Air Quality Dispersion Modeling Summary for Permit No. 1652-M2

Project: Chemical Lime / Belen
Section: 4, T 4 N, R 2 E, Valencia County
UTM Coordinates: 341170 m East, 3829950 m North, zone 13
Elevation = 4890 feet

Brief: Chemical Lime Co. desires that the New Mexico Air Quality Bureau issue air quality permit #1652-M2 to modify their lime hydrator. The plant is located in the city of Belen in Valencia County. The application is to add several pieces of equipment to the process, including screw conveyors, a hopper, a pulverizer, bins, loadout facilities, etc.

Emission units at the facility consist of hoppers, railcars, conveyors, crushers, loadouts, a small natural gas heater, screw conveyors, bins, roary feeders, sifters, and other equipment used to hydrate lime. The emission units are described in Table 1 - Table of Emissions and Stack Parameters. The emission units are sources of PM10, TSP, and the two state air toxics calcium oxide [CaO] and calcium hydroxide [$Ca(OH)_2$], also known as hydrated lime. All particulates are controlled by pulse-jet baghouses, each venting to one of ten stacks. The applicant states that there are no fugitive emissions at this plant.

Conclusion: This modeling analysis demonstrates that operation of the facility described in this report neither causes nor significantly contributes to any exceedances of applicable air quality standards. The standards relevant at this facility are NAAQS for PM10; NMAAQS for TSP; and one one-hundredth of the OEL for the state air toxics calcium oxide and calcium hydroxide.

Action: The permit can be issued based on this modeling analysis.

Modeling report submitted by Trinity Consultants (dated 01/07/00).

The air quality analysis demonstrates compliance with applicable regulatory requirements.

Model(s) Used: ISCST3 was used to run the modeling analysis. Complete modeling input and output files can be made available and are located on computer *AQBSOC09* in the directories *D:\AQB45\Models\1652chlm.*

Number of Model Runs: 1 modeling run was performed by NMED.

Modeling Parameters: The following ISCST3 regulatory default parameters were included in assumptions made by the model: Stack-tip downwash was considered. Buoyancy-induced dispersion was taken into account. Default wind profile exponents were used. Default vertical potential temperature gradients were used. Final plume rise was assumed. Building downwash was not considered.

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

Stack Number	Description	Stack Height (ft)	Stack Height (m)	Diameter (ft)	Diameter (m)	Velocity (ft/s)	Velocity (m/s)	Temp. (oF)[4]	Temp. (K)	PM10 Rate (g/s)[2,3]	PM10 Rate (lbs/hr)[2,3]
DC001	Pulse Jet Baghouse	49.3	15.0	3.28	1	0	0.0	-460	0	0.01	0.09
DC002	Pulse Jet Baghouse	49.7	15.1	3.28	1	0	0.0	-460	0	0.01	0.09
DC003	Pulse Jet Baghouse	103.0	31.4	3.28	1	0	0.0	-460	0	0.01	0.08
DC004	Pulse Jet Baghouse	53.4	16.3	1.74	0.53	85	25.9	240	389	0.10	0.78
DC005	Pulse Jet Baghouse	39.5	12.1	1.15	0.35	47	14.3	150	339	0.03	0.22
DC006	Pulse Jet Baghouse	40.8	12.4	0.49	0.15	92	28.0	68	293	0.01	0.09
DC007	Pulse Jet Baghouse	104.6	31.9	3.28	1	0	0.0	-460	0	0.02	0.15
DC008	Pulse Jet Baghouse	31.8	9.7	0.46	0.14	112	34.1	68	293	0.01	0.09
DC009	Pulse Jet Baghouse	90.0	27.4	2.49	0.76	85	25.9	150	339	0.23	1.85
DC010	Pulse Jet Baghouse	40.8	12.4	0.49	0.15	92	28.0	68	293	0.01	0.09

1. All values copied or converted from Chemical Lime Permit Application No. 1652-M2
2. The applicant has assumed conservative emission rates: TSP rate = PM10 rate, and CaO rate = PM10 rate.
3. The applicant states that there are no fugitive emissions at this plant.
4. A temp. of –460 F is a dummy temperature that indicates a horizontally discharging stack.

Complex Terrain Data: Only a radius of impact modeling run was carried out. Terrain was assumed to be flat.

Receptor Grid:

Grid Type	Description	Shape	Spacing	Radius or Length
Cartesian	Fine	Square	100 m	2.2 km
Cartesian	Medium	Circular	250 m	2.2 km
Cartesian	Fine	Circular	100 m	1.0 km

The grids were centered on the southwest corner of the property in keeping with the consultant's grid setup. The corner is about 100 meters SW of the plant's stack cluster.

Meteorological Data: ISCST3 -- One (1) year, Albuquerque 1989. Missing met data was allowed.

Adjacent Sources: Adjacent sources were not modeled. The radius of impact for PM10 was zero and the maximum concentration of CaO was below 1/100 th of the OEL.

Modeling Procedures. No changes from standard modeling procedures were made.

Results and Discussion. Results are detailed in Table 2.

STANDARDS FOR CRITERIA POLLUTANTS

24-hr and annual PM10/TSP standards

The PM10 and TSP concentrations produced by the facility were demonstrated to be below the 24-hour and annual significance levels, as shown in Table 2. TSP standards were also met because all TSP was assumed to be PM10.

AIR TOXIC SCREENING

8-hr concentration for CaO and $Ca(OH)_2$

All PM10 was modeled conservatively as if it were entirely CaO. Therefore the results of the PM10 modeling can be used directly to determine the maximum ambient impact of CaO. (CaO has an OEL of 2 mg/m^3 while $Ca(OH)_2$ has an OEL of 5 mg/m^3.) The maximum 8-hr concentration for CaO (i.e., PM10) was found to be less than 1/100th the OEL, as shown in Table 2.

Table 2. Ambient Impact from Emissions

Pollutant	Contributing Sources	Averaging Period	Concentration ($\mu g/m^3$)	Receptor Elevation (ft)[1]	UTMH (m)[2]	UTMV (m)[2]	Distance from Site (m)	Radius of Impact (km)	Applicable Standard	Value of Standard	Units of Standard	Percent of Standard or Significance Level
PM10	ALONE	24-hour	4.9	0	+100	-450	450	0	Significance	5	ug/m3	98%
PM10	ALONE	Annual	0.67	0	+100	+150	180	0	Significance	1	ug/m3	67%
CaO	ALONE	8-hour	10.7	0	-300	0	300	0	20NMAC2.72 Subpart IV 1/100th OEL	20	ug/m^3	54%

Note: 1. Terrain was assumed to be flat. Only an ROI run was carried out.
2. UTMs are relative to the center of the stack cluster. Positive UTMs represent N or E while negative UTMs represent S or W, as applicable.