Air Dispersion Modeling Summary for the Lhoist North America - Belen Chemical Lime Plant Permit No. 1652 M2-R6

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Facility Identification:
Project: Belen Chemical Lime Plant Company: Lhoist North America of Arizona (formerly known as Chemical Lime Company of Arizona)
Permit number: 1652 M2-R6 TEMPO ID: 1598

Location Information:
The facility is located 1.5 miles north of Madrone, and 1.9 miles east-southeast of Jarales, in Valencia County.
UTM Coordinates: 341,171 m East, 3,830,208 m North, zone 13, Datum: NAD83
Elevation = 4895feet
Air Quality Control Region (AQCR): 152
Airshed: Mrg

Project Description:
Brief: Lhoist North America has a New Source Review (NSR) minor source air quality permit for its Belen Chemical Lime Plant (the facility). The facility was constructed in 1995. The facility receives quick lime (CaO) and produces hydrated lime ($Ca(OH)_2$). The raw material and the product is kept in silos or storage pigs until ready to be shipped. For the past several years the facility has been mostly idle because of lower demand of lime in the market.

The facility is an emission source for the following pollutants: Particulate Matter 10 micrometers or less in aerodynamic diameter (PM10), and Particulate Matter 2.5 microns or less (PM2.5).

Table 1: Table of Total Facility Emissions (English units)

PM2.5 Rate (lbs/hr)	PM10 Rate (lbs/hr)
1.772	3.408

Table 2: Table of Emissions and Stack Parameters (English units)[1]

Stack Number	Description	Stack Type	Stack Height (ft)	Stack Diameter (ft)	Exit Velocity (ft/s)	Temperature (°F)	PM2.5 Rate (lbs/hr)	PM10 Rate (lbs/hr)
DC006	Railcar load out	Vertical	41.3	0.5	92.0	68	0.03567	0.0685
DC009	Cyclone Truck Load out	Vertical	36.3	2.5	84.9	150	0.9644	1.854
DC005	Air Separator	Vertical	39.1	1.1	47.0	150	0.1155	0.2221
DC004	Seasoning Chamber (Close to White Hydrated lime Silo)	Vertical	50.6	1.7	85.1	240	0.4032	0.7754
DC007	On Top of White Silo (Hydrate)	Horizontal	98.5	0.6	112.6	150	0.07717	0.1484
DC008	Truck Load Out	Vertical	40.0	0.5	111.7	68	0.03567	0.06860
DC003	On Top of White Silo (Hydrate)	Horizontal	103.5	0.4	119.8	68	0.04249	0.08174
DC002	Quick Lime Surge Bin	Horizontal	47.3	0.4	120.6	68	0.04910	0.09444
DC001	On Top of Quick Lime Black Silo	Horizontal	46.8	1.0	22.7	68	0.04910	0.09444

[1] All emission parameters values copied or converted from initial facility modeling and from the survey conducted by the AQB on June 2nd 2016. The survey values for source location, height and emission point orientation vertical or horizontal were used in this analysis.

There are no PointCap sources at this facility.

There are no Area sources at this facility.

There are no Volume sources at this facility.

There are no OpenPit sources at this facility.

There are no AreaCirc sources at this facility.

There are no AreaPoly sources at this facility.

Modeling Assumptions:
The facility operates all year long, 8760 hours per year. To confirm the facility emission sources the New Mexico Air Quality Bureau (AQB) conducted a survey of the facility on June 2, 2016. The AQB performed the air dispersion modeling analyses of the facility to confirm the facility compliance with the applicable ambient air quality standards. The survey values for source location, height and emission point orientation (vertical or horizontal) were used in these analyses.

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 PM10, and PM2.5.
The air quality analysis demonstrates compliance with applicable regulatory requirements.

Note: ♫ Complete modeling input and output files can be made available and are located on the server Aurora in the directory AQB/ModelingArchives/1652_Lhoist Chemical Lime_Belen Chemical Lime Plant_ After Survey Modeling.

Number of Model Runs:
Model(s) Used: AERMOD was used to do the modeling analysis.
AERMOD – Three models were run for the ROI determination and another three for cumulative analyses.

Description of model input files:
Modeling Parameters:
The AERMOD regulatory default parameters were included in assumptions made by the model. First models were run facility alone to find significant receptors for each applicable averaging period for PM10 and PM2.5. Later models were run for each applicable averaging period with surrounding sources. In the resulting cumulative concentrations background concentrations were added and then compared to the applicable standards.

Building downwash produced by buildings at the facility was considered. The following buildings were included in the modeling.

Table 3: Table of Buildings

Building Name	Height (m)	Diagonal Length (m)
Quick lime black silo	13.0	6.7
Storage Containers	2.4	17.5
Office building	4.3	27.6
Storage Pigs	3.7	29.3
Hydrated lime white silo	29.9	6.7

Complex Terrain Data:
Flat terrain was used because terrain surrounding the facility is flat and maximum impacts are close to the fence line.

Receptor Grid: The following grids were used to determine the maximum concentration for each pollutant.

Table 4: Table of Receptors

Grid Type	Description	Shape	Spacing	Radius or Length
Cartesian	Intermediate	Square	250 meters	4 kilometers
Cartesian	Fine	Square	100 meters	2 kilometers
Cartesian	Very fine	Square	50 meters	1 kilometers
Fence line	Very fine	Fence line	25 meters	Fence line

Receptors outside of the radii of impact were discarded for the surrounding source runs.

Meteorological Data: AERMOD - One (1) year, Bernalillo 2013

Adjacent Sources:
~~[35]~~ 34 surrounding sources from 25 facilities were included in the cumulative model runs. Vulcan Material's Southern Plant NOI 2627 was removed from the surrounding sources list because it is no longer located close to the subject facility.

All permitted particulate sources up to 25 km radius around the subject facility were included in the cumulative model run. Beyond 25 km up to 50 km sources with particulate emissions above 1000 lbs./hr. were included.

Background Concentrations:

24-hr background data was collected from PM10 monitoring station in Bernalillo. It is a station that is in the same region but away from Albuquerque.

There is no PM2.5 monitor close to the facility. Stations are located in Albuquerque and in Las Cruces. Since they are located in cities with many anthropogenic sources they measure more than the background concentrations.

Las Cruces is a smaller city compared to Albuquerque. Las Cruces monitor data was used for the PM2.5 24-hr and annual average background.

Modeling Procedures:

No changes from standard modeling procedures were made.

PSD Increment Information:

The facility is a minor source (for PSD purposes) located in AQCR 152. The minor source baseline dates here are 3/26/1997 for PM10, and 2/11/2013 for PM2.5. The facility is a baseline source for both PM10 and PM2.5 increments.
The facility is 81.0 km from the Class I area Bosque del Apache. Class I area impacts are negligible for minor sources over 50 km from a Class I area. Modeling is not required.

Results Discussion:

PM10 Analysis:
The maximum total H1H 24-hour PM10 concentration was [~~47.362~~] 50.55 µg/m^3, which occurred 176 m west-northwest from the center of the facility. This was [~~31.6~~] 33.7% of the NAAQS. The maximum source alone 24-hour PM10 concentration was [~~20.580~~] 26.77 µg/m^3, which occurred 92 m west-northwest from the center of the facility. This was [~~13.7~~] 17.8% of the NAAQS.

PM2.5 Analysis:
The maximum H8H total 24-hour PM2.5 concentration was [~~11.422~~] 11.5 µg/m^3, which occurred 105 m south-southwest from the center of the facility. This was [~~32.6~~] 32.8% of the NAAQS. The maximum H8H source alone 24-hour PM2.5 concentration was [~~8.376~~] 8.4 µg/m^3, which occurred 63 m south-southwest from the center of the facility. This was [~~23.9~~] 24% of the NAAQS.

The maximum total annual PM2.5 concentration was [~~4.594~~] 4.7 µg/m^3, which occurred 94 m north-northeast from the center of the facility. This was [~~38.3~~] 39.2% of the NAAQS. The maximum source alone annual PM2.5 concentration was [~~2.388~~] 2.5 µg/m^3, which occurred 94 m north-northeast from the center of the facility. This was [~~19.9~~] 20.8% of the NAAQS.

Table 5: Table of Ambient Impact from Emissions

Pollutant	Period	Facility Concentration (µg/m^3)	Cumulative Concentration (µg/m^3)	Background Concentration	Cumulative plus background Concentration	Standard	Value of Standard	Units of Standard, Background, and Total	Percent of Standard
PM10	24-hour	~~[20.6]~~ 26.8	~~[47.4]~~ 50.6	21.0	~~[68.4]~~ 71.6	NAAQS	150	µg/m^3	~~[45.6]~~ 47.7
PM2.5	24-hour	8.4	~~[11.4]~~ 11.5	12.8	24.3	NAAQS	35	µg/m^3	~~[69.1]~~ 69.4
PM2.5	annual	~~[2.4]~~ 2.5	~~[4.6]~~ 4.7	5.6	~~[10.2]~~ 10.3	NAAQS	12	µg/m^3	~~[85.2]~~ 85.8

Table 6: Table of Location of Maximum Concentrations

Pollutant	Period	UTM East (m)	UTM North (m)	Elevation (ft)	Distance (m)	ROI (m)
PM10	24-hour	341,000.0	3,830,250.0	5052	176	319
PM10	annual	341,216.0	3,830,290.0	5052	94	342
PM2.5	24-hour	341,135.0	3,830,109.0	5052	105	554
PM2.5	annual	341,216.0	3,830,290.0	5052	94	460


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