Air Dispersion Modeling Summary

January 09, 2007

Project: Company Name – Facility Name
Section 15, Township 2N, Range 35E, Curry County
UTM Coordinates: 660,465 m East, 3,807,913 m North, zone 13
Elevation = 4314 feet

Brief: The company desires that the New Mexico Air Quality Bureau issue air quality permit such for the construction of a new manufacturing facility that is located approximately 3 miles to the west of Clovis in Curry county, New Mexico. The facility has emission sources of Total Suspended Particulates (TSP), Particulates less than 10 micrometers in diameter (PM_{10}), Particulates less than 2.5 micormeters in diameter ($PM_{2.5}$), Nitrogen Oxides (NOx), Sulfur Dioxide (SO_2), and Carbon Monoxide (CO). Thus, impacts for TSP, PM_{10}, $PM_{2.5}$, NOx, SO_2, and CO are reviewed here. The facility is located in air quality control region 155 where the minor source baseline dates for NO_2, SO_2 and PM_{10} have been established. The emissions and stack parameters for the facility are shown in Table 1.

Modeling Assumptions:
The Company, the existing grain processing facility under the current permit number XXXX, reduces the current TSP and PM_{10} emission rates up to 50% to account for enclosure around truck receiving pit as well as 90% control from mineral oil to control fugitive particulates at grain silos. The entire haul road of the facility is paved and swept to reach 95% control. Background concentrations of 7.3 $\mu g/m^3$, 20 $\mu g/m^3$, and 26.6 $\mu g/m^3$ are considered for $PM_{2.5}$, PM_{10} and TSP, respectively. The $PM_{2.5}$ emission rates of the facility sources are calculated using $PM_{2.5}/PM_{10}$ ratios of XXXX for point sources and XXXX for haul roads.

Conclusion: This modeling analysis demonstrates that operation of the facility described in this report neither causes nor contributes to any exceedances of applicable air quality standards. The standards relevant at this facility are NAAQS for NO_2, SO_2, CO, PM_{10}, and $PM_{2.5}$; NMAAQS for NO_2, SO_2, CO, and TSP; and PSD Class II for NO_2, SO_2, and PM_{10}.

Action: The air quality analysis demonstrates compliance with applicable regulatory requirements.

Model(s) Used: AERMOD model was used to run the modeling analysis.

Number of Model Runs: AERMOD- 21 modeling runs.

Table 1. Table of Emissions and Stack Parameters[1]

Air Dispersion Modeling Summary

Point Source Stack Parameters and Emission Rates

Stack ID	Stack Height (m)	Stack Diameter (m)	Exit Velocity (m/s)	Temp (^oK)	NO_2 (lb/hr)	SO_2 (lb/hr)	CO (lb/hr)	TSP (lb/hr)	PM_{10} (lb/hr)	$PM_{2.5}$ (lb/hr)
S1	9.14	0.25	5.59	0	N/A	N/A	N/A	0.0086	0.0086	0.00171
S2	9.14	1.02	17.46	0	N/A	N/A	N/A	0.2571	0.2571	0.05143
S3	9.14	0.86	20.14	317	N/A	N/A	N/A	0.2143	0.2143	0.04286
S4	9.14	0.86	20.14	317	N/A	N/A	N/A	0.2143	0.2143	0.04286
S5	7.62	0.30	11.64	311	N/A	N/A	N/A	0.0413	0.0413	0.00825
S6	15.24	2.44	17.59	430	8.65	11.96	10.09	8.5716	8.5716	1.71431
S7	15.24	1.83	15.27	450	11.51	0.17	10.08	2.1905	2.1905	0.43810
S8	6.71	0.50	20.00	1273	0.31	6.E-05	1.64	0.0008	0.0008	0.00016
S9	7.62	0.80	20.00	1273	0.94	6.E-05	5.04	0.0008	0.0008	0.00016
S10	2.44	0.08	103.49	708	6.45	0.43	1.39	0.0381	0.0381	0.00762
S11.A	12.19	9.14	7.19	303	N/A	N/A	N/A	0.1032	0.1032	0.02064
S11.B	12.19	9.14	7.19	303	N/A	N/A	N/A	0.1032	0.1032	0.02064
S11.C	12.19	9.14	7.19	303	N/A	N/A	N/A	0.1032	0.1032	0.02064

Volume Source Modeling Parameters and Emission Rates

Stack ID	Description	Release Height (m)	Horizontal Dimension (m)	Vertical Dimension (m)	TSP Rate (lb/hr)	PM_{10} Rate (lb/hr)	$PM_{2.5}$ Rate (lb/hr)
HR1 – HR61 (each)	Haul Road Segment	4.00	6.05	3.72	0.0111	0.0022	0.000556

Modeling Parameters: The AERMOD regulatory default parameters were included in assumptions made by the model. Building downwash caused by buildings at the facility was considered.

Complex Terrain Data: Both simple and complex types of terrain were used to model the facility. Elevations of receptors, facility sources, and surrounding sources were obtained from digitized USGS 7.5-minute maps and one degree maps.

Receptor Grid: For each pollutant, the radius of significant impact around the facility was established using a Cartesian grid as shown in Table 2. Fenceline receptors were placed at 25-meter intervals around the facility fenceline. A 50-meter spacing for a very fine grid resolution was extended out to 0.5-km from the fenceline in each direction. Receptors for a fine grid resolution were defined with 100-meter spacing to a distance of 1.0-km from the facility. For intermediate and rough grid resolutions, 250-meter spacing and 500-meter spacing were extended out to 2.5-km and 15-km from the facility, respectively.

Table 2. Used Grid Resolutions in the Modeling Domain

Grid Type	Description	Shape	Spacing (m)	Length (Km)
Cartesian	Very fine	Square	50	0.5
Cartesian	Fine	Square	100	1.0

Cartesian	Intermediate	Square	250	2.5
Cartesian	Rough	Square	500	15.0

Meteorological Data: AERMOD -- Five (5) years of surface and upper air meteorological data: surface meteorological data collected at Clovis Municipal Airport from 2001 through 2005 (CVN01.SFC - CVN05.SFC) and upper air meteorological data collected at Amarillo International Airport from 2001 through 2005 (CVN01.PFL - CVN05.PFL).

Adjacent Sources: All adjacent particulate sources within 65 km were modeled, totaling 33 NO_2, 20 SO_2, 68 TSP, and 68 PM_{10} sources. The total number of 32 surrounding sources, 20 surrounding sources, and 48 surrounding sources was modeled for the NO_2, SO_2, and PM_{10} PSD increment analysis, respectively.

Results Discussion: Results are detailed in Table 3.

CO, NO_2, SO_2, TSP, PM_{10}, $PM_{2.5}$ Standards...

1-hr and 8-hr CO Standards
As shown in Table 3, the 1-hour averaged maximum CO concentration of 188.31 $\mu g/m^3$ from the facility is 9.42 percent of the significance level. The 8-hour averaged maximum CO concentration of 77.74 $\mu g/m^3$ from the facility is 15.55 percent of the significance level. Since both of these concentrations are below the significance levels, no further modeling was needed.

Annual and 24-hr NO_2 NAAQS and NMAAQS…
Compliance with the annual and 24-hour NO_2 NMAAQS and with the annual NO_2 NAAQS has been demonstrated, as shown in Table 3. The NMED's 40% 24-hour conversion of NOx to NO_2 and the 75% annual conversion of NOx to NO_2 from EPA's Ambient Ratio Method (ARM) were applied to calculate concentrations.

Annual NO_2 PSD Class II Increment…
Compliance with the annual NO_2 PSD Class II increment has been demonstrated, as detailed in Table 3.

Annual NO_2 PSD Class I Increment…
The nearest PSD Class I area is Salt Creek, which is located 145 km from the facility. The facility will have negligible impacts at this distance.

Annual, 3-hr, and 24-hr SO_2 NAAQS and NMAAQS
As shown in Table 3, the 3-hour averaged maximum SO_2 concentration of 17.87 $\mu g/m^3$ from the facility is 71.49 percent of the significance level. The annual averaged maximum SO_2 concentration of 0.38 $\mu g/m^3$ from the facility is 38.41 percent of the significance level. Since both of these concentrations are below the significance levels,

no further modeling was needed. Compliance with the 24-hour SO_2 NMAAQS has been demonstrated, as detailed in Table 3.

Annual SO_2 PSD Class II Increment…
Compliance with the 24-hour SO_2 PSD Class II increment has been demonstrated, as detailed in Table 3.

Annual SO_2 PSD Class I Increment…
The nearest PSD Class I area is Salt Creek, which is located 145 km from the facility. The facility will have negligible impacts at this distance.

Annual and 24-hr PM_{10} PSD Class II increment…
Compliance with the annual and 24-hour PM_{10} PSD Class II increments has been demonstrated, as detailed in Table 3.

Annual and 24-hr PM_{10} PSD Class I increment…
The nearest PSD Class I area is Salt Creek, which is located 145 km from the facility. The facility will have negligible impacts at this distance.

Annual and 24-hr $PM_{2.5}$ NAAQS…
Compliance with the annual and 24-hour $PM_{2.5}$ NAAQS has been demonstrated, as shown in Table 3.

Table 3. Ambient Impact from Emissions
Gases Pollutants

Pollutant	Contributing Sources	Averaging Period	Concentration		Standard		Percent of Standard or Significance Level
			μg/m^3	ppm	Applicable	Value	
CO	Alone	1-hour	188.31	0.1902	Significance	2000 μg/m^3	9.42
CO	Alone	8-hour	77.74	0.0785	Significance	500 μg/m^3	15.55
NO_2	All	24-hour[a]	35.06	0.0216	NMAAQS	0.1 ppm	21.56
NO_2	Alone	24-hour[a]	34.47	0.0212	NMAAQS	0.1 ppm	21.20
NO_2	All	annual[b]	8.20	0.0050	NMAAQS	0.05 ppm	10.08
NO_2	Alone	annual[b]	7.71	0.0047	NMAAQS	0.05 ppm	9.49
NO_2	PSD	annual[b]	8.16	0.0050	PSD Class II	25 μg/m^3	32.64
SO_2	All	3-hour	17.90	0.0079	Significance	25 μg/m^3	71.59
SO_2	Alone	3-hour	17.87	0.0079	Significance	25 μg/m^3	71.49
SO_2	PSD	3-hour	17.90	0.0079	Significance	25 μg/m^3	71.59
SO_2	All	24-hour	5.94	0.0026	NMAAQS	0.1 ppm	2.62
SO_2	Alone	24-hour	5.89	0.0026	NMAAQS	0.1 ppm	2.60
SO_2	PSD	24-hour	5.94	0.0026	PSD Class II	91 μg/m^3	6.52
SO_2	All	annual	0.72	0.0003	Significance	1 μg/m^3	72.46
SO_2	Alone	annual	0.38	0.0002	Significance	1 μg/m^3	38.41
SO_2	PSD	annual	0.72	0.0003	Significance	1 μg/m^3	72.46

Table 3. Ambient Impact from Emissions
Particulate Matters

Pollutant	Contributing Sources	Averaging Period	Concentration, μg/m^3			Standard		Percent of Standard or Significance Level
			Modeled Impact	Background	Total*	Applicable	Value	
TSP*	All	24-hour	102.66	26.6	129.26	NMAAQS	150 μg/m^3	86.17
TSP*	Alone	24-hour	18.33	-	18.33	NMAAQS	150 μg/m^3	12.22
TSP*	All	annual	6.6	26.6	33.2	NMAAQS	60 μg/m^3	55.33
TSP*	Alone	annual	3.38	-	3.38	NMAAQS	60 μg/m^3	5.63
PM_{10}*	All	24-hour	36.17	20	56.17	NAAQS	150 μg/m^3	37.45
PM_{10}*	Alone	24-hour	35.40	-	35.40	NAAQS	150 μg/m^3	23.60
PM_{10}*	PSD	24-hour	25.83	-	25.83	PSD Class II	30 μg/m^3	86.10
PM_{10}*	All	annual	8.70	20	28.70	NAAQS	50 μg/m^3	57.40
PM_{10}*	Alone	annual	27.95	-	27.95	NAAQS	50 μg/m^3	55.90
PM_{10}*	PSD	annual	8.17	-	8.17	PSD Class II	17 μg/m^3	48.06
$PM_{2.5}$*	All	24-hour	21.09	7.3	28.39	NAAQS	35 μg/m^3	81.11
$PM_{2.5}$*	Alone	24-hour	5.94	-	5.94	NAAQS	35 μg/m^3	16.97
$PM_{2.5}$*	All	annual	5.52	7.3	12.82	NAAQS	15 μg/m^3	85.47
$PM_{2.5}$*	Alone	annual	1.90	-	1.90	NAAQS	15 μg/m^3	12.67

a: NMED's 40% 24-hour conversion of NOx to NO_2 applied to calculate concentration.
b: 75% annual conversion of NOx to NO_2 from EPA's Ambient Ratio Method (ARM) applied to calculate concentration.
*: PM_{10} background concentration of 20 μg/m^3 and PM2.5 background concentration of 7.3 μg/m^3 were added to the modeled impact of the facility sources and surrounding sources for the NAAQS and the NMAAQS analysis. TSP background concentrations of 26.6 μg/m^3, which were calculated by multiplying PM_{10} concentrations by 1.33, were added to the modeled impact of the facility sources and surrounding sources for the NAAQS and the NMAAQS analysis.