, the center of Mt Pleasant lies outside the impact area. The town Rocky Mound, located about 5 miles to the south, is within the impact area since it is inside the contour line of 180 ug/m3 (with a background of 21 ug/m3, the total concentration of this contour line is 201 ug/m3).

Table 3. Predicted 1-Hour SO2 Impacts by the Luminant Monticello Plant (averaged over 5 years)

Pollutant	Project Conc. (ug/m3)	Background Conc. (ug/m3)	Total Conc. (ug/m3)	NAAQS (ug/m3)	NAAQS Exceed	Percent Over NAAQS
1-hour SO2 (max)	413.4	21	434.4	196	**YES**	**122%**
1-hour SO2 (4th highest)	336.3	21	357.3	196	**YES**	**82%**

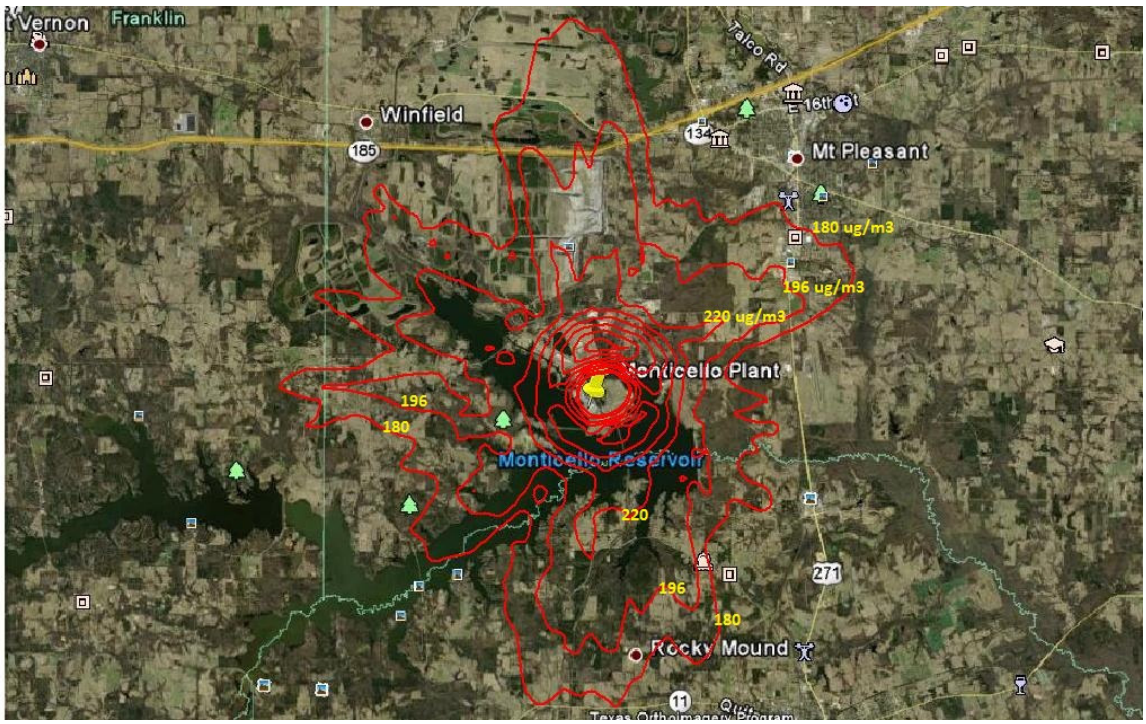

Figure 2. Area with 4th Highest 5-yr Averaged SO2 Concentrations Exceeding the 1-Hour NAAQS of 196 ug/m3 by Plant Emissions Alone

IV. CONCLUSIONS

Air quality impacts of SO2 emissions from the Luminant Monticello facility have been analyzed with the AERMOD model. Using 2003 actual emissions, five years of meteorological data and the latest US EPA modeling guidance, the AERMOD model has predicted large exceedances of the recent 1-hour NAAQS of 196 ug/m3. The plant alone has also been shown to cause a large area with a radius of about 6 miles where the concentrations exceed this NAAQS. Thus, SO2 impacts from the Monticello coal plant are very adverse since its SO2 emissions alone cause large exceedances of the 1-hour NAAQS and a large area of NAAQS violations. It should be noted that the predicted NAAQS exceedances are understated since annual-averaged emissions that are less than maximum hourly emissions have been used in the modeling.

V. REFERENCES

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U.S. EPA, 2011. Addendum to User's Guide of the AMS/EPA Regulatory Model AERMOD version 11103, March 2011. Available at: http://www.epa.gov/ttn/scram/models/aermod/aermod_userguide.zip

U.S. EPA, 2010a. *Guidance Concerning the Implementation of the 1-hour SO2 NAAQS for the Prevention of Significant Deterioration Program*. Memorandum issued on August 23, 2010 from Stephen D. Page, Director of OAQPS. Available at http://www.epa.gov/region07/air/nsr/nsrmemos/appwso2.pdf

U.S. EPA, 2010b. *Applicability of Appendix W Modeling Guidance for the 1-hour SO2 NAAQS*. Memorandum issued on August 23, 2010 from Tyler Fox, Leader of Air Quality Modeling Group, OAQPS. Available at http://www.epa.gov/region07/air/nsr/nsrmemos/appwso2.pdf
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Appendix A

Summary of AERMOD Modeling Results

**MODELOPTs: RegDFAULT CONC ELEV
MULTYR

*** THE SUMMARY OF MAXIMUM 1ST-HIGHEST MAX DAILY 1-HR RESULTS AVERAGED
OVER 5 YEARS ***

** CONC OF SO2 IN MICROGRAMS/M**3 **

GROUP ID	AVERAGE CONC	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	NETWORK OF TYPE GRID-ID
ALL	1ST HIGHEST VALUE IS	413.35919 AT (306550.00, 3663200.00, 119.05, 119.05, 0.00)	DC
	2ND HIGHEST VALUE IS	413.29967 AT (306600.00, 3663200.00, 119.25, 119.25, 0.00)	DC
	3RD HIGHEST VALUE IS	413.22216 AT (306500.00, 3663200.00, 119.09, 119.09, 0.00)	DC
	4TH HIGHEST VALUE IS	412.49633 AT (306400.00, 3663200.00, 118.73, 118.73, 0.00)	DC
	5TH HIGHEST VALUE IS	412.47987 AT (306700.00, 3663200.00, 121.00, 121.00, 0.00)	DC
	6TH HIGHEST VALUE IS	411.34111 AT (306300.00, 3663200.00, 116.75, 116.75, 0.00)	DC
	7TH HIGHEST VALUE IS	411.34111 AT (306300.00, 3663200.00, 116.75, 116.75, 0.00)	DC
	8TH HIGHEST VALUE IS	411.34111 AT (306300.00, 3663200.00, 116.75, 116.75, 0.00)	DC
	9TH HIGHEST VALUE IS	410.99235 AT (306800.00, 3663200.00, 120.72, 120.72, 0.00)	DC
	10TH HIGHEST VALUE IS	410.99235 AT (306800.00, 3663200.00, 120.72, 120.72, 0.00)	DC

*** THE SUMMARY OF MAXIMUM 2ND-HIGHEST MAX DAILY 1-HR RESULTS AVERAGED OVER 5 YEARS ***

** CONC OF SO2 IN MICROGRAMS/M**3 **

GROUP ID	AVERAGE CONC	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	NETWORK OF TYPE GRID-ID
ALL	1ST HIGHEST VALUE IS 352.20257	AT (309300.00, 3664600.00, 115.54, 115.54, 0.00)	DC
	2ND HIGHEST VALUE IS 348.35844	AT (309300.00, 3664500.00, 114.83, 114.83, 0.00)	DC
	3RD HIGHEST VALUE IS 347.66987	AT (309400.00, 3664600.00, 111.00, 111.00, 0.00)	DC
	4TH HIGHEST VALUE IS 347.16965	AT (309400.00, 3664500.00, 113.35, 113.35, 0.00)	DC
	5TH HIGHEST VALUE IS 345.24620	AT (309300.00, 3664700.00, 116.22, 116.22, 0.00)	DC
	6TH HIGHEST VALUE IS 345.24620	AT (309300.00, 3664700.00, 116.22, 116.22, 0.00)	DC
	7TH HIGHEST VALUE IS 345.24620	AT (309300.00, 3664700.00, 116.22, 116.22, 0.00)	DC
	8TH HIGHEST VALUE IS 345.03814	AT (309900.00, 3664700.00, 105.99, 105.99, 0.00)	DC
	9TH HIGHEST VALUE IS 343.80683	AT (309300.00, 3664450.00, 114.63, 114.63, 0.00)	DC
	10TH HIGHEST VALUE IS 342.41828	AT (309500.00, 3664600.00, 103.61, 103.61, 0.00)	DC

**MODELOPTs: RegDFAULT CONC ELEV
MULTYR

*** THE SUMMARY OF MAXIMUM 4TH-HIGHEST MAX DAILY 1-HR RESULTS AVERAGED OVER 5 YEARS ***

** CONC OF SO2 IN MICROGRAMS/M**3 **

GROUP ID	AVERAGE CONC	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	NETWORK OF TYPE GRID-ID
ALL	1ST HIGHEST VALUE IS 336.26764	AT (309300.00, 3664600.00, 115.54, 115.54, 0.00)	DC
	2ND HIGHEST VALUE IS 336.16244	AT (309300.00, 3664500.00, 114.83, 114.83, 0.00)	DC
	3RD HIGHEST VALUE IS 333.51999	AT (309900.00, 3664700.00, 105.99, 105.99, 0.00)	DC
	4TH HIGHEST VALUE IS 333.28766	AT (309800.00, 3664800.00, 106.68, 106.68, 0.00)	DC
	5TH HIGHEST VALUE IS 332.32242	AT (309300.00, 3664700.00, 116.22, 116.22, 0.00)	DC
	6TH HIGHEST VALUE IS 332.32242	AT (309300.00, 3664700.00, 116.22, 116.22, 0.00)	DC
	7TH HIGHEST VALUE IS 332.32242	AT (309300.00, 3664700.00, 116.22, 116.22, 0.00)	DC
	8TH HIGHEST VALUE IS 332.10862	AT (309800.00, 3664700.00, 102.61, 102.61, 0.00)	DC
	9TH HIGHEST VALUE IS 332.10862	AT (309800.00, 3664700.00, 102.61, 102.61, 0.00)	DC
	10TH HIGHEST VALUE IS 332.10862	AT (309800.00, 3664700.00, 102.61, 102.61, 0.00)	DC

Exhibit 4

ORAL ARGUMENT NOT YET SCHEDULED

UNITED STATES COURT OF APPEALS
FOR THE DISTRICT OF COLUMBIA CIRCUIT

NATIONAL ENVIRONMENTAL DEVELOPMENT ASSOCIATION'S CLEAN AIR PROJECT, Petitioner, v. UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, Respondent.	Docket No. 10-1252 (and consolidated cases)

RESPONDENT'S OPPOSITION TO MOTION OF THE STATE OF NORTH DAKOTA FOR A STAY OF EPA'S 1-HOUR SULFUR DIOXIDE AMBIENT STANDARD RULE

Respondent United States Environmental Protection Agency ("EPA") submits this Opposition to the Motion of the State of North Dakota for a Stay of EPA's 1-Hour Sulfur Dioxide Ambient Standard Rule ("Stay Motion"). In its Stay Motion, North Dakota seeks a stay of the rule in its entirety or, in the alternative, a stay of the statutory directive that States submit any recommendations for attainment/nonattainment designations no later than June 3, 2011. The motion should be denied because North Dakota has not satisfied the stringent requirements

for obtaining a stay of agency action. The motion fails to address any of the elements for obtaining a stay with regard to any of the promulgated elements of the rule, i.e., the revised sulfur dioxide ("SO_2") standard itself and the promulgated revisions to the SO_2 monitoring network. Rather, the motion is addressed solely to an advisory discussion in the final rule preamble regarding EPA's anticipated approach to implementing the revised NAAQS. Thus, the motion provides no basis to stay the rule as a whole.

The motion must also be denied with regard to the alternative relief requested. First, North Dakota has not demonstrated a substantial likelihood of success on the merits. It challenges only advisory statements in the final rule preamble concerning EPA's contemplated approach for making initial attainment designations by the June 2012 statutory deadline, an approach the Agency will be addressing in future actions. As the preamble makes clear, EPA has taken no final action nor promulgated any regulatory requirements regarding designations, and, in particular, has taken no final action on its approach to making attainment determinations. To the contrary, the preamble specifically preserves EPA's ability to make those decisions solely on the basis of monitoring data. 75 Fed. Reg. 35,520, 35,552 n.22 (June 22, 2010). Because these preamble statements are not final agency action, the Court lacks jurisdiction to review them, and North Dakota has no substantial likelihood of prevailing on the merits.

Moreover, even if the challenged preamble statements could be read as final agency action, the Agency has historically relied on modeling to make designations for sulfur dioxide. To the extent the proposal preamble reflected a possible change to that practice, it clearly left open the possibility that the Agency would choose not to adopt the proposed change. Interested parties should have known that EPA might retain its past practice, and had ample opportunity to comment on that possibility. Thus, North Dakota cannot demonstrate a likelihood of success on its claim that it lacked an opportunity to comment on the approach to initial designations discussed in the preamble.

Second, North Dakota cannot demonstrate that it will suffer irreparable harm from the statutory directive that it submit designation recommendations to EPA by June 2011. North Dakota claims harm from an alleged bar to the use of monitoring data as the sole basis for its designation recommendations. But, nothing in the SO_2 Rule prevents North Dakota from basing its recommendations solely on monitoring data, and thus the Rule does not cause the harm North Dakota claims. Id. Furthermore, designation recommendations have no independent legal effect. An area is not designated until EPA promulgates the designation, which EPA is required to do by June 2012[1/] (a requirement that would not be affected by a stay of

[1/] The date can be extended to June 2013 if EPA lacks sufficient information to act in 2012. 42 U.S.C. § 7407(d)(1)(B)(i).

the 2011 recommendation submission date). Moreover, EPA is not bound by the State's recommendations and must promulgate a designation for an area even if the State submits no recommendation at all.

Finally, a stay of the SO_2 Rule will cause harm to other parties and is contrary to the public interest. The rule under review revises the primary ambient air quality standard for sulfur dioxide based on findings by EPA that the prior standards were not requisite to protect human health with an adequate margin of safety. A stay of the rule's regulatory provisions promulgating the new standard would delay implementation of the measures needed to achieve attainment with the new standard, including requirements associated with the permitting of new and modified major stationary sources which became effective on the effective date of the standard. A stay of the Rule would thus prolong the time during which existing air quality causes adverse impacts to public health. A stay of the 2011 deadline for States to submit recommendations to EPA would not alter EPA's obligation to promulgate designations by 2012, but would increase the burden on EPA to develop the designations.

BACKGROUND

The consolidated petitions in this case seek review of an EPA regulation revising the primary National Ambient Air Quality Standards ("NAAQS") and associated regulatory requirements for oxides of sulfur as measured by SO_2

pursuant to section 109 of the Clean Air Act, 42 U.S.C. § 7409. 75 Fed. Reg. 35,520 (June 22, 2010) ("SO_2 Rule"). Those regulatory requirements took effect on August 23, 2010, and are currently being implemented. The NAAQS provisions of the Clean Air Act establish a comprehensive scheme to protect public health and welfare from ubiquitous air pollutants. 42 U.S.C. § 7409. Primary standards must be set at levels that, in the judgment of the Administrator, are requisite to protect public health with an adequate margin of safety. Id. § 7409(b)(1). The Act requires periodic review of the NAAQS. Id. § 7409(d). See generally American Lung Ass'n v. EPA, 134 F.3d 388, 388-89 (D.C. Cir. 1998).

EPA first promulgated a primary NAAQS for sulfur dioxide in 1971. 36 Fed. Reg. 8187 (April 30, 1971). In May 1996, after a lengthy review, EPA announced a final decision not to revise the NAAQS. 61 Fed. Reg. 25,566 (May 22, 1996). Petitions for review of that decision were filed in this Court, and the Court held that EPA had failed to adequately explain the basis for its conclusion that short-term SO_2 exposures to asthmatics do not constitute a public health problem. American Lung Ass'n v. EPA, 134 F.3d 388. In the rule under review here EPA has addressed that issue by replacing the prior 24-hour and annual primary standards with a new 1-hour primary standard. The new standard is now in effect, and is being implemented in EPA's prevention of significant deterioration

permitting program for new and modified major stationary sources. See 57 Fed. Reg. at 35,580/1.

Within one year after promulgation of a new or revised NAAQS (or sooner if required by EPA) States are directed to submit to EPA a list of all areas that the State recommends be designated by EPA as attainment, nonattainment, or unclassifiable for the new or revised NAAQS. 42 U.S.C. § 7407(d)(1)(A). In the case of the revised SO_2 standards, such designations are due by June 3, 2011, one year after EPA promulgated the revised NAAQS by signing and publicly disseminating the notice of final rulemaking. Within two years of promulgation (or three years if EPA lacks sufficient information), the Act requires EPA to promulgate designations. Id. § 7407(d)(1)(B)(i). EPA may modify any submitted list of designations provided by a State if it gives the State 120 days notice, and must promulgate designations as EPA deems appropriate for any area for which no designation recommendation is provided by a State. Id. § 7407(d)(1)(B)(ii). Thus, EPA's statutory obligation to promulgate designations is independent of whether a State submits recommendations.

The SO_2 Rule, like its predecessors, includes regulatory provisions that establish the NAAQS itself, as well as regulations governing the installation and use of monitors utilized to measure ambient concentrations of SO_2. See, e.g., 40 C.F.R. §§ 50.4(e); 50.14(c)(2)(vi); 50.17; part 50 Appendices A-1 and T; part 53,

and part 58. Historically, to determine if an area is in attainment with the SO_2 NAAQS, EPA has used a combination of results from regulation-required monitors and air quality modeling, even though in the NAAQS regulations themselves EPA has not promulgated requirements that States or sources conduct modeling. Instead, at 40 C.F.R. part 51, Appendix W, EPA has promulgated guidelines on air quality models, to be used for regulatory purposes such as State Implementation Plan ("SIP") development and new source review and prevention-of-significant-deterioration permitting actions. See, e.g., 40 C.F.R. part 51, Appendix W, § 1.0. In the current rule EPA has revised the regulatory requirements for the minimum number and placement of monitors and adopted a new reference method for detecting ambient SO_2, but did not promulgate or revise any requirements regarding modeling.

In the preamble to the proposed SO_2 Rule, EPA discussed the revisions to the monitoring network proposed to account for the revision of the standard, i.e., the change from the 24-hour and annual standards to a single one-hour standard. 74 Fed. Reg. 64,810, 64,846-55 (Dec. 8, 2009). In the proposal EPA did not discuss its historic and current uses of modeling in implementing the then-effective annual and 24-hour SO_2 standards. In public comments on the proposal, numerous parties suggested that the proposed monitoring network was both inadequate in scope and overly burdensome to administer, and some commenters suggested that

modeling should be used to relieve the administrative burden that a more extensive monitoring regime would otherwise impose. 75 Fed. Reg. at 35,551/1.

In the preamble to the final rule, EPA explained in response to comments that the Agency anticipated in subsequent actions to continue its historic practice of relying on both modeling and monitoring for determining whether an area is in attainment with the SO_2 NAAQS and adopted rules for a smaller monitoring network than initially proposed. 75 Fed. Reg. at 35,550-51. However, the preamble makes clear that, except for the promulgated requirements relating to the scope of the monitoring network and detection method, the Agency is still developing its policy for such future actions as designations and SIP approvals/disapprovals and intends to issue further guidance in the future through a notice-and-comment process. Id. The preamble also states EPA's expectation that any decisions about whether to base an attainment designation or determination on monitoring alone, without reliance on modeling, would be made on a case-by-case basis. Id. at 35,552 n.22.

Following promulgation of the rule, numerous parties filed petitions for review with this Court, and each of those parties also submitted to EPA administrative petitions for reconsideration of the rule under section 307(d)(7)(B) of the Act, 42 U.S.C. § 7607(d)(7)(B). The petitions for reconsideration objected to EPA's final rulemaking preamble discussion explaining EPA's anticipated

approaches in future designations and SIP actions. In addition, each requested that EPA administratively stay the final rule pending such reconsideration. EPA is currently evaluating the petitions for reconsideration and has not yet formally responded to them, but, as the Agency stated in its pending motion filed with the Court seeking a short-term abeyance of the instant litigation, EPA intends to provide initial responses to the petitions for reconsideration, including the requests for a stay of the rule, by January 8, 2011.

STANDARD OF REVIEW

A stay is a disfavored remedy. "On a motion for stay, it is the movant's obligation to justify the court's exercise of such an extraordinary remedy." Cuomo v. United States Nuclear Regulatory Comm'n, 772 F.2d 972, 978 (D.C. Cir. 1985). The factors for determining whether a stay is warranted are: (1) whether the movant has demonstrated a substantial likelihood that it will prevail on the merits; (2) the prospect of irreparable injury to the moving party if relief is withheld; (3) the possibility of harm to other parties if relief is granted; and (4) the public interest. Nken v. Holder, 129 S. Ct. 1749, 1761 (2009). These four prongs of the stay standard are to be applied stringently. Aberdeen & Rockfish R.R. Co. v. Students Challenging Regulatory Agency Procedures, 409 U.S. 1207, 1218 (1972). "A stay is not a matter of right, even if irreparable injury might otherwise result." Nken, 129 S. Ct. at 1760 (citation omitted).

To demonstrate a substantial likelihood of success on the merits, a petitioner must show that it is likely to persuade this Court that EPA's action is "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law." 42 U.S.C. § 7607(d)(9)(A). This narrow, deferential standard prohibits a court from substituting its judgment for that of the agency and presumes the validity of agency actions. Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43-44 (1983). Judicial deference also typically extends to an agency's interpretation of a statute it administers, United States v. Mead Corp., 533 U.S. 218, 227-31 (2001); Chevron, U.S.A., Inc. v. Natural Res. Def. Council, Inc., 467 U.S. 837, 842-45 (1984), and of its own regulations. Auer v. Robbins, 519 U.S. 452, 457 (1997).

To establish irreparable harm, a petitioner must demonstrate an injury that is "both certain and great; it must be actual and not theoretical." Wisconsin Gas Co. v. FERC, 758 F.2d 669, 674 (D.C. Cir. 1985). A movant for injunctive relief must show that "[t]he injury complained of [is] of such imminence that there is a clear and present need for equitable relief to prevent irreparable harm." Id. (citation omitted). The movant must "substantiate the claim that irreparable injury is 'likely' to occur," and "show that the alleged harm will directly result from the action which the movant seeks to enjoin." Id; see also Nken, 129 S. Ct. at 1761 (more than a "mere possibility" of success on the merits is required, and the standard for

irreparable harm is more than showing the "possibility" of harm); Winter v. NRDC, 129 S. Ct. 365, 375-76 (2008) (holding that in a preliminary injunction case, plaintiffs must demonstrate that irreparable injury is "likely," not just "possible").

ARGUMENT

I. THE MOTION IS PREMATURE

Fed. R. App. Proc. 18(a) requires that a petitioner must ordinarily move first before the agency for a stay of its order before seeking a stay in the Court of Appeals, or else show that moving before the agency would be impracticable. In this case, although North Dakota (and other Petitioners) have sought a stay of the SO_2 Rule from EPA, EPA has not yet acted on that request, and North Dakota has not demonstrated that it is impracticable to wait for EPA to act on those requests before seeking a stay from this Court. As described in EPA's Motion to Hold Case in Abeyance, EPA intends to act on the pending administrative petitions for reconsideration by January 8, 2011. At that time EPA will also act on the included requests for a stay, as the Agency previously informed Petitioners. Implicit in Rule 18's requirements is that a petitioner must receive a response to its request for a stay from the agency before seeking a judicial stay. North Dakota has neither waited for that response, nor demonstrated why doing so would be impracticable for submitting a recommendation that is not due until June 2011. Because North

Dakota's request for a stay is still pending before the Agency and the Agency has committed to responding in a timely fashion, North Dakota's motion for stay in this Court is premature and should be denied.

II. NORTH DAKOTA HAS PRESENTED NO BASIS FOR STAYING THE ENTIRE SO_2 RULE

In its motion, North Dakota asks the Court to stay the SO_2 Rule in its entirety (including the standard itself and the associated monitoring provisions) or, in the alternative, to stay the June 3, 2011 statutory deadline by which States may submit recommended designations to EPA. North Dakota, however, identifies no grounds for staying the entire rule. With regard to the merits, North Dakota advances no objection to the promulgated standard or the promulgated requirements related to monitoring. Nor does it present any claim that it will suffer irreparable harm from either the revised standard or the revised requirements related to monitoring. In fact, North Dakota does not address any aspect of the Rule except the non-binding preamble discussion concerning how EPA expects to use modeling in future area designations and SIP actions. Thus, North Dakota has not met the stringent standard for obtaining a stay of the Rule as a whole, and that request must be denied.

III. NORTH DAKOTA CANNOT DEMONSTRATE A SUBSTANTIAL LIKELIHOOD OF SUCCESS ON THE MERITS

The sole claim on the merits presented in the Stay Motion is that the preamble of the final rule allegedly requires the use of air quality modeling for determining whether an area is in attainment with the revised SO_2 NAAQS, that this approach differs from the approach discussed in the preamble to the proposal, and that the public did not have an opportunity to comment on the approach discussed in the final rule. This claim lacks merit for two reasons.

First, North Dakota is not challenging any provision of the promulgated regulations, but rather a discussion in the preamble, i.e., 75 Fed. Reg. at 35,550-54. Although some preamble discussions may constitute final agency action, it is clear that this particular discussion does not. Rather, the challenged discussion regarding the potential use of modeling is, at most, non-binding guidance that the Court lacks jurisdiction to review. The preamble specifically states:

> In many respects, both the overview discussion below and the subsequent more detailed discussions explain our **expected and intended future action** in implementing the 1-hour NAAQS – in other words, they constitute guidance, rather than final agency action – and it is possible that our approaches may continue to evolve as we, States, and other stakeholders proceed with actual implementation. In other respects, such as in the final regulatory provisions regarding the promulgated monitoring network, we are explaining EPA's final conclusions regarding what is required by this rule. We expect to issue further guidance regarding implementation . . . . EPA intends to solicit public comment prior to finalizing this guidance.

Id. at 35,550/3 (emphasis added).

Moreover, nowhere in the preamble (much less in any promulgated regulation) does EPA state that modeling must be used for designating areas as attainment, nonattainment or unclassifiable. Thus, the alleged requirement North Dakota seeks to challenge does not exist. Rather, the preamble states: "We expect that EPA's final area designation decisions in 2012 would be based principally on data reported from SO_2 monitors currently in place today, and any refined modeling the State chooses to conduct specifically for initial designations." Id. at 35,552/1 (emphasis added). The preamble then goes on to say "EPA anticipates making the determination of when monitoring alone is 'appropriate' for a specific area on a case-by-case basis, informed by the area's factual record, as part of the designation process." Id. at 35,552 n.22.

In short, EPA has simply not taken the final agency action alleged by North Dakota and there is no such action for the Court to review or to stay. To the contrary, the preamble states that EPA believes that its historic approach to SO_2 designations continues to appear to be appropriate, while at the same time giving States the flexibility to recommend the appropriate mix of data to rely on, including the possibility of relying entirely on monitoring if supportable.

Second, even if the preamble could be construed as final agency action, North Dakota's claim that the public lacked notice of the possibility that EPA might continue to use modeling when making designations is without merit. As

EPA has frequently explained, because of the nature of SO_2 pollution, EPA has historically relied on air quality modeling (in addition to any required monitoring) to determine whether an area is violating the SO_2 NAAQS. 75 Fed. Reg. at 35,551/2-3, 35,559/2-3; see SO_2 Guideline Document (available at www.epa.gov/ttn/oarpg/t1/memoranda/so2_guide_092109.pdf) at 2-5 ("For SO_2 attainment demonstrations, monitoring data alone will generally not be adequate.") and at 2-1 ("Attainment determinations for SO_2 will generally not rely on ambient monitoring data alone, but instead will be supported by an acceptable modeling analysis which quantifies that the SIP strategy is sound and that enforceable emission limits are responsible for attainment.") As a State responsible for recommending whether an area should be designated attainment or nonattainment, North Dakota certainly should have been aware of the Agency's historical approach.

Thus, to the extent the approach to designations described in the proposal preamble was limited to monitoring, in de-emphasizing the role modeling has long played in SO_2 implementation it represented a departure from the Agency's prior practice. In such circumstances, affected parties are surely aware that not adopting the proposed change is a possibility. American Iron & Steel Inst. v. EPA, 886 F.2d 390, 400 (D.C. Cir. 1989) ("One logical outgrowth of a proposal is surely, as EPA says, to refrain from taking the proposed step.") In fact, the Agency did receive

comments urging the Agency to retain its historic approach. 75 Fed. Reg. at 35,551/1. Accordingly, there is no basis for North Dakota's claim that it lacked notice that the Agency might choose not to adopt a more monitoring-focused approach as discussed in the proposal preamble, but instead to expect to retain its historic approach in which modeling is generally, though not always, utilized.

IV. NORTH DAKOTA CANNOT DEMONSTRATE AN IMMINENT THREAT OF IRREPARABLE HARM

There is no merit to North Dakota's claim that it will suffer irreparable harm if the SO_2 Rule or the statutory deadline to submit designation recommendations is not stayed. North Dakota first claims that it will be harmed because the SO_2 Rule "casts a cloud" over its ability to use its monitoring data and "deprive[s] the state of its right to manage its air resources." Stay Motion at 17. As demonstrated above, there is no factual basis for this claim because neither the SO_2 Rule itself nor the preamble discussion prohibits North Dakota from basing its recommended designations on its monitoring data alone. 75 Fed. Reg. at 35,552 n.22. Nor does anything in the Rule or preamble prohibit EPA from basing its designations for North Dakota on monitoring data alone if EPA determines that the monitoring data is sufficient to determine North Dakota's attainment status.[2/]

[2/] If EPA were to determine that the monitoring data was not sufficient to determine an area's attainment status, and thus that the area would have to be categorized as unclassifiable until sufficient monitoring data or modeling results were available,

(continued...)

Moreover, the State's recommended designations, which are due June 3, 2011, have no legal effect on sources. Not until EPA promulgates the actual designations, which the statute requires it do by June 3, 2012 (or 2013 if extended), will there be a designation in place that has legal effect. Thus, North Dakota can suffer no actual harm from submitting its recommended designations.

North Dakota's second claim of harm, that the use of modeling will result in more areas being designated as nonattainment because modeling is more "conservative," Stay Motion at 17-18, is purely speculative. North Dakota presents no evidence at all to support its assertion that modeling will necessarily result in areas of the State being designated as nonattainment inappropriately, and thus there is no basis on which the Court could find that North Dakota could suffer injury.[3/] Furthermore, as the preamble states, the modeling guidance that EPA intends to

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[2/](...continued)
that designation would be result of the insufficiencies in the data, not of anything that EPA has done in the Rule.

[3/] While it might seem at first blush as if actual monitoring should be inherently more accurate than modeling, this is not necessarily the case. In fact, "[i]n the past, EPA used a combination of modeling and monitoring for SO_2 during permitting, designations and re-designations in recognition of the fact that a single monitoring site is generally not adequate to fully characterize ambient concentrations, including the maximum ground level concentrations, which exist around stationary SO_2 sources." 75 Fed. Reg. at 35,559. This is especially important because "[t]he 1-hour NAAQS is intended to provide protection against short-term (5 minute to 24 hour) peak exposures". Id. See American Lung Ass'n v. EPA, 134 F. 3d at 392-93 (remanding EPA's determination that such exposures do not constitute a threat to public health) and 75 Fed. Reg. at 35,536 (5-10 minute SO_2 exposures can result in adverse health effects to asthmatics).

provide States for use in determining attainment of the revised SO_2 standard is still under development. 75 Fed. Reg. at 35,552-54. Thus, any statements about how the use of modeling affects the designation process for the revised SO_2 standard are necessarily speculative.

Finally, the actual designations will be made by EPA, an action that EPA expects to take by June 3, 2012. States have an opportunity under the Act to provide input on the designations before they are made, and EPA's designations are subject to judicial review. Any claim that modeling is inappropriately used by EPA for a particular designation can and should be raised in that process.

V. A STAY WOULD HARM THIRD PARTIES AND IS CONTRARY TO THE PUBLIC INTEREST

A stay of the SO_2 Rule, whether in whole or in part, would cause harm to third parties and is contrary to the public interest because it would delay achievement of the public health benefits of the revised standard, which is now in effect and being used for the Act's New Source Review and Prevention of Significant Deterioration permitting programs. After an exhaustive review of the existing data, EPA determined that the prior SO_2 standard was not adequately protective of human health and required revision, a conclusion amply supported by the record. EPA's statutorily mandated science review committee, the Clean Air Scientific Advisory Committee, recommended unanimously that the current standard be revised because the current standards are not adequate to protect the

public health, and that EPA should adopt a one-hour standard in their place. 75 Fed. Reg. at 35,530, 35,538. Short-term exposure to SO_2 results in adverse respiratory effects such as bronchoconstriction (narrowing of the airways) and increased asthma symptoms. Id. at 35,525-26. Studies also show an association between short-term SO_2 exposure and increased emergency department visits and hospital admissions for respiratory illness, particularly among children, the elderly, and asthmatics. Id. at 35,547.

Importantly, the data demonstrate that these adverse health effects can occur at concentration levels that are allowed by the prior SO_2 NAAQS. Id. at 35,535-36. Thus, implementation of the revised standard is necessary to reduce the adverse health effects associated with these exposures. North Dakota's motion does not address this issue at all, and thus fails to address two of the elements needed for a stay of agency action.

A stay of the SO_2 Rule, either in whole or in part, is likely to delay attainment of the revised standard. A delay of the SO_2 Rule as a whole will delay States' implementation of the control measures needed to achieve compliance with the revised standard and the requirement for new or modified major stationary sources to implement necessary controls pursuant to the Clean Air Act's New Source Review and Prevention of Significant Deterioration permit requirements.

A stay of the date for States to recommend designations for areas as attainment, nonattainment, or unclassifiable will not delay EPA's independent obligation to promulgate designations. However, it could complicate the process of establishing area designations and impose additional burdens on EPA if States do not submit designation recommendations because EPA would not have the States' recommended designations as a starting point. Thus, a stay of the SO_2 Rule will harm third parties and be adverse to the public interest by delaying the public health benefits of the revised standard.

CONCLUSION

For the reasons stated above, North Dakota's motion for a stay of the SO_2 Rule should be denied.

Respectfully submitted,

IGNACIA S. MORENO
Assistant Attorney General

/S/ Norman L. Rave, Jr.
NORMAN L. RAVE, JR.
Environmental Defense Section
Environment & Natural Resources Division
United States Department of Justice
P.O. Box 23986
Washington, D.C. 20026-3986
(202) 616-7568
Counsel for Respondent

Of Counsel:

STEVEN SILVERMAN
MICHAEL THRIFT
Office of General Counsel
U. S. Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington, DC 20460

November 8, 2010

CERTIFICATE OF SERVICE

I hereby certify that on this 8th day of November, 2010, I caused a copy of the foregoing document to be served by the Court's CM/ECF system on:

Andrea Bear Field
Lucinda Minton Langworthy
Hunton & Williams LLP
1900 K Street, N.W.
Washington, DC 20006

Leslie Sue Ritts
Ritts Law Group, PLLC
620 Fort Williams Parkway
Carriage House
Alexandria, Virginia 22304

Donald Trahan
State of Louisiana Dept. of Environmental Quality
P.O. Box 82282
Legal Affairs Division
Baton Rouge, Louisiana 70884-2282

David S. Baron
Seth Lee Johnson
Earthjustice Legal Defense Fund
1625 Massachusetts Ave., NW
Suite 702
Washington, DC 20036-2212

Roxanne Giedd
Office of the Attorney General,
State of South Dakota
1302 East Highway 14
Suite 1
Pierre, South Dakota 57501-8501

Nhu Q. Nguyen
Office of the Attorney General,
State of Nevada
100 North Carson Street
Carson, Nevada 89701-4717

Sandra Patricia Franco
Robert N. Steinwurtzel
Bingham McCutchen LLP
2020 K Street, NW
Washington, DC 20006-1806

Margaret I. Olson
Assistant Attorney General
Office of the Attorney General
State of North Dakota
Solicitor General
500 North 9th Street
Bismark, North Dakota 58501-4509

Paul M. Seby
Marian C. Larsen
Moye White, LLP
1400 16th Street
6th Floor
Denver, Colorado 80202-1486

Nancy Elizabeth Olinger
Assistant Attorney General
Environmental Protection and
Administrative Law Division
P.O. Box 12548 (MC-018)
Austin, Texas 78711-2548

Benjamin Joseph Alke
Goetz, Gallik & Baldwin, PC
35 North Grand
P.O. Box 6580
Bozeman, Montana 59771-6580

/S/ Norman L. Rave, Jr.
Norman L. Rave, Jr.

Exhibit 5

PN 107-83-04-21-C

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

APR 21 1983

OFFICE OF
AIR, NOISE, AND RADIATION

MEMORANDUM

SUBJECT: Section 107 Designation Policy Summary

FROM: Sheldon Meyers
Sheldon Meyers, Director
Office of Air Quality Planning and Standards (ANR-443)

TO: Director, Air and Waste Management Division
Regions II-IV, VI-VIII, X

Director, Air Management Division
Regions I, V, IX

On February 3, 1983, the Agency published a Federal Register notice regarding the status of all areas designated nonattainment under Part D of the Clean Air Act. This notice indicated that for a significant number of nonattainment areas States are anticipated to be able to demonstrate attainment of the primary national ambient air quality standards. Accordingly, for those areas, States have been encouraged to update their Section 107 designations. In addition, a number of nonattainment areas were identified in the February 3, 1983, notice as "unlikely to attain standards." The Federal Register also stated that the basic existing policy will generally be continued for redesignation. This memorandum summarizes and clarifies existing policy for reviewing designations and provides new guidance on processing these actions.

Policy For Reviewing 107 Designations

1. Data: In general, all available information relative to the attainment status of the area should be reviewed. These data should include the most recent eight (8) consecutive quarters of quality assured, representative ambient air quality data plus evidence of an implemented control strategy that EPA had fully approved. Supplemental information, including air quality modeling emissions data, etc., should be used to determine if the monitoring data accurately characterize the worst case air quality in the area. Also, the following items can be considered in special situations.

An attainment designation can be made using only the most recent four (4) quarters of ambient data if an acceptable state of the art modeling analysis (such as city-specific EKMA for ozone) is provided showing that the basic SIP strategy is sound and that actual, enforceable emission reductions are responsible for the recent air quality improvement.

For nonattainment designations which were originally based solely on modeling, redesignation to attainment is possible even if less than four (4) quarters of ambient data are available provided that a reference modeling analysis considering the sources' legal emission limits shows attainment of the standards. Information must also be presented showing that the sources causing the problem are in compliance with the enforceable SIP measures.

Although the current ozone standard implies the need for three years of data for attainment designations, two years of data with no exceedances is an acceptable surrogate. As discussed previously, this should be accompanied by evidence of an implemented control strategy that EPA had fully approved.

2. Projected Future Violations: Projections of future violations can provide the basis for continuing nonattainment designations. This concept is particularly important because of the current economic downturn. Information submitted to support attainment redesignations must adequately and accurately reflect anticipated operating rates. Areas should remain nonattainment where such projections reveal air quality violations.

3. Modeling: In most SO_2 cases, monitoring data alone will not be sufficient for areas dominated by point sources. A small number of ambient monitors usually is not representative of the air quality for the entire area. Dispersion modeling employing the legally enforceable SO_2 SIP limits will generally be necessary to evaluate comprehensively the sources' impacts as well as to identify the areas of highest concentrations. If either the modeling or monitoring indicates that SO_2 air quality standards are being violated, the area should remain nonattainment.

4. Boundaries: Current policies on appropriate boundaries for designation of nonattainment areas by EPA remain in effect, i.e., generally political boundaries such as city or county for TSP and SO_2, county as a minimum for rural ozone, entire urbanized area and fringe areas of development for urban ozone, and urban core area for CO. When States redesignate, EPA will continue to accept reasonable boundaries which are supported by appropriate data, such as specific new monitoring and/or modeling data or evidence of improvement due to control strategy implementation. Nonattainment areas for ozone should include the significant VOC sources.

5. Dispersion Techniques: Areas which are projected to attain the TSP or SO_2 standards because of the use of unauthorized dispersion techniques should continue to be designated as nonattainment.

Policy for Processing 107 Redesignations

1. SIP Review Actions: Section 107 designations have generally been classified as minor actions, with only a few of the more significant ones being processed as moderate. In the future, redesignations of Tier II nonattainment areas should be classified as major actions so that they can receive a comprehensive review to help ensure regional consistency. Redesignation of Tier I nonattainment areas should continue to be handled as minor or moderate actions, as appropriate.

2. "Unclassifiable" Areas: Since EPA and the States have had nearly five years to resolve discrepancies for nonattainment designations, it is now inappropriate to redesignate any area from nonattainment to unclassifiable. There has been ample time since the first designations were made in 1978 to thoroughly study each nonattainment area. Sufficient data should now exist to either make a redesignation to attainment or to keep the nonattainment designation.

If you have any questions, please contact Tom Helms at (FTS) 629-5525.

cc: Regional Administrator, Regions I-X
Chief, Air Programs Branch, Regions I-X

Exhibit 6

COPY

FILED
SUPERIOR COURT
SANTA BARBARA
DEC 03 1990
KENNETH A. PETTIT, County Clerk-Recorder
By: L. Katherine Rogers
L. KATHERINE ROGERS, Deputy Clerk-Recorder

JOHN K. VAN DE KAMP, Attorney General
of the State of California
ANDREA SHERIDAN ORDIN
Chief Assistant Attorney General
THEODORA BERGER
Assistant Attorney General
CRAIG C. THOMPSON
EDWARD G. WEIL
CLIFFORD RECHTSCHAFFEN
Deputy Attorneys General
2101 Webster Street
Oakland, CA 94612
Telephone: (415) 464-0572

Attorneys for the People of the State of California

SUPERIOR COURT OF THE STATE OF CALIFORNIA

COUNTY OF SANTA BARBARA

PEOPLE OF THE STATE OF CALIFORNIA ex. rel. JOHN K. VAN DE KAMP, Attorney General of the State of California, Plaintiffs, v. SANTA MARIA CHILI, INC. Defendant.	No. SM 64010 (Case transferred to South County, 2/26/90) **DECLARATION OF JOHN C. VIMONT** DATE: Dec. 14, 1990 TIME: 9:00 a.m. Dept: To Be Assigned

I, John C. Vimont, declare:

1. I am currently employed by the United States Environmental Protection Agency (hereafter "EPA"), Region IX (hereafter the "Region" or "Regional Office") as the Regional Meteorologist. I have been employed in this position since June 1987.

a. As the Regional Meteorologist I serve as the Region's expert on air quality modeling, meteorological information and ambient air impact analyses. My position is

1 within the Air and Toxics Division of the Regional Office. I
2 provide support to that division; to the other divisions within
3 the Region, such as the Hazardous Waste Division; and to state
4 and local agencies within Region IX. One of the primary duties
5 of my position is to ensure that appropriate air quality modeling
6 techniques are used by this and other agencies when conducting
7 ambient air quality impact analyses.
8 b. There are a variety of "air quality models."
9 These include conceptual models, qualitative descriptions of the
10 behavior of pollutants in the atmosphere; physical models, scaled
11 models of pollution sources and their surroundings studied in a
12 controlled environment, such as a wind tunnel; statistical
13 models, which encompass statistically based descriptions of
14 source-receptor relationships; and mathematical models, which are
15 mathematical representations of the physical processes which lead
16 to transport and dispersion of pollutants in the atmosphere. The
17 focus of the remaining discussion is on mathematical models;
18 hereafter any reference to an air quality model is implicitly
19 meant to refer to a mathematical air quality model.
20 c. I perform, review and oversee air quality modeling
21 for a variety of different sources and source types. These
22 include stationary sources with emissions emanating from a stack,
23 including stack sources with aerodynamic downwash induced by
24 nearby buildings; stationary sources with emissions emanating
25 from a broad area, commonly called area sources; mobile sources,
26 emissions from automobiles, trucks, busses, aircraft, etc.; and
27 urban and regional scale modeling, which encompasses modeling all

1 of the above processes together on the scale of an entire urban
2 area or over a number of urban areas together.
3 d. The pollutants modeled include both inert
4 pollutants, those which remain chemically stable for long periods
5 of time in the atmosphere, and chemically reactive pollutants,
6 those which undergo relatively rapid chemical transformation and
7 those which are not directly emitted, but rather form through a
8 series of chemical reactions within the atmosphere.
9 2. Previous to my employment at EPA, I worked from March
10 1982 to June 1987 as an Environmental Engineering Specialist in
11 the Air Quality Bureau of the State of New Mexico. My primary
12 responsibilities there were very similar to my current position
13 at EPA. I performed ambient impact analyses of various air
14 pollution sources and conducted engineering analyses of the
15 sources to determine emission characteristics. The primary focus
16 of the analyses was on inert pollutants from stationary sources.
17 a. From August 1978 to March 1982 I worked for the
18 Atmospheric Science Department at Colorado State University (CSU)
19 as a Research Assistant. I worked on a variety of basic
20 scientific research projects dealing with cloud physics. My
21 primary area of research dealt with the uptake of acidic
22 pollutants in snow.
23 b. From November 1977 to August 1978 I worked as a
24 Physical Science Aide for the Pacific Marine Environmental
25 Laboratory of the National Oceanographic and Atmospheric
26 Administration. My duties there involved writing a
27

1 climatological summary of Puget Sound and analyzing the affects
2 of winds on oil spill transport in Puget Sound.
3 3. I received a Bachelor of Science Degree in Atmospheric
4 Sciences from the University of Washington in 1978 and a Master
5 of Science Degree in Atmospheric Science from Colorado State
6 University.
7 4. As the Regional Meteorologist, I routinely evaluate the
8 adequacy of air quality modeling on a technical basis and with
9 respect to its acceptability in the regulatory framework.
10 Acceptable air quality modeling and analysis procedures are
11 outlined in The Guideline on Air Quality Models (Revised) (EPA
12 450/2-78-027R, July 1986, Supplement A, July 1987) (hereafter the
13 "Guideline"). The Guideline was first published in April 1978 to
14 satisfy the requirements of §320 of the 1977 amendments to the
15 Clean Air Act. The Guideline specifies appropriate models to use
16 and provides guidance on their appropriate application. The
17 Guideline provides a common basis for estimating the air quality
18 concentrations used in assessing control strategies and
19 developing emission limits. The modeling techniques embodied in
20 the Guideline are subjected to public, scientific review in
21 accordance with §320 of the CAA.
22 a. EPA has four primary, on-going activities to
23 provide direct input for consistency in implementation and for
24 revisions to the Guideline. The first is a series of annual EPA
25 workshops conducted for the purpose of ensuring consistency and
26 providing clarification in the application of models. The second
27 activity, directed toward the improvement of modeling procedures,

1 is the cooperative agreement that EPA has with the scientific
2 community represented by the American Meteorological Society.
3 This agreement provides scientific assessment of procedures and
4 proposed techniques and sponsors workshops on key technical
5 issues. The third activity is the solicitation and review of new
6 models from the technical and user community. In the March 27,
7 1980 Federal Register, a procedure was outlined for the submittal
8 to EPA of privately developed models. After extensive evaluation
9 and scientific review, these models, as well as those made
10 available by EPA, are considered for recognition in the
11 Guideline. The fourth activity is the extensive, on-going
12 research efforts by EPA and others in air quality and
13 meteorological modeling.
14 b. From the aforementioned process a number of models
15 were selected as being refined models, suitable for regulatory
16 application. Each refined model underwent intensive evaluation.
17 The evaluation exercises include statistical measures of model
18 performance in comparison with measured air quality data and,
19 where possible, peer scientific reviews.
20 c. After a model has been selected as a refined model
21 for a particular type of application, EPA considers the model
22 appropriate for general use for that type of application without
23 undergoing case-by-case evaluation, provided that the application
24 follows the EPA recommendations specified in the Guideline.
25 5. The Industrial Source Complex models (hereafter ISC),
26 have been deemed refined models by EPA for application to
27 industrial complexes. The ISC models consist of a short term

1 model (ISCST) and a long term model (ISCLT). Long term models,
2 such as ISCLT, are only appropriate for calculating ambient
3 concentrations for averaging periods of months to a year. Short
4 term models, such as ISCST, can be used for averaging times from
5 one hour up to a year. (Hereafter my comments referring to ISC
6 apply to both ISCST and ISCLT, unless otherwise specified.) The
7 ISC model is appropriate for simulating the emissions of a
8 variety of industrial air emissions. These would include
9 emissions from free standing stacks and vents; stacks and vents
10 which are influenced by the aerodynamic effects of nearby
11 structures; emissions from area sources, such as storage piles or
12 evaporative emissions from open tanks; line sources, such as
13 roadways; and volume sources, such as large openings in buildings
14 from which emissions emanate. The model is appropriate for
15 simulating the ambient impacts of relatively inert pollutants,
16 such as ethylene oxide, which do not undergo rapid chemical
17 transformation in the atmosphere. The model will calculate the
18 ambient concentrations at a number of user-specified "receptor"
19 locations.
20 a. For simulating a stack-type source, ISC requires
21 the input of the location, emission rate, physical stack height,
22 stack gas exit velocity, stack inside diameter, and stack gas
23 temperature. If the source is affected by the aerodynamic
24 effects of buildings then inputs would also include information
25 about the building dimensions.
26 b. The ISC model also requires meteorological data as
27 input. These data include the wind speed, wind direction,

temperature, stability class and mixing height. The meteorological data must be representative of the geographic area being modeled to be accepted for a refined regulatory application.

c. The ISC model has gone through a number of performance evaluation studies, as outlined above. The following are several references of evaluation studies involving ISC:

(1) Bowers, J. F., and A. J. Anderson, 1981. An Evaluation Study for the Industrial Source Complex (ISC) Dispersion Model, EPA Publication No. EPA-450/4-81-002. U. S. Environmental Protection Agency, Research Triangle Park, NC.

(2) Bowers, J. F., A. J. Anderson, and W. R. Hargraves, 1982. Tests of the Industrial Source Complex (ISC) Dispersion Model at the Armco Middle-town, Ohio Steel Mill, EPA Publication No. EPA-450/4-82-006. U. S. Environmental Protection Agency, Research Triangle Park, NC.

(3) Scire, J. S., and L. L. Schulman, 1981. Evaluation of the BLP and ISC Models with SF_6 Tracer Data and SO_2 Measurements at Aluminum Reduction Plants. Air Pollution Control Association Specialty Conference on Dispersion Modeling for Complex Sources, St. Louis, MO.

(4) Schulman, L. L. and S. R. Hanna, 1986. Evaluation of Downwash Modifications to the Industrial Source Complex Model. Journal of the Air Pollution Control Association, 36:258-264.

d. In my experience of conducting and reviewing air quality modeling analyses, I have found that of the EPA approved

1 models, the ISC model is the most widely used model for
2 determining the ambient concentrations of emissions from
3 industrial sources. This is primarily due to its ability to
4 simulate almost any type of industrial configuration and its
5 status as a refined model under EPA guidelines. EPA considers it
6 appropriate for use without undergoing case by case performance
7 evaluation.

8 6. When EPA has a refined model appropriate for a specific
9 type of application, such as the ISC model, the modeling results,
10 based on the appropriate input data, are generally preferred by
11 EPA over ambient monitoring data for determining emission
12 limitations for both new and existing sources. Normally, EPA
13 does not accept monitoring data as the sole basis for determining
14 an emission limitation. When a refined model is available, EPA
15 generally considers the model results alone (including background
16 concentrations) sufficient for determining ambient concentrations
17 of emissions from industrial sources and setting appropriate
18 emission limitations.

19 a. Monitoring data suffers from a number of
20 limitations. One of the primary limitations is that any given
21 monitor can only measure what is happening at the location where
22 the monitor is physically located and at the time it is
23 operating. In order to adequately detect the maximum impact of
24 any particular source, many monitors would have to be run over a
25 number of years. A monitoring program designed to adequately
26 detect a maximum concentration and to adequately characterize the
27 concentration field would be very expensive. A number of years

of data would be necessary to collect enough samples to cover all possible meteorological situations in combination with the different operating conditions of the facility. A monitoring program with only one or two monitors or of a very short duration would be inadequate to ensure that maximum ambient impacts would be detected.

b. The usual intent of conducting an ambient impact analysis of an air pollution source is to determine if the emissions are likely to affect human health or affect the environment. The ambient concentrations are compared against health or environmental affects data. Rather than helping to resolve a problem, a prolonged ambient monitoring study allows continued air quality degradation, which in turn affects the health or environmental quality which was to be protected. For a new source being proposed, it is impossible to measure its impacts, since it is not yet built.

c. The method of analysis preferred by EPA for determining the ambient concentrations resulting from emissions into the atmosphere of industrial sources, including toxic air emissions, is modeling. As discussed above, before EPA determines a model, such as ISC, to be a refined model, appropriate for general use, the model undergoes rigorous evaluation and is determined to yield accurate estimates of the ambient air concentrations resulting from emission sources under a variety of conditions. With a model, the source can be simulated under the full range of its potential operating and emission conditions, rather than being limited to the specific

1 operating conditions occurring during the period of a limited
2 monitoring study. The model can also yield ambient concentration
3 data at any number of receptor locations, rather than only at the
4 limited number of locations where a monitor is physically
5 located. Also, an air quality model provides the only practical
6 method of estimating the ambient impacts of a new source. A
7 model provides flexibility in an analysis and can be run
8 relatively quickly, at relatively little expense.
9 d. Modeling also allows source contributions to a
10 particular ambient concentration to be ascertained. If two
11 sources each emit the same pollutant, it is impossible to tell
12 from an ambient measurement of the specific pollutant, the
13 relative contributions to the measured ambient concentration,
14 unless there is some unique surrogate being emitted from one of
15 the facilities. Also, there is the uncertainty of whether a
16 heretofore unknown source of the pollutant of concern has
17 contributed to the measurement. Modeling, allows the impact of
18 each source to be calculated separately and in combination.
19 e. The use of monitoring data also pre-supposes that
20 there are acceptable and reliable monitoring techniques available
21 for the pollutant of interest. In the past, this has generally
22 been the case. EPA has established acceptable and reliable
23 methods of measuring a number of pollutants which were regulated
24 under the Clean Air Act. Recently, however, the issue of toxic
25 air contaminants has arisen. Ambient measurement techniques,
26 which can adequately and accurately detect a specific toxic air
27 contaminant, are not necessarily available. The transport and

dispersion of buoyant or neutral plumes of gaseous pollutants, which are relatively inert in the atmosphere, is the same, regardless of the specific chemical constituents of the gas. Therefore, modeling provides a useful technique for detecting levels of pollutants in the air if reliable ambient measurement techniques are not available.

f. EPA does recognize the usefulness of ambient measurements for information on background concentrations, provided reliable monitoring techniques are available. EPA does not recommend, however, that ambient measurements be used as the sole basis of setting emission limitations or determining the ambient concentrations resulting from emissions from an industrial source. These should be based on an appropriate modeling analysis.

I declare under penalty of perjury that the foregoing is true and correct.

DATED: November 30, 1990

JOHN C. VIMONT

Exhibit 7

ORAL ARGUMENT NOT YET SCHEDULED

UNITED STATES COURT OF APPEALS

FOR THE DISTRICT OF COLUMBIA CIRCUIT

NATIONAL ENVIRONMENTAL DEVELOPMENT ASSOCIATION'S CLEAN AIR PROJECT,	)	
Petitioner,	)	
v.	)	Docket No. 10-1252
	)	(and consolidated cases)
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY,	)	
Respondent.	)	

DECLARATION OF ROGER W. BRODE

1. My name is Roger W. Brode. I hold B.S. and M.S. degrees in Atmospheric Sciences and I am currently assigned as a physical scientist in the Air Quality Modeling Group within the Air Quality Assessment Division of the Office of Air and Radiation's Office of Air Quality Planning and Standards at the U.S. Environmental Protection Agency ("EPA"), where my

responsibilities include the development, evaluation and application of air quality dispersion models and the development of guidance associated with application of such models in support of EPA regulations governing the Prevention of Significant Deterioration ("PSD")_permitting program. I have been involved in the development, evaluation, testing, and documentation of the American Meteorological Society EPA Regulatory Model ("AERMOD") throughout its history. I currently serve as co-chair of the AMS/EPA Regulatory Model Improvement Committee (AERMIC) consisting of atmospheric scientists and dispersion model experts overseeing the further technical development of the model, and as co-chair of the AERMOD Implementation Workgroup consisting of EPA Regional Office and State dispersion modelers whose charge has been to indentify and assess potential issues with implementation of the AERMOD model as EPA's preferred model under Appendix W of Part 51 of the Code of Federal Regulations.

2. The revised primary national ambient air quality standard for oxides of sulfur ("SO2 NAAQS") requires that the three year average of the annual 99th percentile of the daily maximum 1-hour average concentrations of SO2 be less than or equal to 75 parts per billion. In addition, owners and operators of a new major stationary source or a major source undergoing a major modification located in areas not designated "nonattainment" for the SO2 NAAQS must obtain a PSD permit, and to do so must demonstrate (among other things) that the emissions increases from the new or modified source will not cause or contribute to a violation of the revised SO2 NAAQS. Existing air quality models, including AERMOD, are readily capable of accurately predicting whether the revised primary SO2 NAAQS is attained and whether individual sources cause or contribute to a violation of the SO2 NAAQS. Specifically, dispersion models that are used to demonstrate compliance with the SO2 (and

other) NAAQS, including under PSD permitting programs, use sequential hourly meteorological data as the basis for estimating ambient concentration levels. These data are combined with other inputs (chiefly source emission information, background emissions, and receptor information) to predict transport and dispersion of emitted pollutant plumes. Since the key varying inputs to these models are input on an hourly basis, all applications of these models under the guidance in Appendix W (40 CFR Part 51) are predicated upon the models' ability to predict hourly ambient concentrations. These models thus generate one-hour air quality distributions from which the three year average of the annual 99th percentile of daily maximum 1-hour average concentration of SO2 can be readily calculated or otherwise reasonably approximated.

3. As part of the basis for EPA adopting the AERMOD model as the preferred model for near-field applications in the *Guideline on Air Quality Models*, Appendix W to 40 CFR Part 51, the performance of the AERMOD model was extensively evaluated based on a total of 17 field study data bases (AERMOD: Latest Features and Evaluation Results. EPA-454/R-03-003. U.S. Environmental Protection Agency, Research Triangle Park (2003), portions of which are attached to this affidavit) ("EPA 2003"). The scope of the model evaluations conducted for AERMOD far exceeds the scope of evaluations conducted on any other model that has been adopted in Appendix W to Part 51. These evaluations demonstrate the overall good performance of the AERMOD model based on technically sound model evaluation procedures, and also illustrate the significant advancement in the science of dispersion modeling represented by the AERMOD model as compared to other models that have been used in the past. In particular, adoption of the AERMOD model has significantly reduced the

potential for overestimation of ambient impacts from elevated sources in complex terrain compared to other models.

4. Some of the field studies used to evaluate AERMOD model performance involved ambient sampling of SO2 for a period of one year or more at several (typically about 10) monitors sited around operating power plants. Other field studies involved sampling of controlled releases of non-reactive tracers, typically SF6, generally over a shorter duration than the operational studies, but with more robust sampling to facilitate more detailed diagnosis of model performance. Although the long-term field studies associated with operating power plants included assessments of 3-hour, 24-hour and even annual average impacts from the model, evaluation results for 1-hour averages were routinely included for all of the field studies. As shown in Tables 2 and 3 of EPA 2003, modeling and monitored results for 1-hour averages are in excellent correlation in these studies, with the ratio of predicted to observed performance approaching 1:1 in most instances. Thus, in my opinion, the performance of the AERMOD model for estimating 1-hour ambient concentrations is well-documented and the form of the new 1-hour SO2 standard raises no questions or concerns regarding the appropriateness of AERMOD.

5. The SO2 NAAQS Coalition states that the revised SO2 NAAQS is a "probabilistic" standard and asserts that this makes modeling more problematic, especially as compared to the previous "deterministic" standard. (Coalition p. 5.) The terms "probabilistic" and "deterministic" do not have an ordinarily understood meaning in this context, but it appears that the assertion is that predictive models like AERMOD are not suitable for a standard which includes a percentile-based form (where the relevant comparison is to a percentile of air quality from an air quality distribution), as opposed to an expected exceedance form

(whereby a standard may exceeded on a given number of days and compliance is assessed based on air quality on the designated day once the allowed exceedance days are removed from the distribution). I know of no reason that AERMOD and other similar types of models is suitable for one type of form and not the other. As just stated in paragraph 2, the models readily generate air quality distributions from which either percentiles (for the revised SO2 NAAQS, the 99th percentile) or exceeding days can be determined. In fact, the percentile form of the 1-hour SO2 NAAQS is a more "stable" metric than a standard based on the 1st-highest or 2nd-highest concentrations, since the potential impact of "outliers" in the distribution is mitigated, especially when the multi-year average aspect of the SO2 NAAQS is accounted for.

6. Both the SO2 NAAQS Coalition and their affiant Mr. Paine raise a number of points regarding the issue of whether allowable or actual source emissions should be modeled, stating that use of allowable emissions overstates sources' impacts. See, e.g. Paine Decl. at ¶ ¶ 11-14. This issue is independent of the predictive accuracy of AERMOD or other models.
7. EPA's rules and guidance provide significant flexibility in the choice of which models to use in determining if sources cause of contribute to NAAQS violations for purposes of PSD permitting. EPA's rules specify that "where an air quality model specified in Appendix W of this part ... is inappropriate, the model may be modified or another model substituted" with written approval from EPA. 40 C.F.R. §51. 166 (l)(2). The rules therefore allow flexibility, subject to appropriate requirements, for alternative modeling techniques to be applied on a case-by-case basis subject to approval by appropriate reviewing authority.
8. The declaration of Michael E. Long voices concerns regarding the use of the AERMOD dispersion model to support implementation of the 1-hour SO2 standard, and asserts that

"AERMOD significantly over predicts the actual one-hour ambient concentrations in our area when the available information is used in the model as directed by EPA." Long Decl. at ¶ 8. This assertion is based on a comparison of model-predicted ambient concentrations to ambient SO2 concentrations reported for 2008 at local EPA monitoring stations in the vicinity of the ArcelorMittal facilities being modeled. Mr. Long reports that the "AERMOD model predicted one-hour concentrations that were higher than the monitored values 90% of the time and the predicted values were as much as 373,131 times higher than the actual monitored values." Id. Lacking any additional details regarding the model-to-monitor comparisons cited by Mr. Long, the response here is necessarily limited to a general discussion of issues involved in such comparisons. A number of factors can affect the comparison of a modeled concentration with a monitored concentration, including the accuracy of the emission rate and other source characteristics input to the model, the representativeness of the meteorological data input to the model, and the influence of local geographical features and land use characteristics on the transport and dispersion of the plume. Another key factor that affects comparisons of modeled vs. monitored concentrations, paired in time and space, is the potential error or uncertainty in the wind direction input to the model for that hour since the wind direction will determine the transport direction of the plume. Slight errors in the transport wind direction may account for significant differences in modeled vs. monitored concentrations for a specific hour, especially for elevated plumes under stable atmospheric conditions where the lateral spread of the plume can be very limited for relatively long transport distances, and errors of a few degrees in wind direction can be the difference in the plume directly impacting the monitor for a particular hour or the plume missing the monitor completely. In such cases, a factor of

373,131 difference between modeled and monitored concentrations could easily be attributable to error or uncertainty in the wind direction. Note that wind directions reported from routine meteorological monitoring stations located at airports, the most common source of meteorological data used in air quality modeling applications, are reported to the nearest 10 degrees. In addition, the comparison may reflect issues related to use of allowable versus actual emissions, which is irrelevant for purposes of determining whether the AERMOD model itself is biased.

9. The declaration of Robert J. Paine addresses practical issues in applying the AERMOD model that allegedly arise due to the form of the 1-hour SO2 standard, as well as concerns regarding the conservatism of the assumptions on source emissions based on Appendix W guidance in relation to the 1-hour SO2 standard. Responses to these issues are summarized below, numbered according to Mr. Paine's declaration, with some responses applying to multiple comments:

(a)

Paine Decl. ¶ 9. : The AERMOD model "does not yet provide results that allow permit applicants to follow EPA's guidance for determining whether they comply with the 1-hour SO2 NAAQS because of the unique statistical form of that NAAQS."

Paine Decl. ¶ 10. : "The form of the 1-hour SO2 NAAQS requires the applicable guideline dispersion model to compute the highest 1-hour concentration for each day at each modeled receptor point, and to keep track of this daily 1-hour maximum concentration statistic for each of the 365 days for each year modeled independently at each location modeled.

Paine Decl. ¶ 11. : "In the case for which a cumulative modeling analysis is required, this same procedure must be applied to the combined contributions of the individual source being permitted, nearby sources and regional background."

Response: As stated in paragraph 2 above, all of these metrics are readily obtainable from model outputs. Although the existing version of AERMOD does not contain an algorithm from which these metrics emerge automatically as model outputs, this does not change the result that all of these metrics are obtainable. In fact, we are aware that Mr. Paine, along with other private sector parties, developed post-processing tools to compute the 1-hour SO2 design value based on the form of the revised SO2 NAAQS utilizing model output options available at the time.

(b)

Paine Decl. ¶ 11. : "Furthermore, EPA in most cases requires a conservatively high regional background concentration to be added for all hours modeled, rather than the actual values measured during each hour of the modeling simulation."

Response: EPA issued guidance on a range of issues related to the new 1-hour SO2 standard on August 23, 2010, including a recommendation that the overall highest 1-hour monitored SO2 concentration from a representative monitor could be used to account for the monitored background component in a cumulative impact assessment "without further justification." We recognize that use of the overall highest 1-hour monitored value may entail a degree of conservatism that could prevent a source from demonstrating compliance with NAAQS; however, that conservatism forms the basis for allowing the approach to be used without further justification. The August 23 memorandum further stated that "Additional refinements to this 'first tier' approach based on some level of temporal pairing of modeled and monitored values

may be considered on a case-by-case basis, subject to approval by the reviewing authority, with adequate justification and documentation." However, we also note that Appendix W explicitly makes "no attempt" to "comprehensively define" the criteria involved in determining which nearby sources to include in an analysis "owing to both the uniqueness of each modeling situation and the large number of variables involved in identifying nearby sources." See Appendix W section 8.2.3.b.

(c)

Paine Decl. ¶ 12. : "Following EPA's regulatory requirements for PSD modeling, the modeled predictions of hourly concentrations of a probabilistic standard such as the 99th percentile daily maximum hourly SO2 concentrations produced by a single source for which a permit is sought can be much higher than concentrations that actually occur in the ambient air."

Response: As noted in paragraph 6 above, the issue of allowable versus actual emissions is independent to the question of the accuracy of AERMOD or other models. Also, as stated in paragraph 5 above, there is no reason that AERMOD (or other similar models) is not equally accurate in predicting percentile air quality distributions or expected exceedances on a given day. The underlying data which are input to the model generate air quality distributions which are equally suitable for either type of form.

(d)

Paine Decl. ¶ 12. : "Modeling of peak SO2 emissions as if they occur continuously is a distortion of reality and will overestimate the ambient air concentrations. This is especially true for 1-hour averages, since the variation of emissions for such a short averaging period is

potentially much higher than that for the other SO2 NAAQS averaging periods. This makes the assumption of constant peak emissions a critical issue for this new standard."

Response: The purpose of dispersion modeling in the context of the PSD permitting program is to demonstrate that the proposed new or modified emissions will not cause or contribute to violations of the standard if the permit is granted. This is inherently a predictive exercise since it entails an assessment of proposed future emissions. EPA's guidance for conducting such analyses is dictated by and consistent with that purpose. Mr. Paine's statement that 1-hour averages are more variable than longer averaging periods again does not relate to potential model bias and in any case makes a sweeping generalization for situations that differ case-by-case. The statement that peak SO2 emissions should not be modeled is a restatement of the dispute as to use of allowable or actual emissions, and does not relate to the issue of model bias.

(e)

Paine Decl. ¶ 13. : "The model overprediction tendency is even more likely to be a problem in a cumulative impact analysis because numerous sources (i.e., the source being permitted and potentially thousands of other nearby sources) are all modeled at peak emissions at all times and added to a regional background level of SO2. . . leading to unrealistic predictions that the 1-hour SO2 NAAQS will be exceeded."

Response: As noted, the issue of allowable versus actual emissions is independent of the issue of models' predictive accuracy. However, EPA's August 23, 2010 clarification memo regarding the applicability of Appendix W guidance for the 1-hour SO2 NAAQS cautioned "against the literal and uncritical application of very prescriptive procedures for identifying which background sources should be included in the modeled emission inventory for NAAQS

compliance demonstrations, including those described in Chapter C, Section IV.C.1 of the draft New Source Review Workshop Manual (EPA, 1990), noting [again] that Appendix W emphasizes the importance of professional judgment in this process." One motivation for that caution was a concern that application of such procedures could lead to an overly conservative result by including too many background sources in the cumulative impact assessment. As noted elsewhere, Section 8.2.3.b of Appendix W suggests that "the number of such sources is expected to be small except in unusual situations."

(f)

Paine Decl. ¶ 13. : "Moreover, since the nearby sources will be modeled individually (but their emissions are already accounted for in the regional monitoring), there will inevitably be double-counting of the background impacts between the components of the "nearby sources" and the "regional background", especially for the common situation of the state requiring a single peak regional background value to be used for all modeled hours."

Response: As noted in several responses above, there are many application-specific factors that need to be considered in determining how to conduct an adequate assessment of cumulative impacts, accounting for contributions from nearby background sources explicitly in the model as well as a monitored contribution, while avoiding or minimizing the potential for double-counting of modeled and monitored impacts.

(g)

Paine Decl. ¶ 14. : "The distribution of total peak daily emissions over the three-year period of 2000-2002 [from major SO2 sources in central North Dakota] was found to overpredict the second-highest monitored 24-hour concentrations by roughly a factor of 2 because the emissions

on average are lower than peak values assumed in the modeling. For the probabilistic 1-hour standard . . . and for closer receptors, the overprediction ratio would likely be even higher than for a 24-hour average, causing extensive areas of fictitious modeled NAAQS violations."

Response: The first statement in this comment merely confirms what was indicated in an earlier response, namely that modeled impacts based on maximum allowable emissions should not be expected to accurately predict ambient monitored concentrations in most cases, since monitored concentrations can only reflect impacts from actual emissions. Overprediction by a factor of 2 does not suggest a significant degree of conservatism given that modeled emissions reflected peak emissions. No rationale is offered to support the assertion that the overprediction ratio would likely be even higher for the 1-hour standard, and we see no reason to expect that necessarily to be the case.

(h)

Paine Decl. ¶ 14. : "Based on my experience with modeling the 1-hour NAAQS for nitrogen dioxide – a NAAQS that is similar in form to the 1-hour SO2 NAAQS – this overprediction ratio could approach a factor of 10 in areas with numerous sources modeled together."

Response: Although the form of the 1-hour NO2 standard is very similar to the form of the 1-hour SO2 standard, the role of NOx chemistry in modeling ambient NO2 impacts associated with NOx emissions makes it difficult to draw comparisons between the two standards in terms of the potential for the model to overestimate ambient impacts as compared to monitored concentrations. The comment does not indicate what assumptions were made in the NO2 modeling analyses regarding the conversion of NO emissions to ambient NO2. An overly conservative assumption in relation to that conversion could introduce a significant bias in the

modeled concentrations relative to monitored concentrations of NO2 that would have no relevance to modeling 1-hour SO2 impacts.

(i)

Paine Decl. ¶ 15. : "If a cumulative modeling assessment shows violations of the NAAQS, then the PSD permit applicant can still obtain a permit for its source by showing that the proposed source does not contribute significantly to the modeled violation. EPA, however, has not yet defined a procedure for determining whether a proposed source that conducts a cumulative modeling analysis and finds modeled violations due to other sources is by itself causing or contributing to these predicted (and possibly false) 1-hour SO2 NAAQS violations. This "safety valve" thus does not yet exist for applicants trying to demonstrate that their proposed SO2-emitting sources will not cause or contribute to any modeled violations of the 1-hour SO2 NAAQS."

Response: Recognizing the importance of the significant contribution test within the PSD permitting program, EPA recommended an interim Significant Impact Level (SIL) in its August 23 guidance memorandum regarding the 1-hour SO2 NAAQS. This interim SIL provides the "safety valve" that may allow a permit applicant to obtain a permit in cases where the cumulative impact assessment shows modeled violations of the 1-hour SO2 NAAQS, if it can be demonstrated that the proposed emission increases do not contribute significantly to those modeled violations, paired in time and space. Although the form of the 1-hour SO2 standard may complicate the "bookkeeping" needed to make such a demonstration, the principle of the significant contribution test based on the SIL has not changed under the 1-hour SO2 NAAQS.

Pursuant to 28 U.S.C. § 1746, and under penalty of perjury, I declare the foregoing is true and correct to the best of my knowledge.

01/18/2011

Date

Roger W. Brode

Exhibit 8

Camille Sears 502 W. Lomita Ave., Ojai, CA 93023
Tel: (805) 646-2588 e-mail: camille.marie@sbcglobal.net

June 28, 2012

EPA Docket Center
1301 Constitution Ave., NW., Room 3334
Washington DC 20004

Re: Docket#: EPA-HQ-OAR-2010-1059
Comments on USEPA's Guidance for One-Hour SO_2 NAAQS SIP Submissions

Thank you for the opportunity to comment on USEPA's guidance for one-hour SO_2 NAAQS SIP submissions. In the 9/22/2011 public draft of their guidance, USEPA summarizes their planned program elements as follows:

> In addition to this guidance document, EPA is also planning a rulemaking to address some of the 1-hour SO_2 NAAQS implementation program elements. These elements include: (1) establishing that compliance with the 1-hour SO_2 NAAQS is appropriately based on the results of both air quality modeling and monitoring; (2) establishing the modeling requirements necessary to determine compliance with the 1-hour SO_2 NAAQS; (3) establishing the minimum scope of analysis required to demonstrate attainment and maintenance of the 1-hour SO_2 NAAQS to comply with the SIP requirements in CAA section 110(a)(1); (4) establishing a reasonable time period for sources to comply with any new emissions limitations states need to establish in the 110(a)(1) SIPs to demonstrate attainment and maintenance of the 1-hour SO_2 NAAQS; (5) to set an attainment date for areas designated as unclassifiable; and (6) establishing the criteria for redesignating areas from "unclassifiable" to "attainment."[1]

This document goes on to say:

> EPA will also propose a rulemaking that would codify the hybrid modeling and monitoring implementation approach in order to ensure compliance with the 1-hour SO_2 NAAQS in a timely manner.[2]

In summary, I believe that air dispersion modeling should be the preferred method for determining one-hour SO_2 impacts from existing sources. Monitoring should be used only in specific cases to supplement modeled impacts, and the monitored data, which cannot cover all ambient air locations, should not be given more weight than the modeled concentrations. In

[1] USEPA, Guidance for One-Hour SO_2 NAAQS SIP Submissions, Public Review Draft, September 22, 2011, pp. iii-iv. (http://www.epa.gov/airquality/sulfurdioxide/pdfs/DraftSO2Guidance_9-22-11.pdf)
[2] Id., p. iv.

essence, USEPA's proposed hybrid modeling and monitoring implementation approach should be heavily weighted towards modeling.

Air dispersion modeling has been used for decades to assess ambient air impacts from proposed and existing sources, and for SO_2 NAAQS SIP purposes, monitoring alone (or a program based predominantly on monitoring) is not a viable alternative. I recently submitted a subset of these comments to USEPA's 10th Conference on Air Quality Modeling docket.

I specialize in atmospheric dispersion modeling, which uses regulatory-approved computer programs to estimate chemical concentrations in the air and deposition fluxes to the ground. In the past 30 years I have prepared over 1,000 air dispersion modeling analyses. I hold B.S. (1978) and M.S. (1980) degrees in Atmospheric Science from the University of California at Davis. A copy of my curriculum vitae is attached.

My comments on this docket concentrate on the issue of modeling vs. monitoring for verifying compliance with the one-hour SO_2 NAAQS (attainment determinations). My comments are in response to USEPA's "key questions" presented in their *Implementation of the 2010 Primary 1-Hour SO_2 NAAQS: Draft White Paper for Discussion*. I address key questions a. and b. on monitoring and key questions a., b., c., and d. on modeling.

Monitoring key questions:

a. Are the conceptual monitoring networks described above sufficient to determine whether ambient SO_2 levels meet the NAAQS and are protective of public health without the need for additional modeling? If not, then what enhancements should be made to them? In what situations should meteorological data collection also be required?

b. What is an appropriate number of monitors to site around a source to assess air quality?

I am providing a combined response to the above questions.

I do not believe that it is feasible for monitoring alone to verify compliance with the one-hour SO_2 NAAQS. A suitable monitoring program would require many monitors and data would need to be collected for at least several years. The number of required monitors would be prohibitively expensive and the duration of the monitoring program, while compounding the expense, also delays the implementation needed to protect public health from any unhealthy SO_2 exposures.

The question of modeling or monitoring was discussed in a California Proposition 65 enforcement declaration by John Vimont, when he was USEPA's Region IX Regional Meteorologist:

> Monitoring data suffers from a number of limitations. One of the primary limitations is that any given monitor can only measure what is happening at the location where the monitor is physically located and at the time it is operating. In order to adequately detect the maximum impact of any particular source, many monitors would have to be run over a number of years. A monitoring program designed to adequately detect a maximum concentration and to adequately characterize the concentration field would be very expensive. A number of years of data would be necessary to collect enough samples to cover all possible meteorological situations in combination with the different operating conditions of the facility. A monitoring program with only one or two monitors or of a very short duration would be inadequate to ensure that maximum ambient impacts would be detected.[3]

Mr. Vimont also declared:

> EPA does recognize the usefulness of ambient measurements for information on background concentrations, provided reliable monitoring techniques are available. EPA does not recommend, however, that ambient measurements be used as the sole basis of setting emission limitations or determining the ambient concentrations resulting from emissions from an industrial source. These should be based on an appropriate modeling analysis.[4]

I agree with Mr. Vimont on the disadvantages of relying on air monitoring to verify compliance with ambient air quality standards. This sentiment is also expressed by the State of California, in their Air Toxics Hot Spots Health Risk Assessment (HRA) guidelines:

> Pollutant concentrations are required in HRA calculations to estimate the potential cancer risk or hazard indices associated with the emissions of any given facility. Although monitoring of a pollutant provides excellent characterization of its concentrations, it is time consuming, costly, and typically limited to a few receptor locations and snapshots in time. Air dispersion modeling has the advantage of being relatively inexpensive and is less time consuming, provided that all the model inputs are available. In addition, air dispersion modeling provides greater flexibility for placement of receptors, assessment of individual

[3] Vimont, John, People of the State of California v. Santa Maria Chili, Declaration, November 30, 1990. (see attached file: Vimont-John-Declaration.pdf)
[4] Id.

> and cumulative source contributions, and characterization of concentration over greater spatial extents.[5]

In addition, it is not always possible to place monitors where maximum project or cumulative impacts may be occurring. I have first-hand experience with the problem of siting monitors to ensure that maximum project impacts are being measured. While I was an employee with the Santa Barbara County Air Pollution Control District, I sited over 30 pre- and post-construction air quality PSD monitoring systems. These monitors were required by permit conditions for various oil and gas processing facilities, and several monitors were to be sited for each project. Using air dispersion modeling, we determined where the peak project impacts were likely to occur and then attempted to place the air quality monitoring systems at those locations. In virtually every case, it was not possible to place the air quality monitor in the desired location. Impediments to siting the monitors where we wanted to place them included: power or communication constraints, lack of security, denial of landowner permission, lack of access, and terrain and vegetation restrictions. In other words, it's one thing to have an adequate number of monitors; it's quite another thing to place them where they are needed.

Part of the problem is that there are relatively few existing monitors that can be used for SO_2 NAAQS attainment determinations. There are not nearly enough SO_2 monitors in place to determine attainment status of the existing major SO_2 emission sources. Moreover, very few, if any, of these monitors are "well-placed" for measuring the maximum ambient air impacts from these existing SO_2 sources. This situation dictates that in virtually every instance, a monitoring program needs to be started from scratch, or air dispersion modeling must be used as the method for determining SO_2 ambient air concentrations and resulting attainment status.

The lack of existing major source-specific SO_2 monitoring is partly due to a failure of State air agencies requiring pre-and post-construction air quality monitoring. In the past few years I have reviewed and commented on major SO_2 emission source PSD permit applications in Texas, Louisiana, Oklahoma, Nevada, Kentucky, North Carolina, South Carolina, Missouri, Kansas, South Dakota, Illinois, and Arkansas. With the exception of Nevada, the State air agencies have not required pre- or post-construction air quality monitoring, even though the PSD significant monitoring concentrations were exceeded. This is the norm for these major sources, and it is one of the key reasons that there is a paucity of ambient air quality monitoring data that could be used to help determine attainment status surrounding these facilities. It is self-serving if a facility that could (should) have been collecting ambient air quality data now argues that SO_2 NAAQS attainment determinations must be based on monitoring, not modeling.

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[5] California Office of Environmental Health Hazard Assessment, Air Toxics Hot Spots Program Risk Assessment Guidelines: The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments, August 2003, p. 4-1. (http://www.oehha.org/air/hot_spots/pdf/HRAguidefinal.pdf)

This same issue applies to pre-construction monitoring for meteorological data. On many occasions I have commented that States should require major source facilities, as part of their PSD permit analysis, to collect site-specific meteorological data rather than rely on National Weather Service (NWS) airport data. On every occasion, my comments were disregarded, even though the PSD significant monitoring concentrations were exceeded for the proposed project. The State's response and comment denial followed a common theme, summarized as follows: site-specific meteorological data monitoring is unnecessary for modeling purposes and that NWS airport data are appropriate for permit application analyses. Although it's water under the bridge, site-specific data could have been collected during these application processes without causing time delays to permit issuance.

USEPA asked the question "*In what situations should meteorological data collection also be required?"* I believe the time has passed when these data could or should have been collected. Of course it would be ideal to have additional site-specific meteorological data for modeling major SO_2 emissions sources. But such a monitoring system will take at least two years to implement, and then the modeling will still have to be performed. The data collection itself will take a minimum of one year. It will take at least another year for developing the data collection protocol, review and approval of the protocol, siting of the system, installation, and afterwards post-processing of the data for modeling. Starting a site-specific meteorological data collection effort from scratch contributes to an unreasonable delay of the measures that may be needed to protect ambient air from any excessive SO_2 exposures.

While I feel that site-specific meteorological data are preferable to NWS airport data, USEPA's AERMINUTE program allows significant improvements to the NWS data in that calms and variable wind hours that were previously unusable by AERMOD can now be recaptured. In lieu of requiring new site-specific data collection efforts, modeling of SO_2 emissions for NAAQS SIP submissions should be performed using NWS data prepared with AERMET, in conjunction with AERMINUTE. The use of one-minute ASOS data should be a requirement, not a recommendation. If available high-quality site-specific meteorological data already exist, then I believe they should be used in preference to NWS airport data.

Based on my experience, site-specific meteorological data tends to result in higher modeled impacts than NWS airport data, even when the NWS data is processed with AERMINUTE and one-minute ASOS data. For example, I modeled the Homer City, PA power station with three different meteorological data sets: One year of site-specific data from the Manor monitoring station; 2006 through 2010 NWS data from Johnstown PA, including one-minute ASOS data processed with AERMINUTE (KJST); and 2006 through 2010 NWS data from Pittsburgh PA, including one-minute ASOS data processed with AERMINUTE (KAGC). All three data sets

used Pittsburgh upper air soundings. The peak receptor grid ambient air impacts from AERMOD modeling using Manor site-specific data were about twice as high as the KJST or KAGC results. And even at specific receptor locations, such as Homer City High School, the Manor site-specific data resulted in significantly higher impacts than the NWS/AERMINUTE data sets.

In other words, using available NWS airport data, processed with AERMINUTE, will not likely over-predict modeled impacts, as suggested by some stakeholders. Moreover, these data have the advantage of being readily available on NCDC data DVDs for years 2007 through 2011, thus meeting The Guideline on Air Quality Modeling requirements of at least five years of consecutive data from the most recent, readily available five-year period. [6]

Modeling key questions:

a. Should some criteria (e.g., the PWEI concept) be used to identify priority sources to be modeled in an area where there is no nearby monitor?

I do not believe that a population weighted emissions index (PWEI) should be used to identify priority sources. The NAAQS, by definition, apply to ambient air, or "… that portion of the atmosphere, external to buildings, to which the general public has access."[7] Ambient air is the defining criteria, and it is not based on the number of people who are exposed, but whether anyone could have access to given locations. This includes waterways and unpopulated areas of all sorts, so long as someone in the public has access.

b. How should the modeling be performed – i.e., what changes to the March 24, 2011 guidance should be made, such as the use of size cut-offs and use of actual emissions?

Some stakeholders have suggested that one-hour SO_2 modeling analyses used for nonattainment SIP modeling should use actual emissions, and not the potential to emit. I understand that using allowable emissions may result in higher impacts than the facility's actual emissions. I have modeled many coal-fired EGUs where I analyzed both allowable and actual emissions obtained from USEPA's Clean Air Markets Database (CAMD). The facility permitted emissions are often, though not always, greater than the reported actual emissions. This is because the permitted allowable emissions are often based on 30-day averaging periods and peak hourly emission limits were not set by the State agency in question. Also, startup, shutdown, and upset conditions are included in the CAMD that may represent quite high actual emission rates.

[6] USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, November 9, 2005. (http://www.epa.gov/ttn/scram/guidance/guide/appw_05.pdf)
[7] 40 CFR Part 50.1 (e) (http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&rgn=div5&view=text&node=40:2.0.1.1.1&idno=40#40:2.0.1.1.1.0.1.1)

If actual emissions are used for nonattainment SIP modeling, a condition must be added to the facility's permit requiring that emissions must not be greater than the level used in the modeling analysis. In other words, a facility that wants to use actual emissions in their modeling analysis must agree to an enforceable permit condition limiting their emissions, by unit, to that quantity modeled. Also, actual emissions cannot be modeled using full load stack parameters. Stack gas exit velocity and temperature will be reduced under less than full load conditions, affecting plume rise and resulting modeled impacts. Any AERMOD modeling using actual emission levels must use corresponding actual stack gas exit velocity and temperature. I suggest that USEPA should develop a method for calculating stack gas exit velocity and temperature as a function of load, for use in cases where these data are not directly measured and reported.

I believe that any emission limits based on actual operating conditions must be rather straight-forward and enforceable. For example, the actual emission rates could be based on the maximum hourly emissions, by stack, for the latest calendar year (or perhaps the maximum for the past three years). Maximum actual emissions could also be for shorter time periods (by season, for example), but emission limits by portion of the year may be more difficult to enforce, or the facility may not wish to be restricted by this condition. And while it is possible to model hour-by-hour actual emissions (using HOUREMIS in AERMOD) coupled with contemporaneous meteorological data, this analysis does not ensure that the one-hour SO_2 NAAQS will be protected in the future. This is because combinations of meteorology and facility emissions that result in peak impacts are virtually unenforceable.

I believe that USEPA should be very careful in considering emission rate cut-off levels. Without modeling, it is very difficult to determine the combined effects that emission rate, stack height, source-to-receptor distance and elevation differences, building downwash, background air quality, and plume rise will have on ambient air concentrations and NAAQS compliance. Obviously not every source will require modeling, but any cut-off criteria should consider all parameters that affect air concentration, not simply emission rate.

c. Are there situations where modeling is preferable to monitoring? If so, then what are these situations? Should EPA require modeling in certain situations, or is monitoring alone always a sufficient option for areas of concern?

As discussed above, modeling is preferable to monitoring for determining ambient air concentrations and for verifying compliance with the one-hour SO_2 NAAQS. I cannot envision a feasible air monitoring network that would verify compliance for a major SO_2 emission source – too many monitors would be needed and the delay in attainment demonstration and resulting controls would be unacceptably long.

I think it is beneficial to consider how California's Air Toxics Hot Spots program, also known as AB 2588, determined ambient air concentrations of air toxics. This program required thousands of facilities in California to quantify emissions of scores of hazardous air pollutants, when virtually no inventory of these pollutants previously existed. AB 2588 also required at least 1,000 facilities state-wide to prepare health risk assessments, which are based on ambient air concentrations of the air toxics in question. In all instances, these facilities used air modeling as the basis for determining ambient air concentrations. This is based not only on State of California guidance (see the Air Toxics Hot Spots program citation in the air monitoring comments above), but on the practicality of actually quantifying air concentrations in a reasonable fashion.

I believe that the AB 2588 program required as much or more modeling work than will be needed for the one-hour SO_2 NAAQS SIP determinations. For example, in Santa Barbara County, where I was the Air Toxics Program Coordinator, we prepared air dispersion modeling analyses for up to 50 facilities per year. Many of these facilities were very complicated and involved numerous toxic air pollutants. Plus, we calculated excess cancer risk and non-carcinogenic health effects from inhalation and all other pathways of exposure. In other words, I think State air agencies should be able to handle the effort required in modeling the major SO_2 emission sources within their jurisdiction.

Some stakeholders have expressed concern that AERMOD will over-predict air impacts, compared to monitoring results. While this may be true in some circumstances, e.g., at one location at a given time, the true value in modeling is the ability to calculate air concentrations at many more places and under many physical conditions that cannot be handled by air monitoring. On the other hand, there are likely many situations where AERMOD underpredicts air concentrations compared to monitoring data.

USEPA should rely on the detailed AERMOD evaluations that were performed during the model development phase. I agree with Roger Brode's 10th Modeling Conference presentation, where he concluded: "AERMOD model performance has been extensively evaluated and shown to provide generally unbiased estimates of 1-hr SO_2 concentrations across a wide range of scenarios."[8]

[8] Roger Brode, USEPA/OAQPS, AERMOD Evaluations Under the 1-hour NO_2 and SO_2 NAAQS, 10th Conference on Air Quality Modeling. (http://www.epa.gov/ttn/scram/10thmodconf/presentations/2-8-Brode_10thMC_AERMOD_Evals_1hr-NO2-SO2_NAAQS_Final_3-25.pdf)

I believe that the concerns about AERMOD over-predicting air concentrations are, on the whole, without merit. At the 2012 RSL Modelers' Workshop, George Bridgers and Roger Brode presented a summary of AERMOD's performance evaluation results. They document that AERMOD provided better model predictions than ISCST3, ISC-Prime, and CTDMPLUS. In addition, they point out that the average ratio of predicted to observed one-hour and three-hour robust highest concentration values across all field studies for AERMOD was 0.995.[9] This is clearly an unbiased estimate of AERMOD's predictive performance.

It is also evident that most of the large SO_2 emission sources have tall stacks, which were rigorously evaluated during AERMOD's development process. From USEPA's Compendium of Reports from the Peer review Process for AERMOD:

> Concerning the model evaluation, we reiterate that AERMOD has been evaluated against 10 substantial data bases, including: 1) four data sets for tall stack buoyant plumes in flat terrain (Kincaid SO2, Kincaid SF6, Baldwin, and Clifty Creek), 2) four data sets for tall stacks in complex terrain or near elevated terrain (Lovett, Martins Creek, Tracy, and Westvaco), 3) a buoyant elevated release in an urban environment (Indianapolis), and 4) a nonbuoyant surface release (Prairie Grass). We agree that more evaluation would be desirable (as always) especially for downwash conditions, urban sources, and surface releases. However, there is a key question to the AERMOD development process: Has there been enough evaluation already to justify replacing ISC3 by AERMOD? AERMIC believes that there has been.[10]

Thus, any argument that AERMOD is not applicable to tall stack emission sources should be dismissed based on the studies used for developing AERMOD. In particular, AERMOD has been extensively evaluated for power plant emissions:

> It is worth noting in this regard that all of the AERMOD evaluation data bases (except for Prairie Grass) involved tall, non-downwashed, highly buoyant power plant stacks (the shortest stack in the group was 84 meters in Indianapolis).[11]

AERMOD's evaluation process ultimately comprised 17 separate data sets. I believe that any concerns from stakeholders that AERMOD over-predicts power plant impacts, or over-predicts impacts from other source types represented in the evaluation databases, should be dismissed.

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[9] George Bridgers and Roger Brode, USEPA/OAQPS, Challenges in Modeling Compliance for New NAAQS: 1-hour NO_2 & SO_2 and $PM_{2.5}$, 2012 RSL Modelers' Workshop. (http://www.cleanairinfo.com/regionalstatelocalmodelingworkshop/archive/2012/presentations/Tues/3-1_2012RSL_ModelingChallenges_Bridges.pdf)

[10] USEPA OAQPS, Compendium of Reports from the Peer review Process for AERMOD, February 2002, pdf page 38/69. (http://www.epa.gov/scram001/7thconf/aermod/dockrpt.pdf)

[11] Id., pdf page 49/69.

I would also add that AERMOD's evaluation analyses included a number of site-specific meteorological data sets that incorporate low wind speed conditions. For example, the Tracy evaluation included meteorological data with wind speeds as low as 0.39 meter/second (m/s); the Westvaco evaluation included wind speeds as low as 0.31 m/s; the Kincaid SO_2 evaluation included wind speeds as low as 0.37 m/s; and the Lovett evaluation included wind speeds as low as 0.30 m/s.[12] Concerns raised by stakeholders regarding AERMOD's ability to model low wind speed conditions seem to neglect the data used in actual AERMOD evaluations.

Some stakeholders are concerned that AERMOD is inaccurate in areas with extreme topography, such as complex river valleys and steep hillsides. This concern has already been addressed by USEPA in their response to the New Jersey Department of Environmental Protection (NJDEP) section 126 petition for SO_2 emissions from the Portland Generating Station. In their review of NJDEP's petition, USEPA found that AERMOD is the most appropriate model for determining air impacts in the complex terrain and complex wind fields surrounding the Portland facility.[13] USEPA also recognizes that "the performance of the AERMOD model for estimating impacts associated with tall stacks in complex terrain settings has been extensively evaluated and documented in peer-review journals… and has consistently been shown to perform better than competing models."[14]

Air monitoring of SO_2 is not a feasible alternative to modeling for steep hillsides and other complex terrain conditions. Proper air quality monitor siting is extremely difficult in these settings, and any siting would depend on prior air dispersion modeling in the first place.

While I have used CALPUFF to model emissions in complex river valleys, I was able to do so only because there were multiple site-specific meteorological monitors to provide the needed data to develop the CALMET wind fields. For facilities where adequate meteorological data exist to run CALPUFF, I believe this is a possible alternative to running AERMOD. Otherwise, AERMOD should be used due to the problems associated with siting and operating an adequate monitoring network in these complex terrain environments.

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[12] The AERMOD evaluations and modeled meteorological data are at: http://www.epa.gov/ttn/scram/dispersion_prefrec.htm

[13] USEPA, Air Quality Modeling Technical Support Document: NJ 126 Petition of September 17, 2010, April 2011, p. 12 of 63. (http://www.epa.gov/ttn/scram/reports/EPA-HQ-OAR-2011-0081-0026.pdf)

[14] Id., p.11 of 63.

d. Are there situations where monitoring is preferable to modeling? If so, then what are these situations? Should EPA require monitoring in certain situations, or is modeling alone always a sufficient option for areas of concern?

As discussed above, I believe that modeling alone is sufficient for verifying compliance with the one-hour SO_2 NAAQS. If monitoring is used, as in USEPA's proposed hybrid modeling and monitoring approach, it should be only as a supplement to modeling and the modeling and monitoring results should be given equal weight.

I think it is important to remember that all NO_2, $PM_{2.5}$, and SO_2 NAAQS and PSD increment permit application analyses are performed with air dispersion modeling, such as running AERMOD in a manner consistent with the Guideline on Air Quality Models. In order to ensure consistency in how air impacts are determined, both existing sources and newly permitted sources should be assessed using the same methods. From the Guideline on Air Quality Models:

> The *Guideline* is used by EPA, States, and industry to prepare and review new source permits and State Implementation Plan revisions. The *Guideline* is intended to ensure consistent air quality analyses for activities regulated at 40 CFR 51.112, 51.117, 51.150, 51.160, 51.166, and 52.21.[15]

Allowing existing sources to use monitoring (assuming adequate monitoring even exists or could exist), results in a lower standard of compliance verification than that being used for new permit applicants.

Concluding Remarks

Using AERMOD for one-hour SO_2 NAAQS SIP submissions is reasonable and reliable. AERMOD has undergone rigorous model evaluations, was subjected to numerous peer-reviewed studies, and has already been used in hundreds, if not thousands, of air quality impact analyses of major emission sources. USEPA must not exchange their existing guideline model for an ambient air monitoring program which will never be able to verify compliance with the one-hour SO_2 NAAQS.

Based on my experience with both modeling and monitoring, I believe that air modeling, using AERMOD, is the best available method for verifying compliance with the one-hour SO_2 NAAQS. I suggest that USEPA's proposed hybrid modeling and monitoring implementation

[15] USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, November 9, 2005, Section II. (http://www.epa.gov/ttn/scram/guidance/guide/appw_05.pdf)

approach for one-hour SO_2 NAAQS SIP submissions should be heavily weighted towards modeling.

Thank you for the opportunity to submit these comments on USEPA's guidance for one-hour SO_2 NAAQS SIP submissions.

Sincerely,

Camille Sears

Camille Sears

Camille Marie Sears 502 W. Lomita Ave., Ojai, CA 93023

Tel: (805) 646-2588 e-mail: camille.marie@sbcglobal.net

Summary

I have over 30 years of regulatory and private-sector experience in air quality impact analyses, health risk assessments, meteorological monitoring, and geographic information systems. I specialize in litigation support; I have successfully provided testimony in numerous cases, both as an individual consultant and as part of a team of experts.

Education

- M.S., Atmospheric Science, University of California, Davis, 1980.
- B.S., Atmospheric Science, University of California, Davis, 1978.

Air Dispersion Modeling

- I am experienced in applying many different air dispersion models, including programs still in the development phase. I have prepared well over 1,000 air dispersion modeling analyses requiring the use of on-site or site-specific meteorological data. These runs were made with the USEPA ISC, OCD, MESOPUFF, INPUFF, CALPUFF, ISC-PRIME, AERMOD, COMPLEX-I, MPTER, and other air dispersion models.
- I prepared and submitted technical comments to the USEPA on beta-testing versions of AERMOD; these comments are being addressed and will be incorporated into the model and instructions when it is ready for regulatory application.
- I am experienced in performing air dispersion modeling for virtually every emission source type imaginable. I have modeled:
  Refineries and associated activities;
  Mobile sources, including cars, trains, airplanes, trucks, and ships;
  Power plants, including natural gas and coal-fired;
  Smelting operations;
  Area sources, such as housing tracts, biocides from agricultural operations, landfills, highways, fugitive dust sources, airports, oil and gas seeps, and ponds;
  Volume sources, including fugitive emissions from buildings and diesel construction combustion emissions;
  Small sources, including dry cleaners, gas stations, surface coating operations, plating facilities, medical device manufacturers, coffee roasters, ethylene oxide sterilizers, degreasing operations, foundries, and printing companies;
  Cooling towers and gas compressors;
  Diatomaceous earth, rock and gravel plants, and other mining operations;
  Offshore oil platforms, drilling rigs, and processing activities;
  Onshore oil and gas exploration, storage, processing, and transport facilities;
  Fugitive dust emissions from roads, wind erosion, and farming activities;
  Radionuclide emissions from actual and potential releases.
- I have extensive experience in modeling plume depletion and deposition from air releases of particulate emissions.
- As a senior scientist, I developed the Santa Barbara County Air Pollution Control District (SBAPCD) protocol on air quality modeling. I developed extensive modeling capabilities for the SBAPCD on VAX 8600 and Intel I-860 computer systems; I acted as systems analyst for the SBAPCD air quality modeling system; I served as director of air quality analyses for numerous major energy projects; I performed air quality impact analyses using inert and photochemical models, including EPA, ARB and private-sector models; I performed technical review and evaluating air quality and wind field models; I developed software to prepare model inputs consistent with the SBAPCD protocol on air quality modeling for OCD, OCDCPM, MPTER, COMPLEX-I/II and ISC.
- I provided detailed review and comments on the development of the Minerals Management Service OCD model. I developed the technical requirements for and

supervised the development of the OCDCPM model, a hybrid of the OCD, COMPLEX-I and MPTER models.

- I prepared the "Modeling Exposures of Hazardous Materials Released During Transportation Incidents" report for the California Office of Environmental Health Hazard Assessment (OEHHA). This report examines and rates the ADAM, ALOHA, ARCHIE, CASRAM, DEGADIS, HGSYSTEM, SLAB, and TSCREEN models for transportation accident consequence analyses of a priority list of 50 chemicals chosen by OEHHA. The report includes a model selection guide for adequacy of assessing priority chemicals, averaging time capabilities, isopleth generating capabilities, model limitations and concerns, and model advantages.
- I am experienced in assessing uncertainty in emission rate calculations, source release, and dispersion modeling. I have developed numerous probability distributions for input to Monte Carlo simulations, and I was a member of the External Advisory Group for the California EPA *Air Toxics Hot Spots Program Risk Assessment Guidelines, Part IV, Technical Support Document for Exposure Assessment and Stochastic Analysis*.

Health Risk Assessment

- I have prepared more than 300 health risk assessments of major air toxics sources. These assessments were prepared for AB 2588 (the Air Toxics "Hot Spots" Information and Assessment Act of 1987), Proposition 65, and other exposure analysis activities. More than 120 of these exposure assessments were prepared for Proposition 65 compliance verification in a litigation support setting.
- I reviewed approximately 300 other health risk assessments of toxic air pollution sources in California. The regulatory programs in this review include AB 2588, Proposition 65, the California Environmental Quality Act, and other exposure analysis activities. My clients include the California Attorney General's Office, the Los Angeles County District Attorney's Office, the SBAPCD, the South Coast Air Quality Management District, numerous environmental and community groups, and several plaintiff law firms.
- I am experienced in assessing public health risk from continuous, intermittent, and accidental releases of toxic emissions. I am experienced in generating graphical presentations of risk results, and characterizing risks from carcinogenic and acute and chronic noncarcinogenic pollutants.
- I am experienced in communicating adverse health risks discovered through the Proposition 65 and AB 2588 processes. I have presented risk assessment results in many public settings -- to industry, media, and the affected public.
- For four years, I was the Air Toxics Program Coordinator for the SBAPCD. My duties included: developing and managing the District air toxics program; supervising District staff assigned to the air toxics program; developing District air toxics rules, regulations, policies and procedures; management of all District air toxics efforts, including AB 2588, Proposition 65, and federal activities; developing and tracking the SBAPCD air toxics budget.
- I have prepared numerous calculations of exposures from indoor air pollutants. A few examples include: diesel PM_{10} inside school buses, formaldehyde inside temporary school buildings, lead from disturbed paint, phenyl mercuric acetate from water-based paints and drywall mud, and tetrachloroethene from recently dry-cleaned clothes.

Litigation Support

- I have prepared numerous analyses in support of litigation, both in Federal and State Courts. I am experienced in preparing F.R.C.P. Rule 26(a)(2) expert reports and providing deposition and trial testimony (I have prepared eight Rule 26 reports). Much of my work is focused on human dose and risk reconstruction resulting from multiple air emission sources (lifetime and specific events).

- I am experienced in preparing declarations (many dozens) and providing expert testimony in depositions and trials (see my testimony history).
- I am experienced in providing support for legal staff. I have assisted in preparing numerous interrogatories, questions for depositions, deposition reviews, various briefs and motions, and general consulting.
- Recent examples of my work include:
  DTSC v. Interstate Non-Ferrous; United States District Court, Eastern District of California (2002).
  In this case I performed air dispersion modeling, downwind soil deposition calculations, and resultant soil concentrations of dioxins (TCDD TEQ) from historical fires at a smelting facility. I prepared several Rule 26 Reports in my role of assisting the California Attorney General's Office in trying this matter.
  Akee v. Dow et al.; United States District Court, District of Hawaii (2003-2004).
  In this case I performed air dispersion modeling used to quantify air concentrations and reconstruct intake, dose, excess cancer risk, and noncancer chronic hazard indices resulting from soil fumigation activities on the island of Oahu, Hawaii. I modeled 319 separate AREAPOLY pineapple fields for the following chemicals: DBCP, EDB, 1,3-trichloropropene, 1,2-dichloropropane, and epichlorohydrin. I calculated chemical flux rates and modeled the emissions from these fumigants for years 1946 through 2001 (56 years) for 34 test plaintiffs and 97 distinct home, school, and work addresses. I prepared a Rule 26 Expert Report, successfully defended against Daubert challenges, and testified in trial.
  Lawrence O'Connor v. Boeing North America, Inc., United States District Court, Central District of California, Western Division (2004-2005).
  In this case I performed air dispersion modeling, quantified air concentrations, and reconstructed individual intake, dose, and excess cancer risks resulting from approximately 150 air toxics sources in Los Angeles and Ventura Counties, California. I prepared these analyses for years 1950 through 2000 (51 years) for 173 plaintiffs and 741 distinct home, school, and work addresses. I prepared several Rule 26 Reports, and the case settled on the eve of trial in September, 2005. Defendants did not attempt a Daubert challenge of my work.
- I have prepared hundreds of individual and region-wide health risk assessments in support of litigation. These analyses include specific sub-tasks, including: calculating emission rates, choosing proper meteorological data inputs, performing air dispersion modeling, and quantifying intake, dose, excess cancer risk, and acute/chronic noncancer health effects.
- I have prepared over 120 exposure assessments for Proposition 65 litigation support. In these analyses, my tasks include: reviewing AB 2588 risk assessments and other documents to assist in verifying compliance with Proposition 65; preparing exposure assessments consistent with Proposition 65 Regulations for carcinogens and reproductive toxicants; using a geographic information system (Atlas GIS) to prepare exposure maps that display areas of required warnings; calculating the number of residents and workers exposed to levels of risk requiring warnings (using the GIS); preparing declarations, providing staff support, and other expert services as required. I have also reviewed scores of other assessments for verifying compliance with Proposition 65. My proposition 65 litigation clients include the California Attorney General's Office, the Los Angeles County District Attorney's Office, As You Sow, California Community Health Advocates, Center for Environmental Health, California Earth Corps, Communities for a Better Environment, Environmental Defense Fund, Environmental Law Foundation, and People United for a Better Oakland.

Geographic Information Systems

- ArcGIS: I am experienced in preparing presentation and testimony maps using ArcView versions 3 through 9.3. I developed methods to convert AutoCAD DXF files to ArcView polygon theme shape files for use in map overlays.

- I have created many presentation maps with ArcView using MrSID DOQQ and other aerial photos as a base and then overlaying exposure regions. This provides a detailed view (down to the house level) of where air concentrations and health risks are projected to occur.
- Using ArcView, I have created numerous presentations using USGS Topographic maps (as TIFF files) as the base on to which exposure regions are overlaid.
- MapInfo for Windows: I prepared numerous presentation maps including exposure isopleths, streets and highways, and sensitive receptors, labels. I developed procedures for importing Surfer isopleths in AutoCAD DXF format as a layer into MapInfo.
- Atlas GIS: I am experienced in preparing presentation maps with both the Windows and DOS versions of Atlas GIS. In addition to preparing maps, I use Atlas GIS to aggregate census data (at the block group level) within exposure isopleths to determine the number of individuals living and working within exposure zones. I am also experienced in geocoding large numbers of addresses and performing statistical analyses of exposed populations.
- I am experienced in preparing large-scale graphical displays, both in hard-copy and for PowerPoint presentations. These displays are used in trial testimony, public meetings, and other litigation support.
- I developed a Fortran program to modify AutoCAD DXF files, including batch-mode coordinate shifting for aligning overlays to different base maps.

Ozone and Long-Range Transport

- I developed emission reduction strategies and identified appropriate offset sources to mitigate project emissions liability. For VOC offsets, I developed and implemented procedures to account for reactivity of organic compound species for ozone impact mitigation. I wrote Fortran programs and developed a chemical database to calculate ozone formation potential using hydroxyl radical rate constants and an alkane/non-alkane reactive organic compound method.
- I provided technical support to the Joint Interagency Modeling Study and South Central Coast Cooperative Aerometric Monitoring Program. With the SBAPCD, I provided technical comments on analyses performed with the EKMA, AIRSHED, and PARIS models. I was responsible for developing emissions inventory for input into regional air quality planning models.
- I was the project manager for the Santa Barbara County Air Quality Attainment Plan Environmental Impact Report (EIR). My duties included: preparing initial study; preparation and release of the EIR Notice of Preparation; conducting public scoping hearings to obtain comments on the initial study; managing contractor efforts to prepare the draft EIR.
- I modified, tested, and compiled the Fortran code to the MESOPUFF model (the precursor to CALPUFF) to incorporate critical dividing streamline height algorithms. The model was then applied as part of a PSD analysis for a large copper-smelting facility.
- I am experienced in developing and analyzing wind fields for use in long-range transport and dispersion modeling.
- I have run CALPUFF numerous times. I use CALPUFF to assess visibility effects and both near-field and mesoscale air concentrations from various emission sources, including power plants.

Emission Rate Calculations

- I developed methods to estimate and verify source emission rates using air pollution measurements collected downwind of the emitting facility, local meteorological data, and dispersion models. This technique is useful in determining whether reported source emission rates are reasonable, and based on monitored and modeled air concentrations, revised emission rates can be created.

- I am experienced in developing emission inventories of hundreds of criteria and toxic air pollutant sources. I developed procedures and programs for quantifying emissions from many air emission sources, including: landfills, diesel exhaust sources, natural gas combustion activities, fugitive hydrocarbons from oil and gas facilities, dry cleaners, auto body shops, and ethylene oxide sterilizers.
- I have calculated flux rates (and modeled air concentrations) from hundreds of biocide applications to agricultural fields. Emission sources include aerial spraying, boom applications, and soil injection of fumigants.
- I am experienced in calculating emission rates using emission factors, source-test results, mass-balance equations, and other emission estimating techniques.

Software Development

- I am skilled in computer operation and programming, with an emphasis on Fortran 95.
- I am experienced with numerous USEPA dispersion models, modifying them for system-specific input and output, and compiling the code for personal use and distribution. I own and am experienced in using the following Fortran compilers: Lahey Fortran 95, Lahey Fortran 90 DOS-Extended; Lahey F77L-EM32 DOS-Extended; Microsoft PowerStation 32-bit DOS-Extended; and Microsoft 16-bit.
- I configured and operated an Intel I-860 based workstation for the SBAPCD toxics program. I created control files and recoded programs to run dispersion models and risk assessments in the 64-bit I-860 environment (using Portland Group Fortran).
- Using Microsoft Fortran PowerStation, I wrote programs to extract terrain elevations from both 10-meter and 30-meter USGS DEM files. Using a file of discrete x,y coordinates, these programs extract elevations within a user-chosen distance for each x,y pair. The code I wrote can be run in steps or batch mode, allowing numerous DEM files to be processed at once.
- I have written many hundreds of utilities to facilitate data processing, entry, and quality assurance. These utility programs are a “tool chest” from which I can draw upon to expedite my work.
- While at the SBAPCD, I designed the ACE2588 model - the first public domain multi-source, multi-pathway, multi-pollutant risk assessment model. I co-developed the structure of the ACE2588 input and output files, supervised the coding of the model, tested the model for quality assurance, and for over 10 years I provided technical support to about 200 users of the model. I was responsible for updating the model each year and ensuring that it is consistent with California Air Pollution Control Officer’s Association (CAPCOA) Risk Assessment Guidelines.
- I developed and coded the ISC2ACE and ACE2 programs for distribution by CAPCOA. These programs were widely used in California for preparing AB 2588 and other program health risk assessments. ISC2ACE and ACE2 contain "compression" algorithms to reduce the hard drive and RAM requirements compared to ISCST2/ACE2588. I also developed ISC3ACE/ACE3 to incorporate the revised ISCST3 dispersion model requirements.
- I developed and coded the "HotSpot" system - a series of Fortran programs to expedite the review of air toxics emissions data, to prepare air quality modeling and risk assessment inputs, and to prepare graphical risk presentations.
- I customized ACE2588 and developed a mapping system for the SBAPCD. I modified the ACE2588 Fortran code to run on an Intel I-860 RISC workstation; I updated programs that allow SBAPCD staff to continue to use the "HotSpot" system – a series of programs that streamline preparing AB 2588 risk assessments; I developed a risk assessment mapping system based on MapInfo for Windows which linked the MapInfo mapping package to the "HotSpot" system.
- I developed software for electronic submittal of all AB 2588 reporting requirements for the SBAPCD. As an update to the "HotSpot" system software, I created software that allows facilities to submit all AB 2588 reporting data, including that needed for risk prioritization, exposure assessment, and presentation mapping. The data submitted

by the facility is then reformatted to both ATDIF and ATEDS formats for transmittal to the California Air Resources Board.

- I developed and coded Fortran programs for AB 2588 risk prioritization; both batch and interactive versions of the program were created. These programs were used by several air pollution control districts in California.

Air Quality and Meteorological Monitoring

- I was responsible for the design, review, and evaluation of an offshore source tracer gas study. This project used both inert tracer gas and a visible release to track the onshore trajectory and terrain impaction of offshore-released buoyant plumes.
- I developed the technical requirements for the Santa Barbara County Air Quality/Meteorological Monitoring Protocol. I developed and implemented the protocol for siting pre- and post-construction air quality and meteorological PSD monitoring systems. I determined the instrumentation requirements, and designed and sited over 30 such PSD monitoring systems. Meteorological parameters measured included ambient temperature, wind speed, wind direction, sigma-theta (standard deviation of horizontal wind direction fluctuations), sigma-phi (standard deviation of vertical wind direction fluctuations), sigma-v (standard deviation of horizontal wind speed fluctuations), and sigma-w (standard deviation of vertical wind speed fluctuations). Air pollutants measured included PM_{10}, SO_2, NO, NO_x, NO_2, CO, O_3, and H_2S.
- I was responsible for data acquisition and quality assurance for an offshore meteorological monitoring station. Parameters measured included ambient temperature (and delta-T), wind speed, wind direction, and sigma-theta.
- In coordination with consultants performing air monitoring for verifying compliance with Proposition 65 and other regulatory programs, I wrote software to convert raw meteorological data to hourly-averaged values formatted for dispersion modeling input.
- Assisting the Ventura Unified School District, I collected air, soil, and surface samples and had them analyzed for chlorpyrifos contamination (caused by spray drift from a nearby citrus orchard). I also coordinated the analysis of the samples, and presented the results in a public meeting.
- Using summa canisters, I collected numerous VOC samples to characterize background and initial conditions for use in Santa Barbara County ozone attainment modeling. I also collected samples of air toxics (such as xylenes downwind of a medical device manufacturer) to assist in enforcement actions.
- For the California Attorney General's Office, I purchased, calibrated, and operated a carbon monoxide monitoring system. I measured and reported CO air concentrations resulting from numerous types of candles, gas appliances, and charcoal briquettes.

Support, Training, and Instruction

- For 10 years, I provided ACE2588 risk assessment model support for CAPCOA. My tasks included: updating the ACE2588 risk assessment model Fortran code to increase user efficiency and to maintain consistency with the CAPCOA Risk Assessment Guidelines; modifying the Fortran code to the EPA ISC model to interface with ACE2588; writing utility programs to assist ACE2588 users; updating toxicity data files to maintain consistency with the CAPCOA Risk Assessment Guidelines; developing the distribution and installation package for ACE2588 and associated programs; providing technical support for all users of ACE2588.
- I instructed approximately 20 University Professors through the National Science Foundation Faculty Enhancement Program. Instruction topics included: dispersion modeling, meteorological data, environmental fate analysis, toxicology of air pollutants, and air toxics risk assessment; professors were also trained on the use of the ISC2ACE dispersion model and the ACE2 exposure assessment model.
- I was the instructor of the Air Pollution and Toxic Chemicals course for the University of California, Santa Barbara, Extension certificate program in Hazardous Materials Management. Topics covered in this course include: detailed review of criteria and

noncriteria air pollutants; air toxics legislation and regulations; quantifying toxic air contaminant emissions; criteria and noncriteria pollutant monitoring; air quality modeling; health risk assessment procedures; health risk management; control/mitigating air pollutants; characteristics and modeling of spills and other short-term releases of air pollutants; acid deposition, precipitation and fog; indoor/occupational air pollution; the effect of chlorofluorocarbons on the stratospheric ozone layer. I taught this course for five years.

- I have trained numerous regulatory staff on the mechanics of dispersion modeling, health risk assessments, emission rate calculations, and presentation mapping. I provided detailed training to SBAPCD staff in using the HARP program, and in comparing and contrasting ACE2588 analyses to HARP.
- Through UCSB Extension, I taught a three-day course on dispersion modeling, preparing health risk assessments, and presentation mapping with Atlas GIS and MapInfo.
- I hold a lifetime California Community College Instructor Credential (Certificate No. 14571); Subject Matter Area: Physics.
- I have presented numerous guest lectures – at universities, public libraries, farm groups, and business organizations.

Indoor Air Quality

- I prepared mercury exposure assessments caused by applying indoor latex paints containing phenylmercuric acetate as a biocide.
- Using a carbon monoxide monitor, I examined CO concentrations inside rooms of varying sizes and with a range of ventilation rates. Indoor sources of CO emissions included gas appliances and candles. I also examined CO concentrations within parking garages.
- I calculated air concentrations of tetrachloroethene inside homes and cars from offgassing dry-cleaned clothes.
- I examined air concentrations of formaldehyde inside manufactured homes and school buildings. I also calculated formaldehyde exposures from carpet emissions within homes.
- I assessed lead air exposures and surface deposition from deteriorating lead-based paint applications within apartments. I also calculated lead air concentrations and associated exposures resulting from milling of brass pipes and fittings.
- While employed by the SBAPCD, I assisted with exposure assessment and awareness activities for Santa Barbara County high-exposure radon areas.
- I calculated BTEX air concentrations and health risks inside homes from leaking underground fuel tanks and resultant contaminated soil plumes. I also assessed indoor VOC exposures and remediation options with the AERIS model.
- I have assessed indoor air concentrations from numerous volatile organic compound sources, including printing operations, microprocessor manufacturing, and solvent degreasing activities.
- I calculated indoor emission flux rates and air concentrations of elemental mercury for plaintiff litigation support purposes. This analysis included an exposure reconstruction (home, school, workplace, outside, and other locations) for 16 plaintiffs who had collected spilled mercury in their village. The study required room volume calculations, air exchange rates, exposure history reconstruction, mercury quantity and droplet size estimation, elemental mercury flux rate calculations (including decay with time), and resultant air concentration calculations. I calculated both peak acute (two-hour) and 24-hour average concentrations.
- I calculated emission rates of lead from disturbed paint surfaces. I then calculated indoor air concentrations of lead for plaintiff litigation support purposes.

Publications

- To establish a legal record and to assist in environmental review, I prepared and submitted dozens of detailed comment letters to regulatory and decision-making bodies.
- I have contributed to over 100 Environmental Impact Statements/Reports and other technical documents required for regulatory decision-making.
- I prepared two software review columns for the *Journal of the Air and Waste Management Association*.
- Correlations of total, diffuse, and direct solar radiation with the percentage of possible sunshine for Davis, California. Solar Energy, 27(4):357-360 (1981).

Employment History

• Self-Employed Air Quality Consultant	1992 to 2012
• Santa Barbara County APCD, Senior Scientist	1988 to 1992
• URS Consultants, Senior Scientist	1987 to 1988
• Santa Barbara County APCD, Air Quality Engineer	1983 to 1987
• Dames and Moore, Meteorologist	1982 to 1983
• UC Davis, Research Associate	1980 to 1981

Testimony History

- People of the State of California v. McGhan Medical, Inc.
  Deposition: Two dates: June - July 1990
- People of the State of California v. Santa Maria Chili
  Deposition: Two dates: August 1990
- California Earth Corps v. Johnson Controls, Inc.
  Deposition: October 26, 1995
- Larry Dale Anderson v. Pacific Gas & Electric
  Deposition: January 4, 1996
  Arbitration: January 17, 1996
- Adams v. Shell Oil Company
  Deposition: July 3, 1996
  Trial: August 21, 1996
  Trial: August 22, 1996
- California Earth Corps v. Teledyne Battery Products
  Deposition: January 17, 1997
- Marlene Hook v. Lockheed Martin Corporation
  Deposition: December 15, 1997
- Lawrence O'Connor v. Boeing North America, Inc.
  Deposition: May 8, 1998
- Bristow v. Tri Cal
  Deposition: June 15, 1998
- Abeyta v. Pacific Refining Co.
  Deposition: January 16, 1999
  Arbitration: January 25, 1999
- Danny Aguayo v. Betz Laboratories, Inc.
  Deposition: July 10, 2000
  Deposition: July 11, 2000
- Marlene Hook v. Lockheed Martin Corporation
  Deposition: September 18, 2000
  Deposition: September 19, 2000
- Tressa Haddad v. Texaco
  Deposition: March 9, 2001

- California DTSC v. Interstate Non-Ferrous
  United States District Court, Eastern District of California,
  Case No. CV-F-97 50160 OWW LJO
  Deposition: April 18, 2002
- Akee v. Dow et al.
  United States District Court, District of Hawaii,
  Case No. CV 00 00382 BMK
  Deposition: April 16, 2003
  Deposition: April 17, 2003
  Deposition: January 7, 2004
  Trial: January 17, 2004
  Trial: January 20, 2004
- Center for Environmental Health v. Virginia Cleaners
  Superior Court of the State of California
  County of Alameda, Case No. 2002 07 6091
  Deposition: March 4, 2004
- Application for Certification for Small Power Plant Exemption – Riverside Energy Resource Center. Docket No. 04-SPPE-01.
  Evidentiary Hearing Testimony before the California Energy Resource Conservation And Development Commission: August 31, 2004
- Lawrence O'Connor v. Boeing North America, Inc.
  United States District Court, Central District of California,
  Western Division. Case No. CV 97-1554 DT (RCx)
  Deposition: March 1, 2005
  Deposition: March 2, 2005
  Deposition: March 3, 2005
  Deposition: March 15, 2005
  Deposition: April 25, 2005
- Clemente Alvarez, et al, v. Western Farm Service, Inc.
  Superior Court of the State of California
  County of Kern, Metropolitan Division. Case No. 250 621 AEW
  Deposition: April 11, 2005
- Gary June et al. v. Union Carbide Corporation & UMETCO Minerals Corporation
  United States District Court, District of Colorado,
  Case No. 04-CV-00123 MSK-MJW
  Deposition: January 9, 2007
- Alberto Achas Castillo, et al. v. Newmont Mining Corporation, et al.
  District Court, Denver County, Colorado,
  Case No. 01-CV-4453
  Deposition: February 19, 2007
  Deposition: February 20, 2007
  Arbitration: March 6, 2007
  Arbitration: March 7, 2007
- Jacobs Farm/Del Cabo Inc. v. Western Farm Service, Inc.
  Superior Court of the State of California
  County of Santa Cruz, Case No. CV 157041
  Deposition: May 8, 2008
  Deposition: August 26, 2008
  Trial: September 18, 2008
  Trial: September 24, 2008

- Environmental Law Foundation et al. v. Laidlaw Transit Inc. et al.
  Superior Court of the State of California
  County of San Francisco, Case No. CGC-06-451832
  Deposition: July 8, 2008
- Application of NRG Texas Power, LLC for State Air Quality Permit No. 79188 and Prevention of Significant Deterioration Air Quality Permit PSD-TX-1072.
  State Office of Administrative Hearings Docket No. 582-08-0861;
  TCEQ Docket No. 2007-1820-AIR.
  Deposition: February 12, 2009
  Hearing: February 24, 2009
- Application of IPA Coleto Creek, LLC for State Air Quality Permit No. 83778 and Prevention of Significant Deterioration Air Quality Permit PSD-TX-1118 and for Hazardous Air Pollutant Major Source [FCAA § 112(G)] Permit HAP-14.
  State Office of Administrative Hearings Docket No. 582-09-2045;
  TCEQ Docket No. 2009-0032-AIR.
  Deposition: September 21, 2009
  Hearing: October 16, 2009
- Application of Las Brisas Energy Center, LLC for State Air Quality Permit No. 85013 and Prevention of Significant Deterioration Air Quality Permit PSD-TX-1138 and for Hazardous Air Pollutant Major Source [FCAA § 112(G)] Permit HAP-48 and Plantwide Applicability Permit PAL41.
  State Office of Administrative Hearings Docket No. 582-09-2005;
  TCEQ Docket No. 2009-0033-AIR.
  Deposition: October 9, 2009
  Hearing: November 5, 2009
  Hearing: November 6, 2009
- Abarca, Raul Valencia, et al. v. Merck & Co., Inc., et al.
  United States District Court, Eastern District of California,
  Case No. 1:07-CV-00388-OWW-DLB
  Deposition: April 13, 2010
  Daubert Hearing: October 7, 2010
  Daubert Hearing: October 13, 2010
  Daubert Hearing: October 14, 2010
  Rule 706 Expert Hearing: December 2, 2010
  Trial: February 10, 2011
- Commonwealth of Kentucky, Energy and Environment Cabinet, File No. DAQ-41109-048. Sierra Club, Kentucky Environmental Foundation, and Kentuckians for the Commonwealth v. Energy and Environment Cabinet, Division for Air Quality, and East Kentucky Power Cooperative, Inc.
  Deposition: August 31, 2010

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JOHN K. VAN DE KAMP, Attorney General
of the State of California
ANDREA SHERIDAN ORDIN
Chief Assistant Attorney General
THEODORA BERGER
Assistant Attorney General
CRAIG C. THOMPSON
EDWARD G. WEIL
CLIFFORD RECHTSCHAFFEN
Deputy Attorneys General
2101 Webster Street
Oakland, CA 94612
Telephone: (415) 464-0572

Attorneys for the People of the State of California

SUPERIOR COURT OF THE STATE OF CALIFORNIA

COUNTY OF SANTA BARBARA

PEOPLE OF THE STATE OF CALIFORNIA ex. rel. JOHN K. VAN DE KAMP, Attorney General of the State of California, Plaintiffs, v. SANTA MARIA CHILI, INC. Defendant.	No. SM 64010 (Case transferred to South County, 2/26/90) **DECLARATION OF JOHN C. VIMONT** DATE: Dec. 14, 1990 TIME: 9:00 a.m. Dept: To Be Assigned

I, John C. Vimont, declare:

1. I am currently employed by the United States Environmental Protection Agency (hereafter "EPA"), Region IX (hereafter the "Region" or "Regional Office") as the Regional Meteorologist. I have been employed in this position since June 1987.

a. As the Regional Meteorologist I serve as the Region's expert on air quality modeling, meteorological information and ambient air impact analyses. My position is

1 within the Air and Toxics Division of the Regional Office. I
2 provide support to that division; to the other divisions within
3 the Region, such as the Hazardous Waste Division; and to state
4 and local agencies within Region IX. One of the primary duties
5 of my position is to ensure that appropriate air quality modeling
6 techniques are used by this and other agencies when conducting
7 ambient air quality impact analyses.
8 b. There are a variety of "air quality models."
9 These include conceptual models, qualitative descriptions of the
10 behavior of pollutants in the atmosphere; physical models, scaled
11 models of pollution sources and their surroundings studied in a
12 controlled environment, such as a wind tunnel; statistical
13 models, which encompass statistically based descriptions of
14 source-receptor relationships; and mathematical models, which are
15 mathematical representations of the physical processes which lead
16 to transport and dispersion of pollutants in the atmosphere. The
17 focus of the remaining discussion is on mathematical models;
18 hereafter any reference to an air quality model is implicitly
19 meant to refer to a mathematical air quality model.
20 c. I perform, review and oversee air quality modeling
21 for a variety of different sources and source types. These
22 include stationary sources with emissions emanating from a stack,
23 including stack sources with aerodynamic downwash induced by
24 nearby buildings; stationary sources with emissions emanating
25 from a broad area, commonly called area sources; mobile sources,
26 emissions from automobiles, trucks, busses, aircraft, etc.; and
27 urban and regional scale modeling, which encompasses modeling all

1 of the above processes together on the scale of an entire urban
2 area or over a number of urban areas together.
3 d. The pollutants modeled include both inert
4 pollutants, those which remain chemically stable for long periods
5 of time in the atmosphere, and chemically reactive pollutants,
6 those which undergo relatively rapid chemical transformation and
7 those which are not directly emitted, but rather form through a
8 series of chemical reactions within the atmosphere.
9 2. Previous to my employment at EPA, I worked from March
10 1982 to June 1987 as an Environmental Engineering Specialist in
11 the Air Quality Bureau of the State of New Mexico. My primary
12 responsibilities there were very similar to my current position
13 at EPA. I performed ambient impact analyses of various air
14 pollution sources and conducted engineering analyses of the
15 sources to determine emission characteristics. The primary focus
16 of the analyses was on inert pollutants from stationary sources.
17 a. From August 1978 to March 1982 I worked for the
18 Atmospheric Science Department at Colorado State University (CSU)
19 as a Research Assistant. I worked on a variety of basic
20 scientific research projects dealing with cloud physics. My
21 primary area of research dealt with the uptake of acidic
22 pollutants in snow.
23 b. From November 1977 to August 1978 I worked as a
24 Physical Science Aide for the Pacific Marine Environmental
25 Laboratory of the National Oceanographic and Atmospheric
26 Administration. My duties there involved writing a
27

1 climatological summary of Puget Sound and analyzing the affects
2 of winds on oil spill transport in Puget Sound.
3 3. I received a Bachelor of Science Degree in Atmospheric
4 Sciences from the University of Washington in 1978 and a Master
5 of Science Degree in Atmospheric Science from Colorado State
6 University.
7 4. As the Regional Meteorologist, I routinely evaluate the
8 adequacy of air quality modeling on a technical basis and with
9 respect to its acceptability in the regulatory framework.
10 Acceptable air quality modeling and analysis procedures are
11 outlined in The Guideline on Air Quality Models (Revised) (EPA
12 450/2-78-027R, July 1986, Supplement A, July 1987) (hereafter the
13 "Guideline"). The Guideline was first published in April 1978 to
14 satisfy the requirements of §320 of the 1977 amendments to the
15 Clean Air Act. The Guideline specifies appropriate models to use
16 and provides guidance on their appropriate application. The
17 Guideline provides a common basis for estimating the air quality
18 concentrations used in assessing control strategies and
19 developing emission limits. The modeling techniques embodied in
20 the Guideline are subjected to public, scientific review in
21 accordance with §320 of the CAA.
22 a. EPA has four primary, on-going activities to
23 provide direct input for consistency in implementation and for
24 revisions to the Guideline. The first is a series of annual EPA
25 workshops conducted for the purpose of ensuring consistency and
26 providing clarification in the application of models. The second
27 activity, directed toward the improvement of modeling procedures,

1 is the cooperative agreement that EPA has with the scientific
2 community represented by the American Meteorological Society.
3 This agreement provides scientific assessment of procedures and
4 proposed techniques and sponsors workshops on key technical
5 issues. The third activity is the solicitation and review of new
6 models from the technical and user community. In the March 27,
7 1980 Federal Register, a procedure was outlined for the submittal
8 to EPA of privately developed models. After extensive evaluation
9 and scientific review, these models, as well as those made
10 available by EPA, are considered for recognition in the
11 Guideline. The fourth activity is the extensive, on-going
12 research efforts by EPA and others in air quality and
13 meteorological modeling.
14 b. From the aforementioned process a number of models
15 were selected as being refined models, suitable for regulatory
16 application. Each refined model underwent intensive evaluation.
17 The evaluation exercises include statistical measures of model
18 performance in comparison with measured air quality data and,
19 where possible, peer scientific reviews.
20 c. After a model has been selected as a refined model
21 for a particular type of application, EPA considers the model
22 appropriate for general use for that type of application without
23 undergoing case-by-case evaluation, provided that the application
24 follows the EPA recommendations specified in the Guideline.
25 5. The Industrial Source Complex models (hereafter ISC),
26 have been deemed refined models by EPA for application to
27 industrial complexes. The ISC models consist of a short term

model (ISCST) and a long term model (ISCLT). Long term models, such as ISCLT, are only appropriate for calculating ambient concentrations for averaging periods of months to a year. Short term models, such as ISCST, can be used for averaging times from one hour up to a year. (Hereafter my comments referring to ISC apply to both ISCST and ISCLT, unless otherwise specified.) The ISC model is appropriate for simulating the emissions of a variety of industrial air emissions. These would include emissions from free standing stacks and vents; stacks and vents which are influenced by the aerodynamic effects of nearby structures; emissions from area sources, such as storage piles or evaporative emissions from open tanks; line sources, such as roadways; and volume sources, such as large openings in buildings from which emissions emanate. The model is appropriate for simulating the ambient impacts of relatively inert pollutants, such as ethylene oxide, which do not undergo rapid chemical transformation in the atmosphere. The model will calculate the ambient concentrations at a number of user-specified "receptor" locations.

a. For simulating a stack-type source, ISC requires the input of the location, emission rate, physical stack height, stack gas exit velocity, stack inside diameter, and stack gas temperature. If the source is affected by the aerodynamic effects of buildings then inputs would also include information about the building dimensions.

b. The ISC model also requires meteorological data as input. These data include the wind speed, wind direction,

temperature, stability class and mixing height. The meteorological data must be representative of the geographic area being modeled to be accepted for a refined regulatory application.

c. The ISC model has gone through a number of performance evaluation studies, as outlined above. The following are several references of evaluation studies involving ISC:

(1) Bowers, J. F., and A. J. Anderson, 1981. An Evaluation Study for the Industrial Source Complex (ISC) Dispersion Model, EPA Publication No. EPA-450/4-81-002. U. S. Environmental Protection Agency, Research Triangle Park, NC.

(2) Bowers, J. F., A. J. Anderson, and W. R. Hargraves, 1982. Tests of the Industrial Source Complex (ISC) Dispersion Model at the Armco Middle-town, Ohio Steel Mill, EPA Publication No. EPA-450/4-82-006. U. S. Environmental Protection Agency, Research Triangle Park, NC.

(3) Scire, J. S., and L. L. Schulman, 1981. Evaluation of the BLP and ISC Models with SF_6 Tracer Data and SO_2 Measurements at Aluminum Reduction Plants. Air Pollution Control Association Specialty Conference on Dispersion Modeling for Complex Sources, St. Louis, MO.

(4) Schulman, L. L. and S. R. Hanna, 1986. Evaluation of Downwash Modifications to the Industrial Source Complex Model. Journal of the Air Pollution Control Association, 36:258-264.

d. In my experience of conducting and reviewing air quality modeling analyses, I have found that of the EPA approved

1 models, the ISC model is the most widely used model for
2 determining the ambient concentrations of emissions from
3 industrial sources. This is primarily due to its ability to
4 simulate almost any type of industrial configuration and its
5 status as a refined model under EPA guidelines. EPA considers it
6 appropriate for use without undergoing case by case performance
7 evaluation.

8 6. When EPA has a refined model appropriate for a specific
9 type of application, such as the ISC model, the modeling results,
10 based on the appropriate input data, are generally preferred by
11 EPA over ambient monitoring data for determining emission
12 limitations for both new and existing sources. Normally, EPA
13 does not accept monitoring data as the sole basis for determining
14 an emission limitation. When a refined model is available, EPA
15 generally considers the model results alone (including background
16 concentrations) sufficient for determining ambient concentrations
17 of emissions from industrial sources and setting appropriate
18 emission limitations.

19 a. Monitoring data suffers from a number of
20 limitations. One of the primary limitations is that any given
21 monitor can only measure what is happening at the location where
22 the monitor is physically located and at the time it is
23 operating. In order to adequately detect the maximum impact of
24 any particular source, many monitors would have to be run over a
25 number of years. A monitoring program designed to adequately
26 detect a maximum concentration and to adequately characterize the
27 concentration field would be very expensive. A number of years

of data would be necessary to collect enough samples to cover all possible meteorological situations in combination with the different operating conditions of the facility. A monitoring program with only one or two monitors or of a very short duration would be inadequate to ensure that maximum ambient impacts would be detected.

b. The usual intent of conducting an ambient impact analysis of an air pollution source is to determine if the emissions are likely to affect human health or affect the environment. The ambient concentrations are compared against health or environmental affects data. Rather than helping to resolve a problem, a prolonged ambient monitoring study allows continued air quality degradation, which in turn affects the health or environmental quality which was to be protected. For a new source being proposed, it is impossible to measure its impacts, since it is not yet built.

c. The method of analysis preferred by EPA for determining the ambient concentrations resulting from emissions into the atmosphere of industrial sources, including toxic air emissions, is modeling. As discussed above, before EPA determines a model, such as ISC, to be a refined model, appropriate for general use, the model undergoes rigorous evaluation and is determined to yield accurate estimates of the ambient air concentrations resulting from emission sources under a variety of conditions. With a model, the source can be simulated under the full range of its potential operating and emission conditions, rather than being limited to the specific

1 operating conditions occurring during the period of a limited
2 monitoring study. The model can also yield ambient concentration
3 data at any number of receptor locations, rather than only at the
4 limited number of locations where a monitor is physically
5 located. Also, an air quality model provides the only practical
6 method of estimating the ambient impacts of a new source. A
7 model provides flexibility in an analysis and can be run
8 relatively quickly, at relatively little expense.
9 d. Modeling also allows source contributions to a
10 particular ambient concentration to be ascertained. If two
11 sources each emit the same pollutant, it is impossible to tell
12 from an ambient measurement of the specific pollutant, the
13 relative contributions to the measured ambient concentration,
14 unless there is some unique surrogate being emitted from one of
15 the facilities. Also, there is the uncertainty of whether a
16 heretofore unknown source of the pollutant of concern has
17 contributed to the measurement. Modeling, allows the impact of
18 each source to be calculated separately and in combination.
19 e. The use of monitoring data also pre-supposes that
20 there are acceptable and reliable monitoring techniques available
21 for the pollutant of interest. In the past, this has generally
22 been the case. EPA has established acceptable and reliable
23 methods of measuring a number of pollutants which were regulated
24 under the Clean Air Act. Recently, however, the issue of toxic
25 air contaminants has arisen. Ambient measurement techniques,
26 which can adequately and accurately detect a specific toxic air
27 contaminant, are not necessarily available. The transport and

dispersion of buoyant or neutral plumes of gaseous pollutants, which are relatively inert in the atmosphere, is the same, regardless of the specific chemical constituents of the gas. Therefore, modeling provides a useful technique for detecting levels of pollutants in the air if reliable ambient measurement techniques are not available.

f. EPA does recognize the usefulness of ambient measurements for information on background concentrations, provided reliable monitoring techniques are available. EPA does not recommend, however, that ambient measurements be used as the sole basis of setting emission limitations or determining the ambient concentrations resulting from emissions from an industrial source. These should be based on an appropriate modeling analysis.

I declare under penalty of perjury that the foregoing is true and correct.

DATED: November 30, 1990

JOHN C. VIMONT

Exhibit 9

AirData

Monitor Values Report

This report displays criteria pollutant summary data for individual monitoring sites. Read more about what's in this report.

1. Pollutant

SO2

2. Year

2011

3. Geographic Area

Texas

-- or --

Select a City (defined as CBSA) ...

-- or --

Select a County ...

4. Exceptional Events

- Include exceptional events data
- Exclude exceptional events data

Geographic Area: Texas
Pollutant: SO2
Year: 2011
Exceptional Events: Included (if any)
About this report

EPA Air Quality Standards:
Sulfur Dioxide: 75 ppb (1-hour), 140 ppb (24-hour)

The following data links are active for the next 10 minutes, after which you must resubmit your query.
Download PDF (printable page)
Download CSV (spreadsheet)

To sort a column in the table below, click on the column heading.

Duration Description=1 HOUR

Duration Description	Obs	First Max	Second Max	99th Percentile	Actual Exceedances	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
1 HOUR	8512	11	9	8	0	None	3	481130069	1415 Hinton Street	Dallas	Dallas	TX	06
1 HOUR	8299	16	11	11	0	None	1	481390016	2725 Old Fort Worth Road	Midlothian	Ellis	TX	06
1 HOUR	8499	12	9	6	0	None	1	481391044	900 Fm 667 Ellis County	Not in a city	Ellis	TX	06
1 HOUR	8161	13	10	10	0	None	1	481410037	250 Rim Rd	El Paso	El Paso	TX	06
1 HOUR	5833	13	12	11	0	None	1	481410044	800 S San Marcial Street	El Paso	El Paso	TX	06
1 HOUR	8630	16	13	11	0	None	1	481410053	700 West San Francisco Ave	El Paso	El Paso	TX	06
1 HOUR	8574	7	5	4	0	None	1	481410058	5050a Yvette Drive	El Paso	El Paso	TX	06
1 HOUR	8577	30	28	26	0	None	1	481670005	2516 1/2 Texas Avenue	Texas City	Galveston	TX	06
1 HOUR	8111	73	61	51	0	None	3	481830001	Gregg Co Airport Near Longview	Not in a city	Gregg	TX	06
1 HOUR	7242	24	15	10	0	None	1	482010046	7330 1/2 North Wayside	Houston	Harris	TX	06
1 HOUR	7840	39	27	24	0	None	2	482010051	13826 1/2 Croquet	Houston	Harris	TX	06
1 HOUR	8583	56	30	21	0	None	1	482010062	9726 1/2 Monroe	Houston	Harris	TX	06
1 HOUR	8305	39	33	25	0	None	1	482010070	5425 Polk Ave., Suite H	Houston	Harris	TX	06
1 HOUR	8608	60	44	34	0	None	1	482010416	7421 Park Place Blvd	Houston	Harris	TX	06
1 HOUR	8620	75	74	41	0	None	2	482011035	9525 1/2 Clinton Dr	Houston	Harris	TX	06
1 HOUR	8098	60	32	27	0	None	2	482011039	4514 1/2 Durant St	Deer Park	Harris	TX	06
1 HOUR	8287	18	17	15	0	None	1	482011050	4522 Park Rd	Seabrook	Harris	TX	06
1 HOUR	8489	439	126	26	4	None	1	482450009	1086 Vermont Avenue	Beaumont	Jefferson	TX	06
1 HOUR	8560	79	75	62	1	None	1	482450011	623 Ellias Street	Port Arthur	Jefferson	TX	06
1 HOUR	6305	93	57	56	1	None	1	482451050	414 Mary Street	Beaumont	Jefferson	TX	06
1 HOUR	8180	49	24	13	0	None	1	482570005	3790 S Houston St	Kaufman	Kaufman	TX	06
1 HOUR	8601	8	6	4	0	None	1	483091037	4472 Mazanec Rd	Waco	McLennan	TX	06
1 HOUR	8665	128	62	51	1	None	1	483491051	Corsicana Airport	Corsicana	Navarro	TX	06
1 HOUR	8508	12	11	9	0	None	1	483550025	Corpus Christi State School (Airport Rd)	Corpus Christi	Nueces	TX	06
1 HOUR	8441	17	16	10	0	None	1	483550026	9860 La Branch	Corpus Christi	Nueces	TX	06
1 HOUR	8397	23	22	18	0	None	1	483550032	3810 Huisache Street	Corpus Christi	Nueces	TX	06

Duration Description=24-HR BLK AVG

Duration Description	Obs	First Max	Second Max	99th Percentile	Actual Exceedances	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
24-HR BLK AVG	359	4	4	3	0	None	3	481130069	1415 Hinton Street	Dallas	Dallas	TX	06
24-HR BLK AVG	347	4	4	3	0	None	1	481390016	2725 Old Fort Worth Road	Midlothian	Ellis	TX	06
24-HR BLK AVG	358	4	2	2	0	None	1	481391044	900 Fm 667 Ellis County	Not in a city	Ellis	TX	06
24-HR BLK AVG	345	3	3	2	0	None	1	481410037	250 Rim Rd	El Paso	El Paso	TX	06
24-HR BLK AVG	247	4	3	3	0	None	1	481410044	800 S San Marcial Street	El Paso	El Paso	TX	06
24-HR BLK AVG	365	4	3	3	0	None	1	481410053	700 West San Francisco Ave	El Paso	El Paso	TX	06
24-HR BLK AVG	361	2	2	1	0	None	1	481410058	5050a Yvette Drive	El Paso	El Paso	TX	06
24-HR BLK AVG	360	13	12	10	0	None	1	481670005	2516 1/2 Texas Avenue	Texas City	Galveston	TX	06
24-HR BLK AVG	340	12	9	7	0	None	3	481830001	Gregg Co Airport Near Longview	Not in a city	Gregg	TX	06
24-HR BLK AVG	306	2	2	2	0	None	1	482010046	7330 1/2 North Wayside	Houston	Harris	TX	06
24-HR BLK AVG	330	6	4	3	0	None	2	482010051	13826 1/2 Croquet	Houston	Harris	TX	06
24-HR BLK AVG	362	7	6	5	0	None	1	482010062	9726 1/2 Monroe	Houston	Harris	TX	06
24-HR BLK AVG	350	9	9	7	0	None	1	482010070	5425 Polk Ave., Suite H	Houston	Harris	TX	06
24-HR BLK AVG	362	9	7	7	0	None	1	482010416	7421 Park Place Blvd	Houston	Harris	TX	06
24-HR BLK AVG	363	12	10	8	0	None	2	482011035	9525 1/2 Clinton Dr	Houston	Harris	TX	06
24-HR BLK AVG	342	6	5	4	0	None	2	482011039	4514 1/2 Durant St	Deer Park	Harris	TX	06
24-HR BLK AVG	345	4	4	4	0	None	1	482011050	4522 Park Rd	Seabrook	Harris	TX	06
24-HR BLK AVG	354	31	21	6	0	None	1	482450009	1086 Vermont Avenue	Beaumont	Jefferson	TX	06
24-HR BLK AVG	358	19	17	12	0	None	1	482450011	623 Ellias Street	Port Arthur	Jefferson	TX	06
24-HR BLK AVG	261	14	11	7	0	None	1	482451050	414 Mary Street	Beaumont	Jefferson	TX	06
24-HR BLK AVG	344	5	4	4	0	None	1	482570005	3790 S Houston St	Kaufman	Kaufman	TX	06
24-HR BLK AVG	363	1	1	1	0	None	1	483091037	4472 Mazanec Rd	Waco	McLennan	TX	06
24-HR BLK AVG	365	15	8	5	0	None	1	483491051	Corsicana Airport	Corsicana	Navarro	TX	06
24-HR BLK AVG	361	2	2	2	0	None	1	483550025	Corpus Christi State School (Airport Rd)	Corpus Christi	Nueces	TX	06
24-HR BLK AVG	358	2	2	1	0	None	1	483550026	9860 La Branch	Corpus Christi	Nueces	TX	06
24-HR BLK AVG	352	8	6	4	0	None	1	483550032	3810 Huisache Street	Corpus Christi	Nueces	TX	06

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This report is based on monitor-level summary statistics. Air quality standards for some pollutants (PM2.5 and Pb) allow for combining data from multiple monitors into a site-level summary statistic that can be compared to the standard. In those cases, the site-level statistics may differ from the monitor-level statistics upon which this report is based.

Last updated on Wednesday, November 14, 2012

Exhibit 10

AirData

Monitor Values Report

This report displays criteria pollutant summary data for individual monitoring sites. Read more about what's in this report.

1. Pollutant

SO2

2. Year

2012

3. Geographic Area

Texas

-- or --

Select a City (defined as CBSA) ...

-- or --

Select a County ...

4. Exceptional Events

- Include exceptional events data
- Exclude exceptional events data

Geographic Area: Texas
Pollutant: SO2
Year: 2012 (Annual statistics for 2012 are not final until May 1, 2013)
Exceptional Events: Included (if any)
About this report

EPA Air Quality Standards:
Sulfur Dioxide: 75 ppb (1-hour), 140 ppb (24-hour)

The following data links are active for the next 10 minutes, after which you must resubmit your query.
Download PDF (printable page)
Download CSV (spreadsheet)

To sort a column in the table below, click on the column heading.

Duration Description=1 HOUR

Duration Description	Obs	First Max	Second Max	99th Percentile	Actual Exceedances	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
1 HOUR	6304	7	5	5	0	None	3	481130069	1415 Hinton Street	Dallas	Dallas	TX	06
1 HOUR	6483	22	14	11	0	None	1	481390016	2725 Old Fort Worth Road	Midlothian	Ellis	TX	06
1 HOUR	6432	10	7	6	0	None	1	481391044	900 Fm 667 Ellis County	Not in a city	Ellis	TX	06
1 HOUR	6371	8	7	5	0	None	1	481410037	250 Rim Rd	El Paso	El Paso	TX	06
1 HOUR	5715	9	8	8	0	None	1	481410044	800 S San Marcial Street	El Paso	El Paso	TX	06
1 HOUR	6489	9	8	8	0	None	1	481410053	700 West San Francisco Ave	El Paso	El Paso	TX	06
1 HOUR	6417	4	3	3	0	None	1	481410058	5050a Yvette Drive	El Paso	El Paso	TX	06
1 HOUR	6372	13	12	12	0	None	1	481670005	2516 1/2 Texas Avenue	Texas City	Galveston	TX	06
1 HOUR	7109	57	43	42	0	None	3	481830001	Gregg Co Airport Near Longview	Not in a city	Gregg	TX	06
1 HOUR	6368	11	10	10	0	None	1	482010046	7330 1/2 North Wayside	Houston	Harris	TX	06
1 HOUR	6267	45	26	13	0	None	2	482010051	13826 1/2 Croquet	Houston	Harris	TX	06
1 HOUR	6428	18	12	11	0	None	1	482010062	9726 1/2 Monroe	Houston	Harris	TX	06
1 HOUR	3800	16	16	16	0	None	1	482010070	5425 Polk Ave., Suite H	Houston	Harris	TX	06
1 HOUR	6434	27	25	22	0	None	1	482010416	7421 Park Place Blvd	Houston	Harris	TX	06
1 HOUR	2775	9	9	9	0	None	1	482011017	7726 ? Eastpoint Boulevard	Baytown	Harris	TX	06
1 HOUR	6312	36	32	31	0	None	2	482011035	9525 1/2 Clinton Dr	Houston	Harris	TX	06
1 HOUR	6294	31	25	24	0	None	2	482011039	4514 1/2 Durant St	Deer Park	Harris	TX	06
1 HOUR	6474	16	15	12	0	None	1	482011050	4522 Park Rd	Seabrook	Harris	TX	06
1 HOUR	5790	75	63	34	0	None	1	482450009	1086 Vermont Avenue	Beaumont	Jefferson	TX	06
1 HOUR	1482	45	43	45	0	None	1	482450011	623 Ellias Street	Port Arthur	Jefferson	TX	06
1 HOUR	5656	96	32	32	1	None	1	482451050	414 Mary Street	Beaumont	Jefferson	TX	06
1 HOUR	6221	15	10	10	0	None	1	482570005	3790 S Houston St	Kaufman	Kaufman	TX	06
1 HOUR	5018	7	5	3	0	None	1	483091037	4472 Mazanec Rd	Waco	McLennan	TX	06
1 HOUR	6122	37	33	29	0	None	1	483491051	Corsicana Airport	Corsicana	Navarro	TX	06
1 HOUR	4886	14	8	5	0	None	1	483550025	Corpus Christi State School (Airport Rd)	Corpus Christi	Nueces	TX	06
1 HOUR	4853	7	5	4	0	None	1	483550026	9860 La Branch	Corpus Christi	Nueces	TX	06
1 HOUR	4865	79	52	13	1	None	1	483550032	3810 Huisache Street	Corpus Christi	Nueces	TX	06

Duration Description=24-HR BLK AVG

Duration Description	Obs	First Max	Second Max	99th Percentile	Actual Exceedances	Exc Events	Monitor Number	Site ID	Address	City	County	State	EPA Region
24-HR BLK AVG	265	2	1	1	0	None	3	481130069	1415 Hinton Street	Dallas	Dallas	TX	06
24-HR BLK AVG	273	3	3	2	0	None	1	481390016	2725 Old Fort Worth Road	Midlothian	Ellis	TX	06
24-HR BLK AVG	269	2	1	1	0	None	1	481391044	900 Fm 667 Ellis County	Not in a city	Ellis	TX	06
24-HR BLK AVG	269	1	1	1	0	None	1	481410037	250 Rim Rd	El Paso	El Paso	TX	06
24-HR BLK AVG	241	3	2	2	0	None	1	481410044	800 S San Marcial Street	El Paso	El Paso	TX	06
24-HR BLK AVG	274	2	2	2	0	None	1	481410053	700 West San Francisco Ave	El Paso	El Paso	TX	06
24-HR BLK AVG	270	1	1	1	0	None	1	481410058	5050a Yvette Drive	El Paso	El Paso	TX	06
24-HR BLK AVG	268	5	4	4	0	None	1	481670005	2516 1/2 Texas Avenue	Texas City	Galveston	TX	06
24-HR BLK AVG	300	13	11	7	0	None	3	481830001	Gregg Co Airport Near Longview	Not in a city	Gregg	TX	06
24-HR BLK AVG	268	2	2	1	0	None	1	482010046	7330 1/2 North Wayside	Houston	Harris	TX	06
24-HR BLK AVG	264	3	2	2	0	None	2	482010051	13826 1/2 Croquet	Houston	Harris	TX	06
24-HR BLK AVG	271	3	3	2	0	None	1	482010062	9726 1/2 Monroe	Houston	Harris	TX	06
24-HR BLK AVG	160	5	4	4	0	None	1	482010070	5425 Polk Ave., Suite H	Houston	Harris	TX	06
24-HR BLK AVG	270	6	4	4	0	None	1	482010416	7421 Park Place Blvd	Houston	Harris	TX	06
24-HR BLK AVG	117	3	2	2	0	None	1	482011017	7726 ? Eastpoint Boulevard	Baytown	Harris	TX	06
24-HR BLK AVG	266	12	10	8	0	None	2	482011035	9525 1/2 Clinton Dr	Houston	Harris	TX	06
24-HR BLK AVG	265	6	5	4	0	None	2	482011039	4514 1/2 Durant St	Deer Park	Harris	TX	06
24-HR BLK AVG	273	4	4	4	0	None	1	482011050	4522 Park Rd	Seabrook	Harris	TX	06
24-HR BLK AVG	244	7	6	4	0	None	1	482450009	1086 Vermont Avenue	Beaumont	Jefferson	TX	06
24-HR BLK AVG	61	5	5	5	0	None	1	482450011	623 Ellias Street	Port Arthur	Jefferson	TX	06
24-HR BLK AVG	238	9	7	5	0	None	1	482451050	414 Mary Street	Beaumont	Jefferson	TX	06
24-HR BLK AVG	261	3	2	2	0	None	1	482570005	3790 S Houston St	Kaufman	Kaufman	TX	06
24-HR BLK AVG	212	1	1	1	0	None	1	483091037	4472 Mazanec Rd	Waco	McLennan	TX	06
24-HR BLK AVG	257	6	4	4	0	None	1	483491051	Corsicana Airport	Corsicana	Navarro	TX	06
24-HR BLK AVG	206	3	2	2	0	None	1	483550025	Corpus Christi State School (Airport Rd)	Corpus Christi	Nueces	TX	06
24-HR BLK AVG	203	1	1	1	0	None	1	483550026	9860 La Branch	Corpus Christi	Nueces	TX	06
24-HR BLK AVG	205	19	7	2	0	None	1	483550032	3810 Huisache Street	Corpus Christi	Nueces	TX	06

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Last updated on Wednesday, November 14, 2012