Appendix D
Sid Richardson Carbon and Energy
Addis Plant
BART Modeling Analyses

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LONG B. NGUYEN, P.E.
Environmental, Health & Safety Manager

January 23, 2014

Ms. Vivian Aucoin
Department of Environmental Quality
Office of Environmental Services
Air Permits Division
P.O. Box 4313
Baton Rouge, LA 70821-4313

Re: Sid Richardson Carbon & Energy
Addis Plant – Agency Interest No. 4174
BART Modeling

Dear Ms. Aucoin:

Per your request, this letter details the differences between the Best Available Retrofit Technology (BART) modeling analyses that were performed in 2013 and 2007.

The 2013 analysis (Bowman) used the methods and guidance of FLAG 2010 and the 8/31/2009 Memorandum "Clarification on EPA-FLM Recommended Settings for CALMET", along with the most recent versions of the CALPUFF system of programs. The 2007 analysis (Environ) modeling used methods and guidance of FLAG 2000, along with older versions of the CALPUFF system of programs that were current in 2007.

FLAG 2010/IMPROVE Equations - The FLAG 2010 guidance document includes new IMPROVE equations to calculate visibility impacts. The FLAG 2010/IMPROVE equations include new higher background concentrations and relative humidity adjustment factors for the hygroscopic effects for each of the major species that account for most of the visibility effects. Higher natural background concentrations and higher relative humidity adjustment factors for the 2013 analysis gives higher background visibility than the previous data and methods used the 2007 analysis. The visibility impacts from the Addis plant when included with the natural background visibility gives a lower delta-deciview impact because of the higher natural background visibility.

CALMET Parameters – There were major differences in the 2013 analysis and the 2007 analysis in the CALMET parameters. The 2013 analysis followed the 8/31/2009 Memorandum for CALMET settings. According to this Memorandum, "These recommendations are based in large part upon the understanding we have developed from the numerous tracer evaluations we have conducted in addition to the collective experience of the national Park Service, Forest Service, and US Fish and Wildlife from the BART process." The 2007 analysis used values determined by the modeler and approved in their protocol. The CALMET parameters and values for the 2013 analysis and 2007 analysis are shown below.

CALMET – Six of the important CALMET parameters were "User Defined" values under FLAG 2000 and were defined by EPA/FLM in 8/31/2009 Memorandum.

	2007 Environ	2013 Bowman	EPA/FLM
TERRAD	10	15	15
RMAX1	30	100	100
RMAX2	60	200	200
RMAX3	60	200	200
R1	6*, 18**	50	50
R2	12*, 36**	100	100

*2001, **2002 & 2003

For example, the parameter RMAX1 sets the distance that surface observations (surface met stations) modify Step 1 Wind Fields to develop the Step 2 Wind Fields of the three-dimensional Meteorological Grid. The 2013 analysis used the guideline value of 100 km for RMAX1. The 2007 analysis used 30 km. The smaller value used in the 2007 analysis means that the surface observations did not influence the wind fields beyond 30 km, whereas the 2013 analysis that used the Memorandum value of 100 km influenced the wind fields out to a much greater distance. The change in the CALMET three-dimensional Meteorological Grid is expected to change the overall visibility impact. Never the less, the 2013 analysis used the current guidance.

CALPUFF Modeling System of Programs – The 2013 analysis used the versions of the CALPUFF system of programs that were current at the time of the protocol submittal (June 2013). The 2007 analysis used the versions of the programs that were current at the time of their modeling analysis. The version numbers of the programs used in the 2013 analysis and 2007 analysis are shown below.

CALMET	5.53A	5.8
CALPUFF	5.711A	5.8
CALPOST	5.51	6.221
POSTUTIL	1.3	1.56
TERREL	3.311	3.684
CTGPROC	2.42	2.682
MAKEGEO	2.22	2.29

Emission Rates Used in Modeling Analysis– The emission rates used in the 2007 modeling analysis were based on the highest annual emission rates from the period of 2001-2003, which occurred in 2002. The daily emission rates were back-calculated from these annual emission rates. These daily emission rates (rates used in the modeling) did not necessarily represent the worst-case scenario emission rates because they were based on annual averages. The emission rates used in the 2013 modeling analysis, on the other hand, represented the worst-case scenario emission rates because they were derived from the permitted lbs/hr limits. The emission rates used in the 2013 modeling analysis were greater than those that were used in the 2007 modeling analysis.

Please call me at (817) 390-8604 if you have any questions.

Sincerely,

Long B. Nguyen

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LONG B. NGUYEN, P.E.
Environmental, Health & Safety Manager

October 31, 2013

Ms. Vivian Aucoin
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P.O. Box 4313
Baton Rouge, LA 70821-4313

Re: Sid Richardson Carbon & Energy
Addis Plant – Agency Interest No. 4174
BART Modeling

Dear Ms. Aucoin:

Sid Richardson Carbon & Energy (SCRE) would like to submit an updated report for the BART (Best Available Retrofit Technology) modeling that was recently performed for the Addis Plant. The results in the enclosed report show that the Addis Plant's impact on Breton Island is less than 0.5 deciview.

This modeling analysis followed the protocol that was submitted to you and Ms. Ellen Belk of U.S. EPA Region 6 via email on July 1, 2013. An email was received from Ms. Belk on October 17, 2013 stating that the protocol was approved.

Now that the results show that the Addis Plant does not have a visibility impact on Breton Island, it is SRCE's understanding that no further action is needed to comply with the BART regulation. We would like your confirmation on this and please call me at (817) 390-8604 if you have any questions.

Sincerely,

Long B. Nguyen

Cc: Ms. Ellen Belk – U.S. EPA Region 6

BART Visibility Impact Analysis

Sid Richardson Carbon Company, Ltd.
Addis, Louisiana, Plant

Prepared for:
Sid Richardson Carbon Company, Ltd.
Fort Worth, Texas

Prepared by:
J. Thomas Bowman, Ph.D., P.E.

October 2013

CONTENTS

1. Executive Summary

Overview. The Sid Richardson Carbon & Energy Company (Sid Richardson) retained J. Thomas Bowman (Bowman) to perform a source-specific Best Available Retrofit Technology (BART) modeling analysis using the CALPUFF model for the Sid Richardson Addis, Louisiana, Plant. Sid Richardson submitted a BART analysis in 2007 prepared by Environ.

The 2007 analysis showed a maximum 98th percentile of 0.619 delta-deciviews at the Breton NWR and 0.147 delta-deciviews at the Caney Creek Wilderness Area.

Bowman has been asked to remodel the facility's impact at the Breton NWR using the current versions of the models and current guidelines. This document is the result of this request. The impact of the Addis plant at the Caney Creek Wilderness Area was well below 0.50 delta-deciviews and was not remodeled as part of this study.

Summary of Results. The highest 98th percentile for the 2001-2003 period was 0.344 delta-deciviews and the highest 98th percentile for the highest year was 0.397 delta-deciviews for the year 2002. These impacts are well below the 0.50 delta-deciview requirement.

Table 1.1
Results (delta-deciviews)

Value	Year of Meteorological Data			
	Breton NWR, LA			
	2001	2002	2003	2001-2003
98^{th} Percentile	0.316	0.397	0.340	0.344

2. Facility Description

The Sid Richardson Addis Plant is a carbon black manufacturing facility (SIC code 2895, NAICS code 325182) located in Addis, Louisiana. The Plant is located west of Louisiana Highway 1 on Sid Richardson Road about 3 kilometers south-southwest of the town of Addis. Figure 2.1 shows the location of the plant in relation to the town of Addis, Highway 1, and the Mississippi River. Figure 2.2 shows an enlarged image of the Addis Plant. Both images were created using Google Earth.

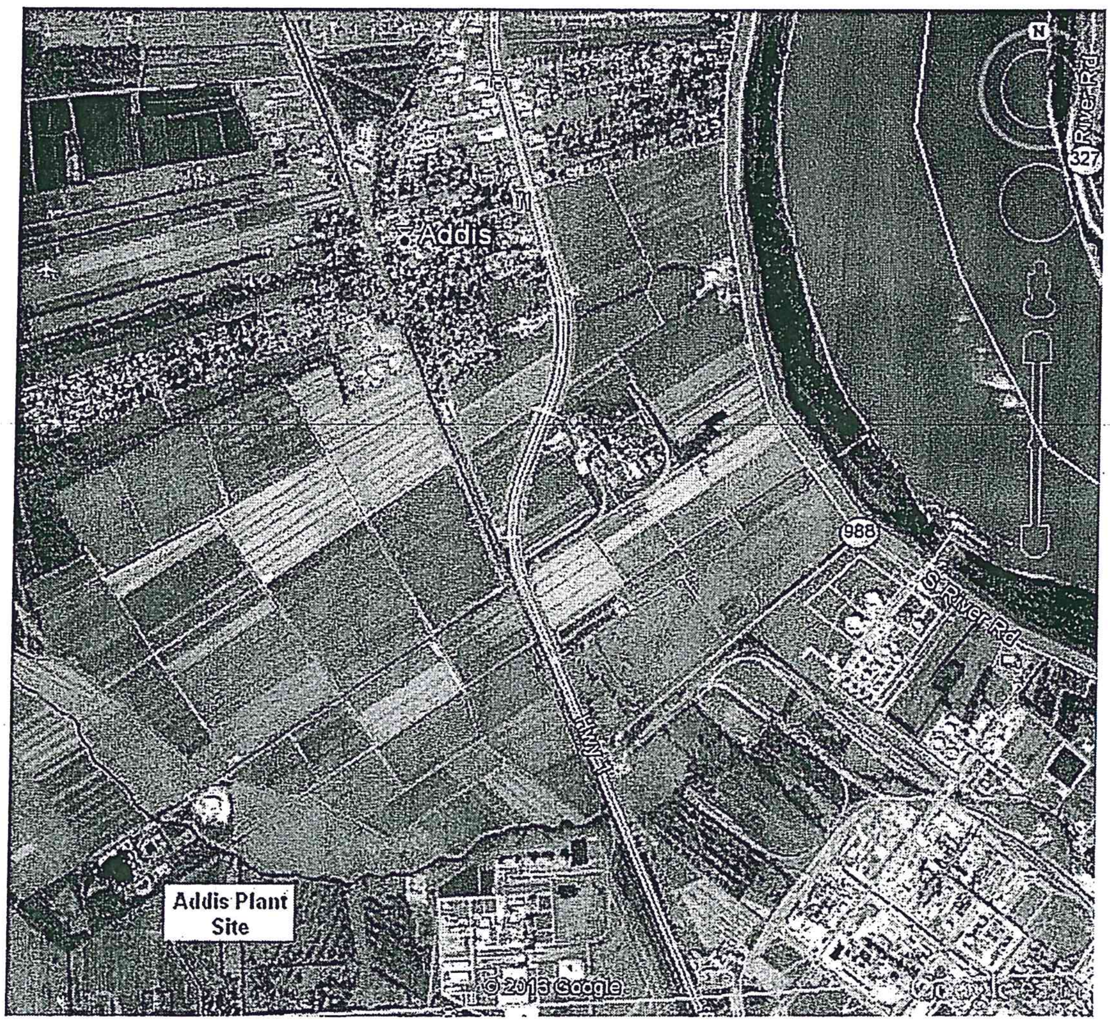

Figure 2.1 Addis Site Location

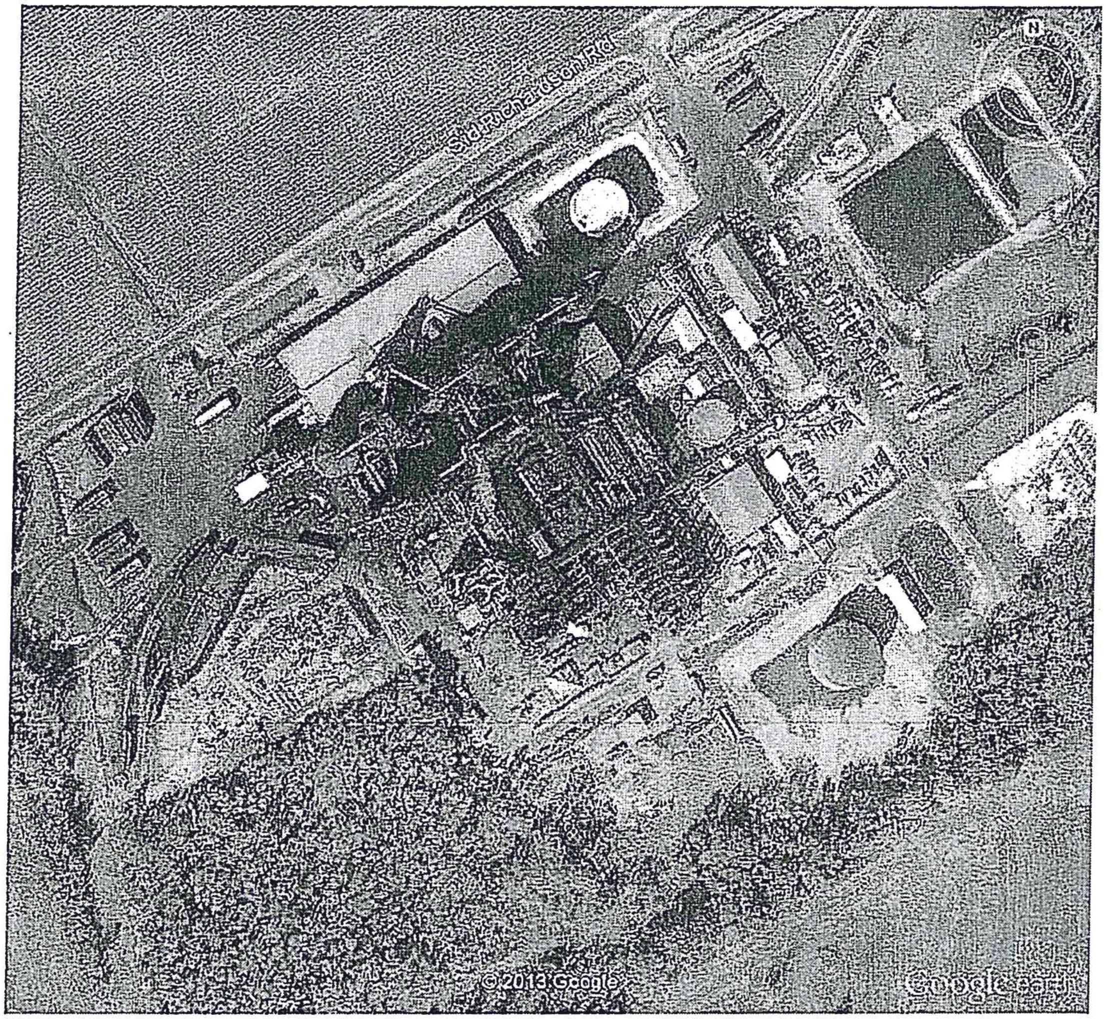

Figure 2.2 Addis Plant

3. Source Parameters and Emission Rates

The source information below and source parameters in Table 3.1, Table 3.2 and Table 3.3 and were supplied by Sid Richardson. To be consistent with the 2007 Environ analysis, the speciated emission rates shown in Table 3.4 were calculated using the same ration of SOA(OC) to PM and PMF to PM as used in the 2007 analysis.

The worst-case scenario emissions (i.e., permitted emission rates) were used in this analysis. Just like the 2007 analysis, the emissions from certain pieces of equipment that were built outside of the BART eligible period of 1962-1977 were not included in the analysis. The excluded equipment in the current analysis is the identical to the excluded equipment in the 2007 analysis. The details of these exclusions are outlined below.

Unit 1 (Reactors A, 1, 2, 3) => Reactor A was built outside of 1962-1977 time frame, therefore it was excluded. All reactors are identical in terms of capacity, therefore the emission rates have been reduced by 25% for the exclusion of reactor A.

Unit 3 (Reactors 8, 9, 10, 11) => Reactor 11 was built outside of 1962-1977 time frame, therefore it was excluded. Reactors 8 and 9 are slightly smaller (45" tunnel) than Reactors 10 and 11 (60" tunnel). The percentage of reactor 11 when compared to the unit's overall capacity is 29%. Therefore, the emission rates have been reduced by 29% for the exclusion of reactor 11.

West Dryer Stack (Dryer 6) => Dryer 6 was built outside of 1962-1977 timeframe. Therefore, it was excluded.

East Dryer Stack (Dryers A, 1, 2, 3, 5) => Dryers A and 5 were built outside of 1962-1977 time frame, therefore they were excluded. All dryers are identical in terms of capacity. Therefore, the emission rates have been reduced by 40% for the exclusion of Dryers A and 5.

The emissions from Units' 1and 2 dryer exhaust bagfilters are routed to a common stack (DF1). The emission rate used in the modeling is the summation of the emission rates from these two bagfilters.

The emission rates in Table 3.3 reflect the permitted emission rates with the exclusion of the equipment stated above.

Table 3.1

Source Locations

Source ID	Geographic Location		LCC		UTM Coordinates		
	Longitude	Latitude	Easterly	Northerly	Easterly	Northerly	Zone
	(deg)	(deg)	(km)	(km)	(km)	(km)	
B1	91.2791	30.3292	551.8023	-1055.5936	665.4378	3356.5160	15
B2	91.2792	30.3291	551.7906	-1055.6019	665.4257	3356.5084	15
B3	91.2796	30.3290	551.7573	-1055.6189	665.3918	3356.4931	15
D5	91.2794	30.3292	551.7741	-1055.5935	665.4097	3356.5175	15
SF1	91.2793	30.3292	551.7808	-1055.5948	665.4163	3356.5159	15
SF2	91.2795	30.3291	551.7636	-1055.6061	665.3987	3356.5055	15
SF3A	91.2800	30.3289	551.7233	-1055.6319	665.3573	3356.4819	15
DF1	91.2797	30.3290	551.7493	-1055.6110	665.3842	3356.5013	15

Table 3.2

Stack Parameters

Source ID	Stack Height	Base Elevation	Stack Diameter	Exit Velocity	Exit Temp.
	(m)	(m)	(m)	(m/s)	(K)
B1	32.50	5.49	1.64	20.00	1273.20
B2	32.50	5.49	1.72	20.00	1273.20
B3	32.50	5.49	1.68	20.00	1273.20
D5	60.40	5.49	1.52	32.30	699.80
SF1	27.30	5.49	0.46	40.20	366.50
SF2	27.30	5.49	0.46	40.20	366.50
SF3A	26.20	5.49	0.61	37.20	366.50
DF1	36.60	5.49	0.91	16.18	477.60

Table 3.3

Permit Emission Rates

Source ID	Permit Limits					
	NOX		SO2		PM10	
	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)
B1	4.6575	0.5868	392.3625	49.4377	46.2000	5.8212
B2	6.1400	0.7736	485.1700	61.1314	51.2400	6.4562
B3	4.8351	0.6092	483.1621	60.8784	67.9612	8.5631
D5	40.4520	5.0970	346.7760	43.6938	73.9440	9.3169
SF1	0.0000	0.0000	0.0000	0.0000	22.8000	2.8728
SF2	0.0000	0.0000	0.0000	0.0000	18.9600	2.3890
SF3A	0.0000	0.0000	0.0000	0.0000	35.4400	4.4654
DF1	0.0000	0.0000	0.0000	0.0000	6.2000	0.7812

Table 3.4

Speciated Emission Rates as Modeled

Source ID	Modeled Emission Rates								
	SO2	SO4	NOX	HNO3	NO3	EC	SOA	PM10	PMF
	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)
B1	49.4377	0.0000	0.5868	0.0000	0.0000	0.0000	5.7937	0.0000	0.0231
B2	61.1314	0.0000	0.7736	0.0000	0.0000	0.0000	6.4307	0.0000	0.0260
B3	60.8784	0.0000	0.6092	0.0000	0.0000	0.0000	8.5213	0.0000	0.0341
D5	43.6938	0.0000	5.0970	0.0000	0.0000	0.0000	9.2827	0.0000	0.0371
SF1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.8107	0.0000	0.0154
SF2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	2.3810	0.0000	0.0096
SF3A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	5.9397	0.0000	0.0238
DF1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.8241	0.0000	0.0031

4. Model Selection

The current guideline versions of the CALPUFF system of programs was used. The programs and program versions that were used in this analysis are as follows:

Main Programs
- CALMET 5.8
- CALPUFF 5.8

Postprocessors
- CALPOST 6.221
- PRTMET 4.34
- POSTUTIL 1.56

Geophysical Data Preprocessors
- TERREL 3.684
- CTGPROC 2.682
- MAKEGEO 2.29

Meteorological Preprocessors
- SMERGE 5.57
- PXTRACT 4.25
- PMERGE 5.32
- READ62 5.54

5. Modeling Domain

The Modeling Domain is set large enough to ensure that puffs are not eliminated from the computational grid prematurely. The Modeling Domain extends more than 150 kilometers beyond all sources and receptors. This Domain is cast on a Lambert Conformal Conic (LCC) coordinate system. The Modeling Domain is shown in Figure 5.1. The projection parameters and Meteorological Domain coordinates are listed in Table 5.1 and Table 5.2.

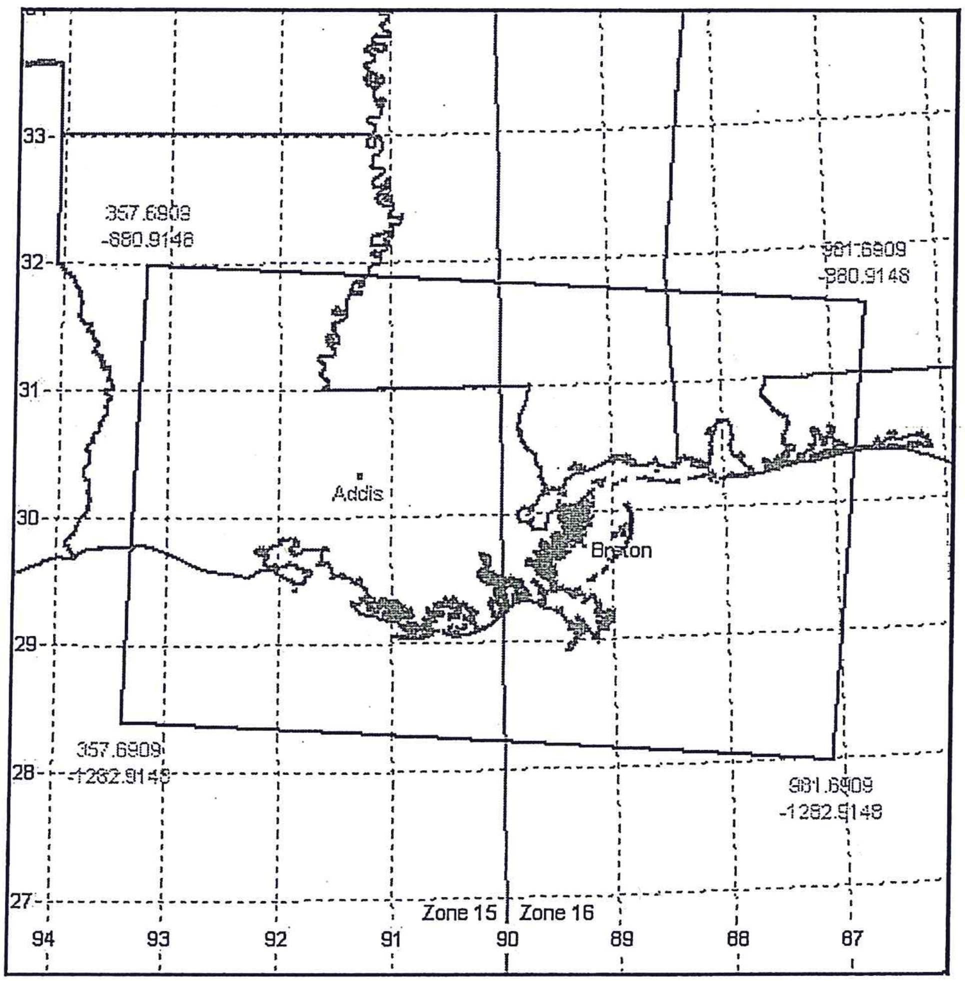

Figure 5.1 Meteorological Domain

Table 5.1

LCC Projection Parameters

Projection Origin		
	RLAT0	40.0N
	RLON0	97.0W
False Origin		
	FEAST	0
	FNORTH	0
Matching Parallels		
	XLAT1	33.0N
	XLAT2	45.0N

Table 5.2

Meteorological Domain

Datum		WGS-84
Southwest Corner (KM)		
	XORIGKM	357.691
	YORIGKM	-1282.915
Number of Grid Cells		
	NX	104
	NY	67
Horizontal Grid Spacing (KM)		6
Vertical Grid Spacing (KM)*		
	1	20
	2	40
	3	80
	4	160
	5	320
	6	640
	7	1200
	8	2000
	9	3000
	10	4000

*Top of each cell

6. CALMET Analysis

The CALMET analysis was conducted in accordance with August 31, 2009, Memorandum *Clarification on EPA-FLM Recommended Settings for CALMET.* The CALMET model was used to develop the parameters for the three-dimensional Meteorological Grid. The Meteorological Grid includes meteorological parameters, surface parameters, and terrain elevations for each hour. This three-dimensional Meteorological Grid was calculated by CALMET in three steps, as discussed in the following subsections. The technical options that were used in CALMET are listed in Appendix A, which is a CALMET input file for January 2001.

Initial Guess Wind Fields. The 36-km prognostic data for 2002 and 2003 and the 12-km data for 2001 from the CALMM5 CENRAP data were used by CALMET for developing the Initial Guess Wind Fields of the 6-km, three-dimensional Meteorological Grid.

Step 1 Wind Fields. The terrain and surface parameters were used by CALMET to modify the Initial Guess Wind Fields to develop the Step 1 Wind Fields of the 6-km, three-dimensional Meteorological Grid. The terrain character of this area is, in general, gently sloping to flat. The terrain varies from sea level to about 160 meters amsl.

Step 2 Wind Fields. Meteorological observations (surface data, upper air data, precipitation data, and buoy data) are used by CALMET to modify the Step 1 Wind Fields to develop the Step 2 Wind Fields of the 6-km, three-dimensional Meteorological Grid.

6.1 Meteorological Data

CALMM5 Data. The CENRAP CALMM5 data were acquired from Erik Snyder, US EPA Region VI. Extractions of the data were make for each year for an area that included the Modeling Domain and all meteorological stations. Upper air substitution files were created using the nearest CALMM5 node for each upper air station. The substitution files are used as input to the READ62 program. Figure 6.1 shows the location of the 2001 nodes and Figure 6.2 shows the location of the 2002 and 2003 nodes.

Surface Data. Surface data for 2001, 2002 and 2003 were used as observations in developing the Step 2 Wind Fields in the CALMET model. The surface data were obtained from the National Climatic Data Center (NCDC) in Asheville, North Carolina. The data included all stations having sufficient data for modeling that are located within 100 kilometers of the meteorological modeling domain. Data from a total of 45 surface stations were used for 2001, 42 for 2002 and 43 for 2003. Table 6.1 is a listing of these surface stations and associated site information. Figure 6.3 depicts the surface station locations.

Upper Air Data. Upper air data for 2001, 2002 and 2003 were used as observations in developing the Step 2 Wind Fields in the CALMET model. The upper air data were downloaded from the National Oceanic and Atmospheric Administration (NOAA) Forecast Systems Laboratory web site. Four upper air stations are located within 200 kilometers of the meteorological modeling domain and were used in this analysis. Table

6.2 lists the upper air data stations and locations, and the station locations are depicted in Figure 6.3.

Precipitation Data. .Precipitation data for 2001, 2002 and 2003 were used as observations in developing the Step 2 Wind Fields in the CALMET model. The precipitation data were obtained from the NCDC. The precipitation data stations consisted of all stations having sufficient data for modeling that are also located within the meteorological modeling domain. Totals of 34, 35, and 38 stations were used for the precipitation analyses conducted for 2001, 2002, and 2003, respectively. Table 6.3 lists these stations and locations, and Figure 6.4 depicts the station locations.

Buoy Data. .Buoy data for 2001, 2002 and 2003 were used as observations in developing the Step 2 Wind Fields in the CALMET model. The buoy data were obtained from the National Oceanographic Data Center. The buoy data consisted of two stations. Table 6.4 lists these stations and locations, and Figure 6.4 depicts the station locations.

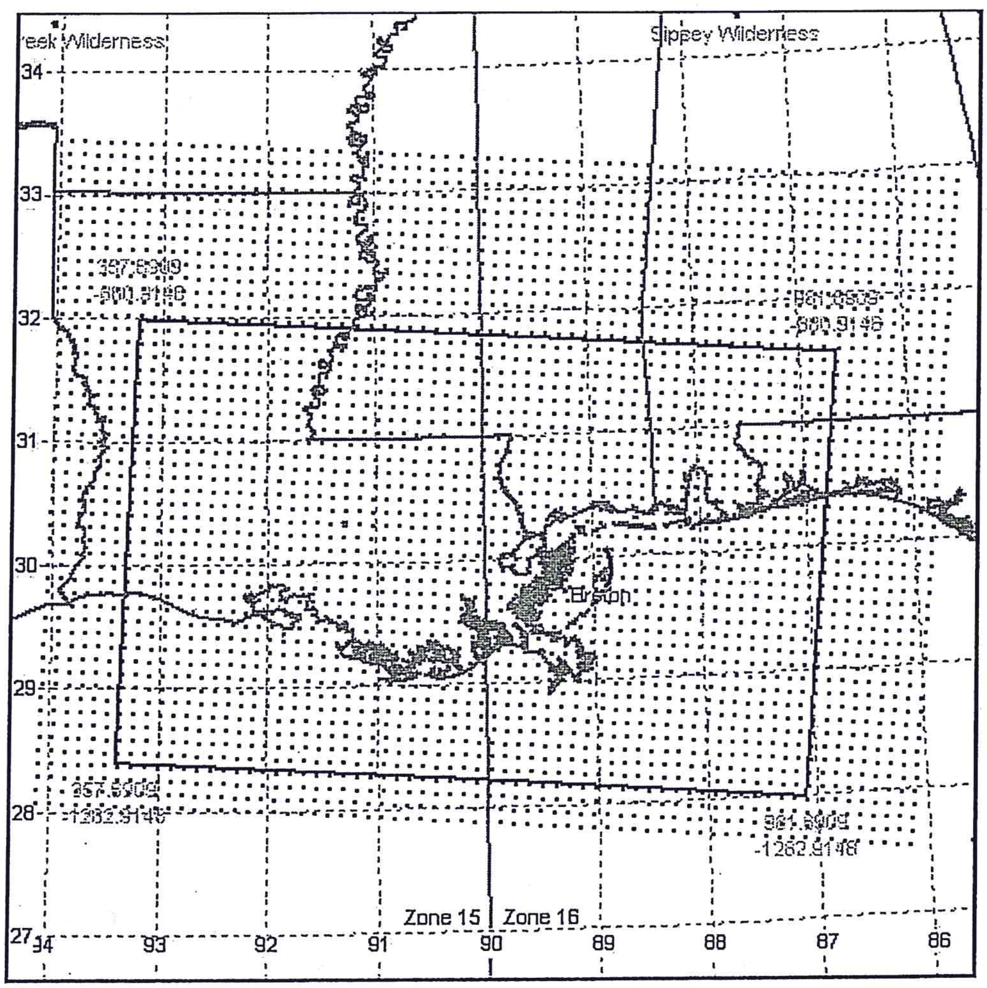

Figure 6.1 Location of Nodes From the 2001 CALMM5 Extraction From CENRAP Data

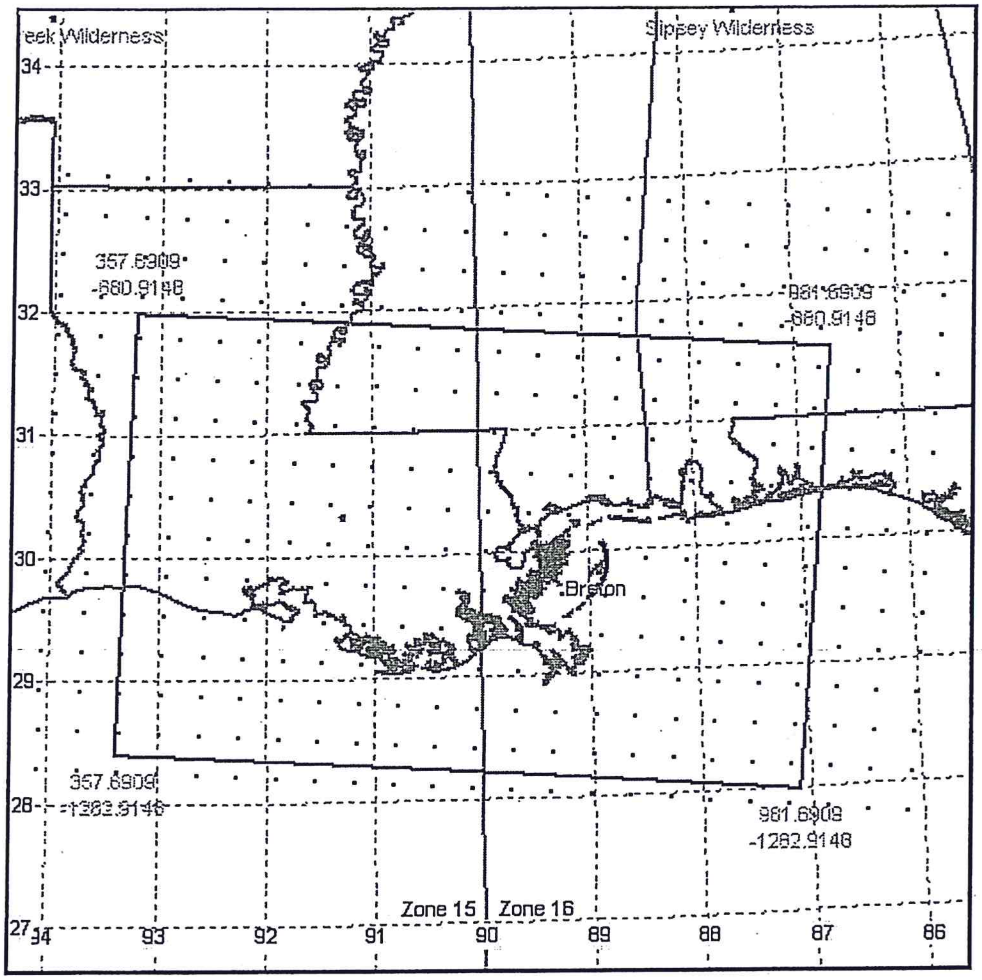

Figure 6.2 Location of Nodes From the 2002 and 2003 CALMM5 Extraction From CENRAP Data

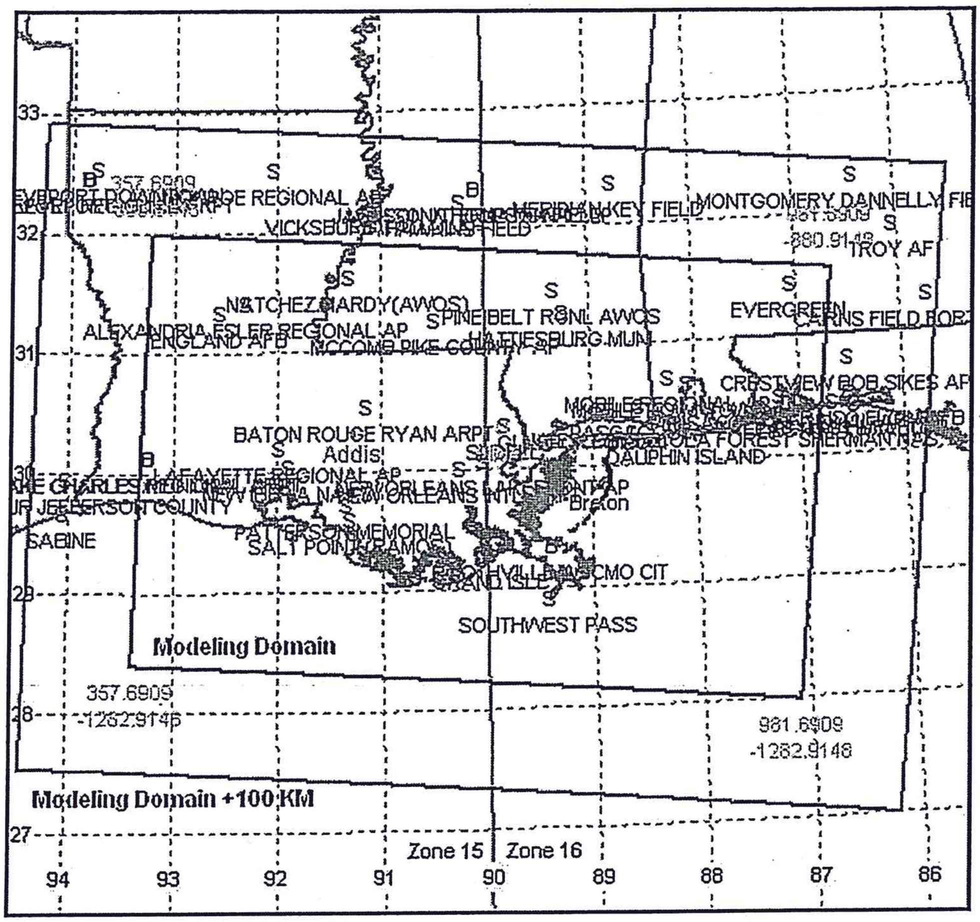

Figure 6.3 Surface and Upper Air Stations

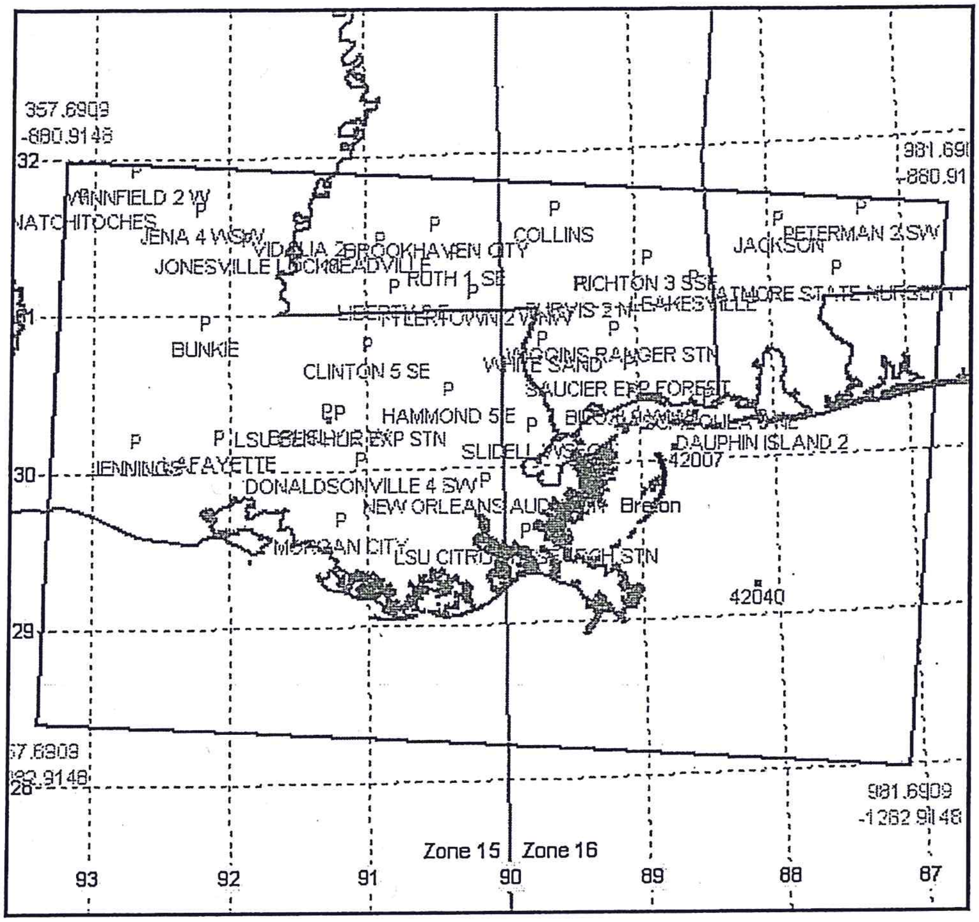

Figure 6.4 Precipitation and Buoy Stations

Table 6.1

Surface Stations

WBAN	USAF	Name	State	Geographic Location		LCC		UTM Coordinates		
				Longitude (deg)	Latitude (deg)	Easterly (km)	Northerly (km)	Easterly (km)	Northerly (km)	Zone
3850	722269	CAIRNS FIELD FORT RUCKER	AL	87.3170	30.3500	932.5653	-1020.9092	1194.2010	3482.1700	15
3852	747770	VALPARAISO HURLBURT	FL	86.6830	30.4170	992.5226	-1006.7479	1107.3000	3381.9870	15
3855	722225	PENSACOLA FOREST SHERMAN NAS	FL	87.3170	30.3500	932.5653	-1020.9092	1046.6200	3371.2950	15
3878	722267	TROY AF	AL	86.0170	31.8670	1036.7804	-838.5950	1161.2600	3547.0330	15
3934	722314	NEW IBERIA NAAS	LA	91.8830	30.0330	495.4845	-1092.1452	607.7000	3322.9680	15
3937	722400	LAKE CHARLES REGIONAL ARPT	LA	93.2330	30.1170	364.4612	-1089.1449	477.5540	3331.7730	15
3940	722350	JACKSON INTERNATIONAL AP	MS	90.0830	32.3170	650.1048	-826.4515	774.6250	3579.3130	15
12884	722320	BOOTHVILLE WSCMO CIT	LA	89.4000	29.3330	741.9960	-1153.4636	849.6300	3250.2650	15
12916	722310	NEW ORLEANS INTL ARPT	LA	90.2500	30.0000	653.6274	-1085.5065	765.2820	3321.9700	15
12917	722410	PORT ARTHUR JEFFERSON COUNTY	TX	94.0170	29.9500	289.2526	-1110.6404	401.8610	3313.6800	15
13820	747686	KEESLER AFB	MS	88.9170	30.4170	778.2516	-1028.5148	892.3020	3372.0780	15
13838	722235	MOBILE DOWNTOWN AP	AL	88.0670	30.6330	857.4715	-996.8283	973.0110	3399.3220	15
13858	722210	VALPARAISO ELGIN AFB	FL	86.5170	30.4830	1007.5725	-997.5914	1122.8690	3390.2320	15
13865	722340	MERIDIAN KEY FIELD	MS	88.7500	32.3330	774.9116	-814.2255	900.1360	3585.2930	15
13884	722215	CRESTVIEW BOB SIKES AP	FL	86.5170	30.7830	1003.7143	-964.2936	1120.9380	3423.5800	15
13894	722230	MOBILE REGIONAL AP	AL	88.2500	30.6830	839.4226	-992.9767	955.2080	3404.1140	15
13895	722260	MONTGOMERY DANNELLY FIELD	AL	86.4000	32.3000	995.1807	-794.9915	1121.9600	3592.8830	15
13899	722223	PENSACOLA REGIONAL AP	FL	87.1830	30.4830	943.8175	-1004.7419	1058.7680	3386.7280	15
13934	747540	ENGLAND AFB	LA	92.5500	31.3170	423.9314	-952.2589	542.8170	3464.8220	15
13935	722487	ALEXANDRIA ESLER REGIONAL AP	LA	92.3000	31.4000	447.2483	-941.8144	566.5460	3474.1450	15
13942	722486	MONROE REGIONAL AP	LA	92.0330	32.5170	465.8337	-816.2109	590.8240	3598.1560	15
13957	722480	SHREVEPORT REGIONAL ARPT	LA	93.8170	32.4500	298.8685	-831.1667	423.2080	3590.6100	15
13970	722317	BATON ROUGE RYAN ARPT	LA	91.1500	30.5330	562.7725	-1032.0620	677.4820	3379.3040	15
13976	722405	LAFAYETTE REGIONAL AP	LA	91.9830	30.2000	484.7807	-1074.0300	597.8930	3341.3840	15
53905	722484	SHREVEPORT DOWNTOWN	LA	93.7500	32.5330	304.8272	-821.7132	429.5710	3599.7650	15
53917	722315	NEW ORLEANS LAKEFRONT AP	LA	90.0330	30.0500	674.1718	-1078.3416	786.0810	3328.0370	15
93919	722358	MCCOMB PIKE COUNTY AP	MS	90.4670	31.2330	622.7553	-949.6183	741.2620	3458.1910	15
722069	722069	DESTIN FT. WALTON	GA	86.4670	30.4000	1013.4295	-1006.2527	1128.2180	3381.2830	15
722276	722276	EVERGREEN	AL	87.0500	31.4170	945.1591	-899.6924	1066.0040	3491.1710	15
722312*	722312	HAMMOND	LA	90.4170	30.5170	633.3004	-1029.0216	747.8640	3378.9140	15

Table 6.1 (cont.)

Surface Stations

WBAN	USAF	Name	State	Geographic Location Longitude (deg)	Geographic Location Latitude (deg)	LCC Easterly (km)	LCC Northerly (km)	UTM Coordinates Easterly (km)	UTM Coordinates Northerly (km)	Zone
722319*	722319	NATCHITOCHES	LA	93.1000	31.7330	369.5797	-908.3226	490.5270	3510.8460	15
722329*	722329	PATTERSON MEMORIAL	LA	91.3330	29.7170	550.8803	-1124.2950	661.2440	3288.5900	15
722347*	722347	HATTIESBURG MUNI	MS	89.2500	31.2670	738.1833	-936.7234	857.1150	3465.2640	15
722348*	722348	PINE BELT RGNL AWOS	MS	89.3330	31.4670	728.4160	-915.1646	848.4650	3487.1850	15
722354*	722354	HAWKINS FIELD	MS	90.2170	32.2130	638.3983	-838.9472	762.3050	3567.4430	15
722357*	722357	NATCHEZ/HARDY(AWOS)	MS	91.3000	31.6170	540.7777	-912.2194	661.2490	3499.2390	15
722366*	722366	SLIDELL	LA	89.8170	30.3500	692.3811	-1043.2610	805.9880	3361.8670	15
722403*	722403	SALT POINT (RAMOS)	LA	91.3000	29.6000	554.9055	-1137.1746	664.6270	3275.6700	15
722488*	722488	VICKSBURG\TALLULAH	LA	91.0330	32.2500	561.4463	-840.2241	685.3040	3569.8450	15
747685*	747685	GULFPORT BILOXI INT	MS	89.0670	30.4000	764.0119	-1031.6801	877.9440	3369.6810	15
747688*	747688	PASCAGOULA	MS	88.5330	30.4670	814.5995	-1019.5829	929.0130	3379.0250	15
994010*	994010	SOUTHWEST PASS	LA	89.4330	28.9000	742.8224	-1202.1420	847.8800	3202.1440	15
994260*	994260	SABINE	TX	94.0500	29.6670	287.0827	-1142.4170	398.3910	3282.3480	15
994290*	994290	GRAND ISLE	LA	89.9670	29.2670	687.3269	-1165.2992	794.7240	3241.3830	15
994420*	994420	DAUPHIN ISLAND	AL	88.0830	30.2500	860.1348	-1039.5895	973.3280	3356.7350	15

*A pseudo-WBAN number was assigned for the missing WBAN number.

Note: 722312 and 722319 data for 2003, only. 994290 data for 2002 and 2003.

Table 6.2

Upper Air Stations

WBAN	Name	State	Geographic Location		LCC		UTM Coordinates			Time Zone
			Longitude (deg)	Latitude (deg)	Easterly (km)	Northerly (km)	Easterly (km)	Northerly (km)	Zone	
3937	LAKE CHARLES/MUNICIPAL ARPT	LA	93.2170	30.1170	366.0080	-1089.0806	479.0950	3331.7700	15	6
3940	JACKSON/THOMPSON FIELD	MS	90.0830	32.3170	650.1048	-826.4515	774.6250	3579.3130	15	6
13957	SHREVEPORT REGIONAL ARPT	LA	93.8170	32.4500	298.8685	-831.1667	423.2080	3590.6100	15	6
53813	Slidell	LA	89.8200	30.3330	692.2422	-1045.1795	805.7520	3359.9730	15	6

Table 6.3

Precipitation Stations

WBAN	Name	State	Geographic Location		LCC		UTM Coordinates		
			Longitude (deg)	Latitude (deg)	Easterly (km)	Northerly (km)	Easterly (km)	Northerly (km)	Zone
10402	ATMORE ST NURSERY	AL	87.4800	31.1700	907.3470	-931.4728	1026.4160	3461.5930	15
12172	DAUPHIN ISLAND 2	AL	88.0800	30.2500	860.4231	-1039.5606	973.6170	3356.7480	15
14193	JACKSON	AL	87.9000	31.5000	863.7734	-898.9469	984.6100	3496.3040	15
15478	MOBILE WSO ARPT	AL	88.2500	30.6800	839.4557	-993.3103	955.2230	3403.7810	15
16370	PETERMAN 2 SW	AL	87.2800	31.5500	921.8113	-887.3103	1043.3170	3504.7780	15
160549	BATON ROUGE WSO AP	LA	91.1300	30.5300	564.7158	-1032.2716	679.4070	3379.0040	15
161246	BRUSLY 2 W	LA	91.2700	30.3800	552.3220	-1049.8663	666.2280	3362.1630	15
161287	BUNKIE	LA	92.1700	30.9500	462.2752	-991.3118	579.2790	3424.3560	15
161899	CLINTON 5 SE	LA	90.9700	30.8000	578.0857	-1001.1644	694.2190	3409.1990	15
162534	DONALDSONVILLE 4 SW	LA	91.0300	30.0700	577.6989	-1082.9764	689.8870	3328.1780	15
164030	HAMMOND 5 E	LA	90.3700	30.5000	637.9519	-1030.5884	752.4190	3377.1330	15
164696	JENA 4 WSW	LA	92.2000	31.6700	455.1667	-911.2527	575.8350	3504.1370	15
164700	JENNINGS	LA	92.6700	30.2000	418.4516	-1077.4440	531.7640	3340.9930	15
164739	JONESVILLE LOCKS	LA	91.8500	31.4800	489.5216	-930.5864	609.2360	3483.3720	15
165021	LAFAYETTE	LA	92.0700	30.2200	476.2609	-1072.2560	589.5000	3343.5290	15
165078	LK CHARLES WSO ARPT	LA	93.2200	30.1200	365.7043	-1088.7573	478.8070	3332.1030	15
165620	LSU BEN-HUR EXP STN	LA	91.1700	30.3700	562.0197	-1050.3686	675.8560	3361.2060	15
165624	LSU CITRUS RESEARCH	LA	89.8300	29.5800	697.9226	-1129.2767	807.0990	3276.4440	15
166394	MORGAN CITY	LA	91.1800	29.6800	565.9980	-1127.4904	676.1100	3284.7130	15
166582	NATCHITOCHES	LA	93.0800	31.7700	371.2965	-904.1217	492.4250	3514.9450	15
166660	NEW ORLEANS WSMO A	LA	90.2500	29.9800	653.7943	-1087.7382	765.3360	3319.7530	15
166664	NEW ORLEANS AUDUBON	LA	90.1300	29.9200	665.9020	-1093.5644	777.0850	3313.3840	15
168539	SLIDELL WSFO	LA	89.7700	30.2500	697.7904	-1054.0494	810.8240	3350.9050	15
169357	VIDALIA 2	LA	91.4700	31.5800	524.9196	-917.3335	645.1790	3494.8990	15
169803	WINNFIELD 2 W	LA	92.6800	31.9300	408.3095	-884.5962	530.2490	3532.7210	15
220797	BILOXI 9 WNW	MS	89.0300	30.4500	767.0762	-1025.8008	881.3070	3375.3520	15
221094	BROOKHAVEN CITY	MS	90.4500	31.5500	621.8265	-914.2358	742.0660	3493.3780	15

Table 6.3 (cont.)

Precipitation Stations

WBAN	Name	State	Geographic Location		LCC		UTM Coordinates		
			Longitude (deg)	Latitude (deg)	Easterly (km)	Northerly (km)	Easterly (km)	Northerly (km)	Zone
221852	COLLINS	MS	89.5700	31.6300	704.4664	-898.9216	825.3640	3504.5360	15
224966	LEAKESVILLE	MS	88.5500	31.1500	805.8855	-943.7804	924.3570	3454.7610	15
225074	LIBERTY 2 E	MS	90.7700	31.1700	594.4002	-958.6598	712.5360	3450.5840	15
225704	MEADVILLE	MS	90.8800	31.4700	581.6693	-925.9825	701.4100	3483.6370	15
226718	PASCAGOULA 3 NE	MS	88.4800	30.4000	820.3849	-1026.5636	934.4060	3371.7920	15
227220	PURVIS 2 N	MS	89.4000	31.1500	725.0195	-950.9404	843.2440	3451.8080	15
227444	RICHTON 3 SSE	MS	88.9000	31.3000	771.1068	-930.1499	890.3350	3470.1130	15
227714	RUTH 1 SE	MS	90.3000	31.3700	637.5207	-933.2165	756.8020	3473.7600	15
227840	SAUCIER EXP FOREST	MS	89.0500	30.6300	763.3987	-1005.9288	878.6840	3395.2550	15
229048	TYLERTOWN 2 WNW	MS	90.1800	31.1200	651.0093	-960.1830	768.9280	3446.3230	15
229617	WHITE SAND	MS	89.6800	30.8000	701.5116	-992.0814	817.6920	3412.1540	15
229648	WIGGINS RANGER STN	MS	89.1500	30.8500	751.7006	-982.2792	868.2510	3419.3290	15

Note: 2001 missing 164700, 166394, 166664, 220797 AND 229617
Note: 2002 missing 15478, 160549, 165078 and 166660
Note: 2003 missing 227714

Table 6.4
Buoy Stations

NODC	Name	State	Geographic Location		LCC		UTM Coordinates		
			Longitude (deg)	Latitude (deg)	Easterly (km)	Northerly (km)	Easterly (km)	Northerly (km)	Zone
42040	MOBILE SOUTH 64 NM SOUTH OF DAUPHIN ISLAND	AL	88.2000	29.2080	860.1680	-1156.8460	966.8688	3240.5876	15
42007	BILOXI 22 NM SOUTH-SOUTHEAST OF BILOXI	MS	88.7690	30.0900	795.7710	-1063.6580	907.8873	3336.3177	15

6.2 Geophysical Data

Land Use Data. Land Use Data are used to develop the surface characteristic for input to the CALMET model. The best large-scale land use data sets are the USGS National Land Cover Datasets (NLCD 92), which have a 30-meter resolution. Data extracted from these data sets are used as raw data input to the CTGPROC program to calculate surface characteristics for input to the CALMET program. Figure 6.5 shows land use for each grid cell (output from ctgproc.exe and makegeo.exe).

Terrain Data. Terrain data is used by the CALMET model to modify the Initial Guess Wind Fields in developing the Step 1 Wind Fields. USGS 1:250,000 scale Digital Elevation Model (DEM) data are used as the raw data input to the TERREL program to calculate elevations for input to the CALMET program. Figure 6.5 shows contours based on the elevation of the center of each grid cell (output from terrel.exe).

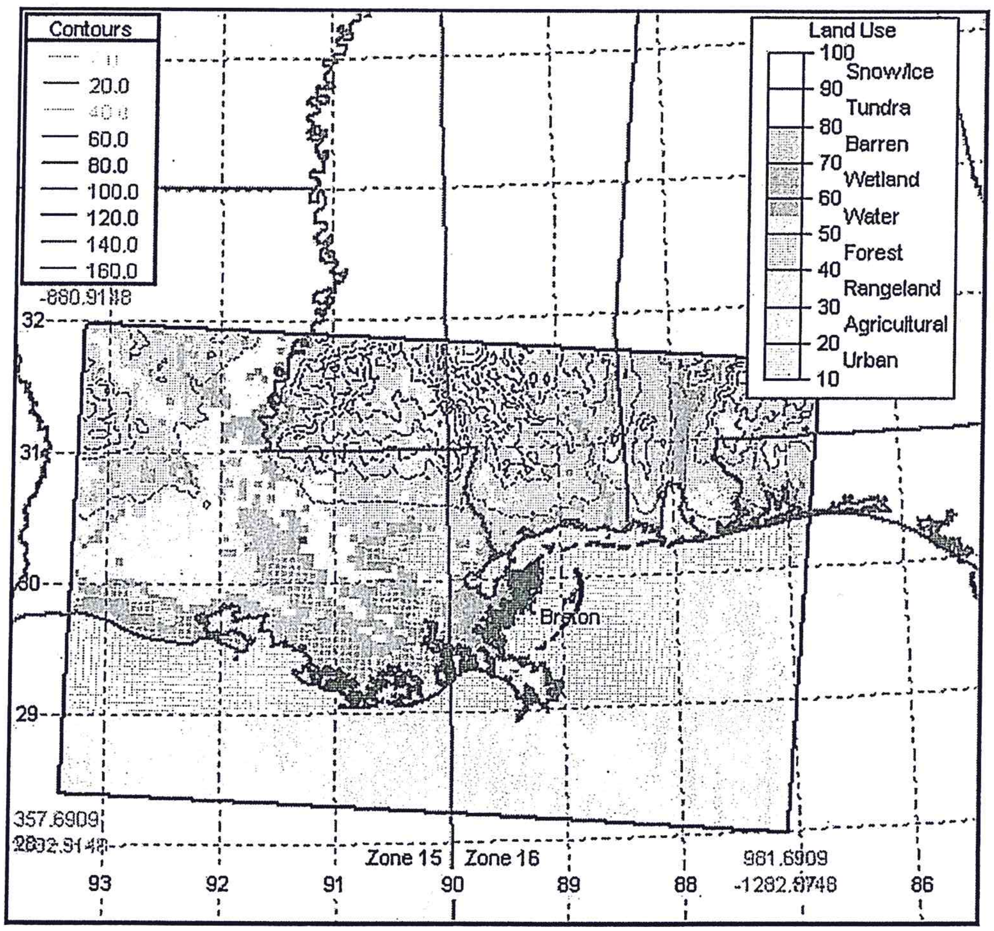

Figure 6.5 Land Use and Terrain

6.3 Preparing Data for CALMET

SMERGE. The SMERGE program reads multiple surface data files that may be in several different formats, makes any needed units conversion, and writes the combined data to a single file (surf.dat). The surf.dat file is read by CALMET as observations and is used in the modification of the Step 1 Wind Fields in developing the Step 2 Wind Fields.

READ62. The READ62 program reads an upper air data file and a substitution file, extracts soundings, makes any needed units conversion, substitutes for missing or bad data from the substitution file, and writes the data to a processed data file (*.ua) for each upper air station. The substitution file is an extraction of the nearest CALMM5 node. READ62 is repeated for each upper air file. Any data errors flagged in the READ62 output files are corrected and documented in the upper air list (.lst) files for each station. The processed data files are read by CALMET as observations and are used in the modification of the Step 1 Wind Fields in developing the Step 2 Wind Fields.

PXTRACT and PMERGE. PXTRACT and PMERGE extract data for specific stations and combine the data into a single processed data file (PRECIP.DAT). The processed data file is read by CALMET as observations and is used in the modification of the Step 1 Wind Fields in developing the Step 2 Wind Fields.

CTGPROC. CTGPROC reads land use data and calculates weighted land use for each grid cell in the modeling domain and writes a processed data file.

TERREL. TERREL reads terrain data, calculates the elevation of the center of each grid cell in the modeling domain, and writes a processed data file.

MAKEGEO. MAKEGEO reads the processed data files from CTGPROC and TERREL. MAKEGEO calculates weighted surface characteristics and writes these characteristics along with the terrain elevations to a processed data file (MAKEGEO.DAT). The processed data file is used by the CALMET model to modify the Initial Guess Wind Fields in developing the Step 1 Wind Fields. Figure 6.3 shows the land use for each grid cell and topographic lines based on the terrain elevation at the center of each grid cell.

6.4 CALMET Options

MREG. The regulatory default option, MREG, was set to one (1 = required).

NoObs. The NoObs option was set to zero so that surface and upper air stations were required. Overwater (buoy) data and precipitation data were also used.

EPA-FLM Recommended Settings. The major CALMET EPA/FLM Recommended Settings are shown in Table 6.5. All settings are as required by the Clarification Memorandum of August 31, 2009.

Table 6.5
EPA-FLM CALMET Settings

Parameter	Description	CALMET Default	EPA/FLM Value
TERRAD	Radius of Influence of Terrain	None	15
RMAX1	Max. radius of influence over land in surface layer	None	100
RMAX2	Max. radius of influence over land in layers aloft	None	200
RMAX3	Max. radius of influence over water	None	200
R1	Relative weighting in surface layer	None	50
R2	Relative weighting in the aloft layer	None	100

7. CALPUFF Analysis

The CALPUFF model calculates transport and dispersion using the three-dimensional Meteorological Grid created by CALMET. The technical options that were used in CALPUFF are listed in Appendix B, which is a CALPUFF input file for 2001.

The CALPUFF default values for particle size parameters and scavenging coefficients for sulfate and nitrate particles are used.

Ammonia. As in the 2007 analysis, a constant background ammonia concentration of 3.0 parts per billion (ppb) was used as input to CALPUFF for calculating chemical transformation using the MESOPUFF II chemical transformation procedure.

Ozone. The hourly ozone files from the 2007 analysis were used. Monthly average values were calculated for each month to be used for missing data. Table 7.1 lists the average ozone values for each month.

Table 7.1
Average Monthly Ozone Background Concentrations (ppb)

Month	2001	2002	2003
January	20.87535	23.12891	24.92080
February	25.09028	29.52795	24.28612
March	34.87327	31.38484	33.93057
April	36.24034	33.80058	37.85152
May	38.01718	35.46679	39.30647
June	34.46120	32.98103	33.02329
July	35.22554	29.20031	28.53507
August	33.63565	37.03028	33.90635
September	27.97368	35.61813	33.09259
October	28.62675	20.19771	30.40248
November	24.67059	24.26124	22.96470
December	21.96526	21.46122	24.35795

Receptors. In accordance with EPA-FLM guidance, the required discrete receptor locations contained in the NPS database for Class I areas are used in the CALPUFF analysis. Each receptor provided by this database has an associated terrain height. Table 7.2 shows the receptors for the Breton NWR.

Table 7.2

NPS Receptors for Breton NWR Class I Area

Geographic Location		LCC		UTM Coordinates			Ground Elevation (m)
Longitude (deg)	Latitude (deg)	Easterly (km)	Northerly (km)	Easterly (km)	Northerly (km)	Zone	
89.0042	29.6208	777.7102	-1118.0130	887.0070	3283.4487	15	0
88.9792	29.6375	779.9709	-1115.9389	889.3661	3285.3817	15	0
88.9708	29.6458	780.6968	-1114.9374	890.1416	3286.3343	15	0
88.9625	29.6542	781.4225	-1113.9359	890.9169	3287.2870	15	0
88.9125	29.7208	785.6071	-1106.0668	895.5004	3294.8538	15	0
88.8708	29.7625	789.2269	-1101.0580	899.3700	3299.6204	15	0
88.8625	29.7875	789.7834	-1098.1972	900.0770	3302.4232	15	0
88.8458	29.8042	791.2295	-1096.1934	901.6233	3304.3305	15	1
88.8458	29.8125	791.1458	-1095.2640	901.5899	3305.2551	15	1
88.8375	29.8292	791.7848	-1093.3328	902.3293	3307.1335	15	1
88.8375	29.8375	791.7011	-1092.4035	902.2959	3308.0581	15	1
88.8292	29.8542	792.3396	-1090.4724	903.0349	3309.9365	15	1
88.8292	29.8625	792.2559	-1089.5431	903.0013	3310.8612	15	1
88.8292	29.8708	792.1721	-1088.6139	902.9677	3311.7858	15	1
88.8292	29.8792	792.0883	-1087.6848	902.9341	3312.7104	15	1
88.8292	29.8875	792.0046	-1086.7556	902.9005	3313.6350	15	0
88.8292	29.8958	791.9208	-1085.8265	902.8669	3314.5597	15	0
88.8292	29.9125	791.7533	-1083.9682	902.7997	3316.4089	15	0
88.8208	29.9125	792.5586	-1083.8956	903.6052	3316.4382	15	1
88.8208	29.9208	792.4747	-1082.9665	903.5715	3317.3629	15	1
88.8292	29.9292	791.5858	-1082.1101	902.7324	3318.2582	15	0
88.8208	29.9292	792.3909	-1082.0375	903.5378	3318.2875	15	1
88.8292	29.9375	791.5020	-1081.1811	902.6988	3319.1828	15	0
88.8208	29.9375	792.3071	-1081.1085	903.5041	3319.2121	15	1
88.8292	29.9458	791.4182	-1080.2521	902.6651	3320.1074	15	1
88.8292	29.9542	791.3345	-1079.3231	902.6315	3321.0321	15	1
88.8375	29.9625	790.4459	-1078.4666	901.7927	3321.9274	15	0
88.8292	29.9625	791.2507	-1078.3941	902.5978	3321.9567	15	1
88.8375	29.9708	790.3623	-1077.5376	901.7591	3322.8520	15	0
88.8292	29.9708	791.1670	-1077.4651	902.5641	3322.8813	15	1
88.8375	29.9792	790.2786	-1076.6087	901.7254	3323.7766	15	0
88.8375	29.9875	790.1949	-1075.6798	901.6918	3324.7013	15	0
88.8375	29.9958	790.1113	-1074.7509	901.6582	3325.6259	15	1
88.8458	30.0042	789.2232	-1073.8944	900.8198	3326.5213	15	0
88.8458	30.0125	789.1397	-1072.9655	900.7862	3327.4459	15	0
88.8542	30.0208	788.2519	-1072.1090	899.9480	3328.3413	15	0
88.8542	30.0292	788.1684	-1071.1802	899.9144	3329.2659	15	1
88.8625	30.0375	787.2808	-1070.3236	899.0764	3330.1614	15	0
88.8708	30.0458	786.3934	-1069.4669	898.2385	3331.0569	15	0
88.8792	30.0542	785.5062	-1068.6102	897.4007	3331.9525	15	0

8. POSTUTIL and CALPOST Analysis

CALPOST is the CALPUFF modeling system post-processor that computes the final modeling results. CALPOST performs averaging and ranking of the concentration or deposition files derived from CALPUFF or POSTUTIL. CALPOST is processed individually for each impact-of-interest (e.g., concentrations, visibility impacts, and total deposition of sulfur and nitrogen). The technical options that were used in POSTUTIL are listed in Appendix C, which is a POSTUTIL input file for 2001. The technical options that were used in CALPOST are listed in Appendix D, which is a CALPOST input file for 2001.

POSTUTIL. POSTUTIL was used to re-compute the HNO_3/NO_3 concentration partition for the TOTAL (all sources) concentration fields (SO_4, NO_3, HNO_3; NH_3) (MNITRATE = 1). A monthly average of 3.0 parts per billion (ppb) was used for ammonia.

Visibility. The CALPUFF modeling system is used to predict the impacts that the Project emissions will have at the Breton NWR Class I Area. The CALPOST postprocessor uses the POSTUTIL concentrations to calculate the change in light extinction due to the project emissions. CALPOST includes several methods to calculate visibility. Following the EPA-FLM guidance, the IMPROVE (2006) formulation (MFRH = 4) was used along with Method 8 (MVISBK = 8), Mode 5 (M8_MODE = 5). Values from the FLAG2010 guidance document were used for the relative humidity adjustment factors and for the background concentrations for average conditions.

The background conditions and relative humidity factors for Method 8 for the Breton NWR are from the *Federal Land Managers' Air Quality Related Values Workgroup (FLAG), Phase I Report – Revised (2010).* Table 8.1 shows the relative humidity adjustment factors for Breton NWR and Table 8.2 shows the monthly background concentrations for average conditions for Breton NWR.

Table 8.1

Monthly Average Relative Humidity Adjustment Factors for the Breton NWR Class I Area

Month	Large SO4 and NO3	Small SO4 and NO3	Sea Salt
January	2.91	4.08	4.10
February	2.76	3.82	3.89
March	2.74	3.79	3.87
April	2.72	3.74	3.85
May	2.83	3.94	4.02
June	2.94	4.12	4.21
July	3.10	4.41	4.44
August	3.07	4.37	4.38
September	2.97	4.18	4.23
October	2.82	3.92	3.99
November	2.83	3.93	4.01
December	2.90	4.06	4.11

Table 8.2

Monthly Background Concentrations for the Breton NWR Class I Area

Month	Ammonium Sulfate (µg/m³)	Ammonium Nitrate (µg/m³)	Organic Mass (µg/m³)	Elemental Carbon (µg/m³)	Soil (µg/m³)	Coarse Mass (µg/m³)	Sea Salt (µg/m³)
January	0.23	0.1	1.78	0.02	0.48	3.01	0.19
February	0.23	0.1	1.78	0.02	0.48	3.01	0.19
March	0.23	0.1	1.78	0.02	0.48	3.01	0.19
April	0.23	0.1	1.78	0.02	0.48	3.01	0.19
May	0.23	0.1	1.78	0.02	0.48	3.01	0.19
June	0.23	0.1	1.78	0.02	0.48	3.01	0.19
July	0.23	0.1	1.78	0.02	0.48	3.01	0.19
August	0.23	0.1	1.78	0.02	0.48	3.01	0.19
September	0.23	0.1	1.78	0.02	0.48	3.01	0.19
October	0.23	0.1	1.78	0.02	0.48	3.01	0.19
November	0.23	0.1	1.78	0.02	0.48	3.01	0.19
December	0.23	0.1	1.78	0.02	0.48	3.01	0.19

9. Results

The highest 98th percentile impact of the Addis plant at the Breton NWR Class I Area was 0.397 delta-deciviews for 2002 for the individual years and 0.344 delta-deciviews for the combined period. This is well below the standard of 0.5 delta-deciviews

Table 9.1

Visibility Impacts at Breton NWR

For Each Year (delta-dv)

Day	Year of Meteorological Data		
	Breton NWR		
	2001	2002	2003
1st Highest	0.631	0.766	0.735
2nd Highest	0.594	0.659	0.691
3rd Highest	0.534	0.600	0.475
4th Highest	0.469	0.568	0.385
5th Highest	0.418	0.527	0.373
6th Highest	0.391	0.479	0.355
7th Highest	0.370	0.426	0.344
8th Highest (98th Percentile)	0.316	0.397	0.340

Table 9.2

Visibility Impacts at Breton NWR

For the Period 2001-2003 (delta-dv)

High Ranking	Impact (delta-dv)	Year	Day
1	0.766	2002	285
2	0.735	2003	210
3	0.691	2003	309
4	0.659	2002	363
5	0.631	2001	5
6	0.600	2002	202
7	0.594	2001	353
8	0.568	2002	258
9	0.534	2001	229
10	0.527	2002	201
11	0.479	2002	237
12	0.475	2003	310
13	0.469	2001	226
14	0.426	2002	205
15	0.418	2001	190
16	0.397	2002	213
17	0.391	2001	191
18	0.385	2003	150
19	0.373	2003	294
20	0.370	2001	202
21	0.355	2003	104
22 (8th Percentile)	0.344	2003	31