Universal Application 4

Air Dispersion Modeling Report

Refer to and complete Section 16 of the Universal Application form (UA3) to assist your determination as to whether modeling is required. If, after filling out Section 16, you are still unsure if modeling is required, e-mail the completed Section 16 to the AQB Modeling Manager for assistance in making this determination. If modeling is required, a modeling protocol would be submitted and approved prior to an application submittal. The protocol should be emailed to the modeling manager. A protocol is recommended but optional for minor sources and is required for new PSD sources or PSD major modifications. Fill out and submit this portion of the Universal Application form (UA4), the "Air Dispersion Modeling Report", only if air dispersion modeling is required for this application submittal. This serves as your modeling report submittal and should contain all the information needed to describe the modeling. No other modeling report or modeling protocol should be submitted with this permit application.

16-A: Identification		
1	Name of facility:	Alto Concrete Batch Plant
2	Name of company:	Roper Construction, Inc
3	Current Permit number:	New Permit
4	Name of applicant's modeler:	Paul Wade
5	Phone number of modeler:	(505) 830-9680 ext6
6	E-mail of modeler:	pwade@montrose-env.com

16-B: Brief			
1	Was a modeling protocol submitted and approved? Submitted 04/18.2021; No Approval	Yes☒	No☐
2	Why is the modeling being done?	New Facility	
3	Describe the permit changes relevant to the modeling.		
	New Permit		
4	What geodetic datum was used in the modeling?	NAD83	
5	How long will the facility be at this location?	Permanent	
6	Is the facility a major source with respect to Prevention of Significant Deterioration (PSD)?	Yes☐	No☒

7	Identify the Air Quality Control Region (AQCR) in which the facility is located	153	
8	List the PSD baseline dates for this region (minor or major, as appropriate).		
	NO2	08/02/1995	
	SO2	N/A	
	PM10	06/16/2000	
	PM2.5	N/A	
9	Provide the name and distance to Class I areas within 50 km of the facility (300 km for PSD permits).		
	White Mountain Wilderness Area, 1.91 kilometers		
10	Is the facility located in a non-attainment area? If so describe below	Yes☐	No☒
11	Describe any special modeling requirements, such as streamline permit requirements.		
	None		

16-C: Modeling History of Facility

1 Describe the modeling history of the facility, including the air permit numbers, the pollutants modeled, the National Ambient Air Quality Standards (NAAQS), New Mexico AAQS (NMAAQS), and PSD increments modeled. (Do not include modeling waivers).

Pollutant	Latest permit and modification number that modeled the pollutant facility-wide.	Date of Permit	Comments
CO			New Permit – No Previous Modeling
NO_2			New Permit – No Previous Modeling
SO_2			New Permit – No Previous Modeling
H_2S			Not Emitted
PM2.5			New Permit – No Previous Modeling
PM10			New Permit – No Previous Modeling
Lead			None
Ozone (PSD only)			Not a PSD Permit
NM Toxic Air Pollutants (20.2.72.402 NMAC)			Not Emitted

16-D: Modeling performed for this application

1 For each pollutant, indicate the modeling performed and submitted with this application.
Choose the most complicated modeling applicable for that pollutant, i.e., culpability analysis assumes ROI and cumulative analysis were also performed.

Pollutant	ROI	Cumulative analysis	Culpability analysis	Waiver approved	Pollutant not emitted or not changed.
CO	☒	☐	☐	☐	☐
NO_2	☒	☒	☐	☐	☐
SO_2	☒	☐	☐	☐	☐

	H_2S	☐	☐	☐	☐	☒
	PM2.5	☒	☒	☐	☐	☐
	PM10	☒	☒	☐	☐	☐
	Lead	☐	☐	☐	☐	☒
	Ozone	☐	☐	☐	☐	☒
	State air toxic(s) (20.2.72.402 NMAC)	☐	☐	☐	☐	☒

16-E: New Mexico toxic air pollutants modeling

1	List any New Mexico toxic air pollutants (NMTAPs) from Tables A and B in 20.2.72.502 NMAC that are modeled for this application. None
2	List any NMTAPs that are emitted but not modeled because stack height correction factor. Add additional rows to the table below, if required.

Pollutant	Emission Rate (pounds/hour)	Emission Rate Screening Level (pounds/hour)	Stack Height (meters)	Correction Factor	Emission Rate/ Correction Factor

16-F: Modeling options

1	Was the latest version of AERMOD used with regulatory default options? If not explain below.	Yes☒	No☐
	For volume sources were processed in flat terrain mode.		

16-G: Surrounding source modeling

1	Date of surrounding source retrieval	March 16, 2021
2	If the surrounding source inventory provided by the Air Quality Bureau was believed to be inaccurate, describe how the sources modeled differ from the inventory provided. If changes to the surrounding source inventory were made, use the table below to describe them. Add rows as needed.	

AQB Source ID	Description of Corrections

16-H: Building and structure downwash

1	How many buildings are present at the facility?	1 - Office
2	How many above ground storage tanks are present at the facility?	1 – Cement/Fly Ash Storage Silo

3	Was building downwash modeled for all buildings and tanks? If not explain why below.	Yes☒	No☐
4	Building comments		

16-I: Receptors and modeled property boundary

1	"Restricted Area" is an area to which public entry is effectively precluded. Effective barriers include continuous fencing, continuous walls, or other continuous barriers approved by the Department, such as rugged physical terrain with a steep grade that would require special equipment to traverse. If a large property is completely enclosed by fencing, a restricted area within the property may be identified with signage only. Public roads cannot be part of a Restricted Area. A Restricted Area is required in order to exclude receptors from the facility property. If the facility does not have a Restricted Area, then receptors shall be placed within the property boundaries of the facility. Describe the fence or other physical barrier at the facility that defines the restricted area.		
	Site is fenced on all sides of the facility with gates at entrances.		
2	Receptors must be placed along publicly accessible roads in the restricted area. Are there public roads passing through the restricted area?	Yes☐	No☒
3	Are restricted area boundary coordinates included in the modeling files?	Yes☒	No☐

4 Describe the receptor grids and their spacing. The table below may be used, adding rows as needed.

Grid Type	Shape	Spacing	Start distance from restricted area or center of facility	End distance from restricted area or center of facility	Comments
Very fine	Cartesian	50	0	500 meters	
Fine	Cartesian	100	500 meters	1000 meters	
Course	Cartesian	250	1000 meters	3000 meters	

5	Describe receptor spacing along the fence line.
	25 meters
6	Describe the PSD Class I area receptors.
	100 meters spacing across east side of White Mountain Wilderness Area

16-J: Sensitive areas

1	Are there schools or hospitals or other sensitive areas near the facility? If so describe below. This information is optional (and purposely undefined) but may help determine issues related to public notice.	Yes☐	No☒

3	The modeling review process may need to be accelerated if there is a public hearing. Are there likely to be public comments opposing the permit application?	Yes☐	No☒

16-K: Modeling Scenarios

1 Identify, define, and describe all modeling scenarios. Examples of modeling scenarios include using different production rates, times of day, times of year, simultaneous or alternate operation of old and new equipment during transition periods, etc. Alternative operating scenarios should correspond to all parts of the Universal Application and should be fully described in Section 15 of the Universal Application (UA3).

The concrete batch plant will limit hourly processing rate to 125 cubic yard per hour and 500,000 cubic yard per year. The hours of operation are presented below in Table 1. Seasonal daily throughputs are presented in Table 2.

TABLE 1: CBP Plant Hours of Operation (MST)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
12:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	1	1	1	1	0	0	0	0
4:00 AM	0	0	0	1	1	1	1	1	1	0	0	0
5:00 AM	0	0	1	1	1	1	1	1	1	1	0	0
6:00 AM	0	0	1	1	1	1	1	1	1	1	0	0
7:00 AM	1	1	1	1	1	1	1	1	1	1	1	1
8:00 AM	1	1	1	1	1	1	1	1	1	1	1	1
9:00 AM	1	1	1	1	1	1	1	1	1	1	1	1
10:00 AM	1	1	1	1	1	1	1	1	1	1	1	1
11:00 AM	1	1	1	1	1	1	1	1	1	1	1	1
12:00 PM	1	1	1	1	1	1	1	1	1	1	1	1
1:00 PM	1	1	1	1	1	1	1	1	1	1	1	1
2:00 PM	1	1	1	1	1	1	1	1	1	1	1	1
3:00 PM	1	1	1	1	1	1	1	1	1	1	1	1
4:00 PM	1	1	1	1	1	1	1	1	1	1	1	1
5:00 PM	1	1	1	1	1	1	1	1	1	1	1	1
6:00 PM	0	0	1	1	1	1	1	1	1	1	0	0
7:00 PM	0	0	0	1	1	1	1	1	1	0	0	0
8:00 PM	0	0	0	1	1	1	1	1	1	0	0	0
9:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
Total	11	11	14	17	18	18	18	18	17	14	11	11

TABLE 2: HMA Daily Production Rates and Corresponding Max Hours of Production

Month	Cubic Yards Per Day	At Max Hourly Throughput – Hours per Day
November - February	1125	9
March, October	1500	12
April, September	1750	14
May - August	1875	15

Table 3 presents the 3 model scenarios modeled hours for showing compliance with the worst-case operating scenario.

TABLE 3: HMA Model Scenario Time Segments - Particulate

Model Scenario	Time Segments 9-Hour Blocks November - February	Time Segments 12-Hour Blocks March & October	Time Segments 14-Hour Blocks April & September	Time Segments 15-Hour Blocks May - August
1	7 AM to 4 PM	5 AM to 5 PM	4 AM to 6 PM	3 AM to 6 PM
2	9 AM to 6 PM	7 AM to 7 PM	6 AM to 8 PM	5 AM to 8 PM
3	9 AM to 6 PM	7 AM to 7 PM	7 AM to 9 PM	6 AM to 9 PM

2	Which scenario produces the highest concentrations? Why?		
	PM10 – Scenario 2 – Year 2017, low wind speed. PM2.5 - Scenario 3 because the operating times includes early evening, low wind speed.		
3	Were emission factor sets used to limit emission rates or hours of operation? (This question pertains to the "SEASON", "MONTH", "HROFDY" and related factor sets, not to the factors used for calculating the maximum emission rate.)	Yes☐	No☒
4	If so, describe factors for each group of sources. List the sources in each group before the factor table for that group. (Modify or duplicate table as necessary. It's ok to put the table below section 16-K if it makes formatting easier.) Sources:		

5

Hour of Day	Factor	Hour of Day	Factor								
1		13									
2		14									
3		15									
4		16									
5		17									
6		18									
7		19									
8		20									
9		21									
10		22									
11		23									
12		24									

If hourly, variable emission rates were used that were not described above, describe them below.

6	Were different emission rates used for short-term and annual modeling? If so describe below.	Yes☐	No☒

16-L: NO_2 Modeling

1	Which types of NO_2 modeling were used? Check all that apply.	
	☒	ARM2
	☐	100% NO_X to NO_2 conversion
	☐	PVMRM
	☐	OLM
	☐	Other:

2	Describe the NO_2 modeling.		
	ARM2 for both 1-hour and annual averaging period modeling. All ARM2 default values were used.		
3	Were default NO_2/NO_X ratios (0.5 minimum, 0.9 maximum or equilibrium) used? If not describe and justify the ratios used below.	Yes☒	No☐
4	Describe the design value used for each averaging period modeled.		
	1-hour: 98th percentile as calculated by AERMOD Annual: Highest Annual Average of Three Years		

16-M: Particulate Matter Modeling

1	Select the pollutants for which plume depletion modeling was used.	
	☐	PM2.5
	☒	PM10
	☐	None
2	Describe the particle size distributions used. Include the source of information.	

Representative average particle densities were obtained from NMED accepted values.

Material	Density (g/cm^3)	Reference
Road Dust – Roper Construction	2.5	NMED Value
Cement – Roper Construction	3.3	NMED Value
Fly Ash – Roper Construction	1.04	NMED Value
Combustion – Roper Construction and Neighbor	1.5	NMED Value
Fugitive Dust – Roper Construction and Neighbor	2.5	NMED Value

The densities and size distribution for PM_{10} emission sources are presented in Tables 4 - 8.

TABLE 4: Unpaved Road Vehicle Fugitive Dust Depletion Parameters

Particle Size Category (µm)	Mass Mean Particle Diameter (µm)	Mass Weighted Size Distribution (%)	Density (g/cm^3)
PM10			
0 – 2.5	1.57	25.0	2.5
2.5 – 10	6.91	75.0	2.5

Based on NMED Particle Size Distribution Spreadsheet – April 25, 2007

TABLE 5: Cement Baghouse Source Depletion Parameters

Particle Size Category (µm)	Mass Mean Particle Diameter (µm)	Mass Weighted Size Distribution (%)	Density (g/cm^3)
PM10			
0-2.5	1.57	25	3.3
2.5-10	6.91	75	3.3

Parameters based on baghouse exhaust capture percentages.

TABLE 6: Fly Ash Baghouse Source Depletion Parameters

Particle Size Category (µm)	Mass Mean Particle Diameter (µm)	Mass Weighted Size Distribution (%)	Density (g/cm^3)
PM10			
0-2.5	1.57	25	3.3
2.5-10	6.91	75	3.3

Parameters based on baghouse exhaust capture percentages

TABLE 7: Combustion Source Depletion Parameters

Particle Size Category (µm)	Mass Mean Particle Diameter (µm)	Mass Weighted Size Distribution (%)	Density (g/cm^3)
PM10			
0 - 2.5	1.57	100	1.5

Based on NMED Particle Size Distribution Spreadsheet – April 25, 2007

TABLE 8: Fugitive Dust Source Depletion Parameters

Particle Size Category (µm)	Mass Mean Particle Diameter (µm)	Mass Weighted Size Distribution (%)	Density (g/cm^3)
PM10			
2.5 – 5	3.88	22.6	2.5
5 – 10	7.77	77.4	2.5

Parameters based on values from the Albuquerque Air Quality Division Modeling Guidelines.

3	Does the facility emit at least 40 tons per year of NO_X or at least 40 tons per year of SO_2? Sources that emit at least 40 tons per year of NO_X or at least 40 tons per year of SO_2 are considered to emit significant amounts of precursors and must account for secondary formation of PM2.5.	Yes☐	No☒
4	Was secondary PM modeled for PM2.5?	Yes☐	No☒

5	If MERPs were used to account for secondary PM2.5 fill out the information below. If another method was used describe below.			
	NO_X (ton/yr)	SO_2 (ton/yr)	$[PM2.5]_{annual}$	$[PM2.5]_{24\text{-hour}}$

16-N: Setback Distances

1	Portable sources or sources that need flexibility in their site configuration requires that setback distances be determined between the emission sources and the restricted area boundary (e.g. fence line) for both the initial location and future locations. Describe the setback distances for the initial location.
	Permanent Site
2	Describe the requested, modeled, setback distances for future locations, if this permit is for a portable stationary source. Include a haul road in the relocation modeling.
	N/A

16-O: PSD Increment and Source IDs

1	The unit numbers in the Tables 2-A, 2-B, 2-C, 2-E, 2-F, and 2-I should match the ones in the modeling files. Do these match? If not, provide a cross-reference table between unit numbers if they do not match below.	Yes☐	No☒
	Unit Number in UA-2	Unit Number in Modeling Files	
	Concrete Plant Truck Load Baghouse (Unit 7,8)	TMBH	
	Concrete Plant Cement Silo Baghouse (Unit 9)	CSBH	
	Concrete Plant Fly Ash Baghouse (Unit 10)	FASBH	

2	Concrete Batch Plant Heater (Unit 12)	CBPH
	Feed Hopper Loading (Unit 2)	FH
	Feed Hopper Unloading to Conveyor (Unit 3)	TP
	Aggregate Bin Loading (Unit 4)	AB
	Aggregate Weigh Batcher and Conveyor (Unit 5,6)	WH
	Storage Piles (Aggregate) (Unit 11)	SP1
	Storage Piles (Aggregate) (Unit 11)	SP2
	Storage Piles (Aggregate) (Unit 11)	SP3
	Storage Piles (Sand) (Unit 11)	SP4
	Storage Piles (Sand) (Unit 11)	SP5
	Storage Piles (Sand) (Unit 11)	SP6
	Aggregate Haul Trucks Volume 1 (Unit 1)	AGG_0001 - 36
	Concrete Cement Fly Ash Haul Trucks Volume1 (Unit 1)	CON_0001 - 18

2	The emission rates in the Tables 2-E and 2-F should match the ones in the modeling files. Do these match? If not, explain why below.	Yes☐	No☒

Hourly model emission rates for material handling sources (Emissions calculated using AP-42 Section 13.2.4) are calculated using annual average windspeed for Ruidoso 2006 - 2016. Mineral filler silo modeled emission rate is based on the hourly usage (3 tons/hr) times the silo baghouse particulate emission factor.

Emission Point #	**Process Unit Description**	**PM10**	**PM2.5**
		lbs/hr	**lbs/hr**
FH	Feed Hopper Loading (Unit 2)	0.27369	0.04144
SP1	Storage Piles (Aggregate) (Unit 11)	0.05970	0.00904
SP2	Storage Piles (Aggregate) (Unit 11)	0.05970	0.00904
SP3	Storage Piles (Aggregate) (Unit 11)	0.05970	0.00904
SP4	Storage Piles (Sand) (Unit 11)	0.05970	0.00904
SP5	Storage Piles (Sand) (Unit 11)	0.05970	0.00904
SP6	Storage Piles (Sand) (Unit 11)	0.05970	0.00904
CSBH	Concrete Plant Cement Silo Baghouse (Unit 9)	0.01436	0.00331
FASBH	Concrete Plant Fly Ash Baghouse (Unit 10)	0.00908	0.00209

3	Have the minor NSR exempt sources or Title V Insignificant Activities" (Table 2-B) sources been modeled?	Yes☐	No☒

4 Which units consume increment for which pollutants?

Unit ID	NO_2	SO_2	PM10	PM2.5
TMBH			X	
CSBH			X	
FASBH			X	
CBPH	X		X	
FH			X	
TP			X	
AB			X	
WH			X	
SP1			X	

	SP2			X	
	SP3			X	
	SP4			X	
	SP5			X	
	SP6			X	
	AGG_0001 - 36			X	
	CON_0001 - 18			X	

5	PSD increment description for sources. (for unusual cases, i.e., baseline unit expanded emissions after baseline date).	Baseline unit expanded emissions after minor baseline date		
6	Are all the actual installation dates included in Table 2A of the application form, as required? This is necessary to verify the accuracy of PSD increment modeling. If not please explain how increment consumption status is determined for the missing installation dates below.		Yes☐	No☒
	Facility has not been installed. Is a new facility that will consume increment for NO_2 and PM_{10}			

16-P: Flare Modeling

1	For each flare or flaring scenario, complete the following			
	Flare ID (and scenario)	Average Molecular Weight	Gross Heat Release (cal/s)	Effective Flare Diameter (m)
	NA			

16-Q: Volume and Related Sources

1	Were the dimensions of volume sources different from standard dimensions in the Air Quality Bureau (AQB) Modeling Guidelines? If not please explain how increment consumption status is determined for the missing installation dates below.	Yes☐	No☒
	Volume sources for storage piles are based on 8 feet release height and 50 feet width.		
2	Describe the determination of sigma-Y and sigma-Z for fugitive sources.		
	For storage piles, the model inputs were based on the size (100 feet) of the pile/4.3 (sigma-Y) and a release height of 8 feet or a sigma-Z of 8ft*2/2.15. All others followed standard dimensions from Air Quality Bureau (AQB) Modeling Guidelines.		
3	Describe how the volume sources are related to unit numbers. Or say they are the same.		
4	Describe any open pits.		
	None		
5	Describe emission units included in each open pit.		
	None		

16-R: Background Concentrations

1	Were NMED provided background concentrations used? Identify the background station used below. If non-NMED provided background concentrations were used describe the data that was used.	Yes☒	No☐
	CO: Del Norte High School (350010023)		
	NO_2: Outside Carlsbad (350151005)		
	PM2.5: Las Cruces Distric Office (350130025)		
	PM10: Las Cruces City Well #46 (350130024)		
	SO_2: Bloomfield(350450009)		
	Other:		
	Comments:		
2	Were background concentrations refined to monthly or hourly values? If so describe below.	Yes☐	No☒

16-S: Meteorological Data

1	Was NMED provided meteorological data used? If so select the station used.	Yes☐	No☒
2	If NMED provided meteorological data was not used describe the data set(s) used below. Discuss how missing data were handled, how stability class was determined, and how the data were processed.		

Dispersion model meteorological input files were created from meteorological data collected at Holloman AFB, NM for the years 2016 - 2020, about 45 miles south-southwest from the site. The similar elevation, topography, terrain, vegetation, and climate of both sites make this meteorological data representative of the model area. Figure 3 shows wind rose diagram of the meteorological wind speed versus direction data that has been collected for the years 2016 - 2020.

AERMET wind speed threshold for surface data is 0.5 meters per second.

Santa Teresa Airport 2016-2020 data was used for upper air.

Since the meteorological input data does not include turbulence data, the adjust U* option in AERMET was used during processing of the meteorological data.

AERMET/AERMOD requires that several additional parameters be input during data processing in AERMET:

- Surface roughness length (m)
- Albedo
- Bowen Ratio

The surface roughness length influences the surface shear stress and is an important factor in determining the magnitude of mechanical turbulence and the stability of the boundary layer. The albedo is the fraction of total incident solar radiation reflected by the surface back to space without absorption. The daytime Bowen ratio, an indicator of surface moisture, is the ratio of sensible heat flux to latent heat flux and, together with albedo and other meteorological observations, is used for determining planetary boundary layer parameters for convective conditions driven by the surface sensible heat flux.

These parameters would be obtained using AERSURFACE (*Version 20060*). AERSURFACE requires the input of land cover data from the U.S. Geological Survey (USGS) National Land Cover Data (NLCD) 2016 archives, which it uses to determine the land cover types for the Alamogordo airport-specified location. AERSURFACE matches the 2016 NLCD land cover categories to seasonal values of albedo, Bowen ratio, and surface roughness. Values of surface characteristics are calculated based on the land cover data for the study area and output in a format for input into AERMET Stage 3.

Site descriptive questions required by AERSURFACE include:

- Meteorological data from airport
- Continuous snowcover for a month in winter
- Arid climate
- Dry climate

For the Holloman AFB meteorological data, YES was checked for airport data, NO was checked for continuous snowcover in winter, YES was checked for arid climate, and YES was checked for dry climate. For each parameter, data was extracted from land cover data for each month of the year and 12 equal sectors radiating from the Alamogordo Airport.

The meteorological data was processed using AERMET (*Version 19191)* and upper air from Santa Teresa Airport for the same time period. The upper air and surface data are considered to be representative and comparable with both the Holloman AFB and Roper Construction's Alto CBP site. The Holloman AFB meteorological data files, Santa Teresa upper air files, and Holloman AFB surface air file are submitted to the NMED-AQB Modeling Section for review with this modeling protocol.

No missing hours were substituted.

16-T: Terrain

1	Was complex terrain used in the modeling? If not, describe why below.	Yes☒	No☐
2	What was the source of the terrain data?		
	NED		

16-U: Modeling Files

1	Describe the modeling files:		
	File name (or folder and file name)	Pollutant(s)	Purpose (ROI/SIA, cumulative, culpability analysis, other)
	RoperAltaCombustionROI	CO, NO2, SO2	ROI
	RoperAltaPMROIS1-3	PM10, PM2.5	ROI
	RoperAltaCIANO21Hr	NO2	Cumulative
	RoperAltaCIAPM10dS1-3	PM10 24 Hour and Annual Increment	Cumulative, PSD Class II Increment
	RoperAltaCIAPM25_24S1-3	PM2.5 24 Hour	Cumulative
	RoperAltaCIAPM25_YrS1-3	PM2.5 Annual	Cumulative
	RoperAltaNO2IncSIL	NO2	Class I Increment SIL
	RoperAltaPM10dS1IncSIL – S3	PM10	Class I Increment SIL
	RoperAltaPM10dS1Inc – S3	PM10 24 Hour and Annual	Class I Increment Cumulative

16-V: PSD New or Major Modification Applications

1	A new PSD major source or a major modification to an existing PSD major source requires additional analysis. Was preconstruction monitoring done (see 20.2.74.306 NMAC and PSD Preapplication Guidance on the AQB website)?	Yes☐	No☒
2	If not, did AQB approve an exemption from preconstruction monitoring?	Yes☐	No☒
3	Describe how preconstruction monitoring has been addressed or attach the approved preconstruction monitoring or monitoring exemption.		
	NA		
4	Describe the additional impacts analysis required at 20.2.74.304 NMAC.		
	NA		
5	If required, have ozone and secondary PM2.5 ambient impacts analyses been completed? If so describe below.	Yes☐	No☒
	Total facility emissions of NO2, SO2, and VOC are all less than <1.0 tons per year		

16-W: Modeling Results

1	If ambient standards are exceeded because of surrounding sources, a culpability analysis is required for the source to show that the contribution from this source is less than the significance levels for the specific pollutant. Was culpability analysis performed? If so describe below.	Yes☐	No☒
2	Identify the maximum concentrations from the modeling analysis. Rows may be modified, added and removed from the table below as necessary.		

Pollutant, Time Period and Standard	Modeled Facility Concentration (µg/m3)	Modeled Concentration with Surrounding Sources (µg/m3)	Secondary PM (µg/m3)	Background Concentration (µg/m3)	Cumulative Concentration (µg/m3)	Value of Standard (µg/m3)	Percent of Standard	Location		
								UTM E (m)	UTM N (m)	Elevation (ft)
NO_2 1 Hour H8H	20.8	-	-	38.7	59.5	188.03	31.6	438252.1	3697885.1	1267.39
NO_2 Annual H1H	0.87	-	-	-	-	SIL-1	87.0	438252.1	3697885.1	-
NO_2 Annual Class II	0.87	-	-	-	-	SIL-1	87.0	438252.1	3697885.1	-
NO_2 Annual Class I	0.0046	-	-	-	-	SIL-0.1	4.6	437055.0	3699583.7	2222.57
CO 1 Hour H1H	50.5	-	-	-	-	SIL-2000	2.5	438158.3	3697938.3	-
CO 8 Hour H1H	12.8	-	-	-	-	SIL-500	2.6	438252.1	3697885.1	-
SO_2 1 Hour H1H	0.64	-	-	-	-	SIL-7.8	8.2	438158.3	3697938.3	-
SO_2 3 Hour H1H	0.24	-	-	-	-	SIL-25	1.0	438319.0	3697924.6	-
SO_2 24 Hour H1H	0.07	-	-	-	-	SIL-5	1.4	438252.1	3697885.1	-
SO_2 Annual H1H	0.01	-	-	-	-	SIL-1	1.0	438252.1	3697885.1	-
$PM_{2.5}$ 24 Hour H8H	3.9	4.1	-	14.9	19.0	35	54.3	438234.5	3698033.5	2208.74

Pollutant, Time Period and Standard	Modeled Facility Concentration (µg/m3)	Modeled Concentration with Surrounding Sources (µg/m3)	Secondary PM (µg/m3)	Background Concentration (µg/m3)	Cumulative Concentration (µg/m3)	Value of Standard (µg/m3)	Percent of Standard	Location		
								UTM E (m)	UTM N (m)	Elevation (ft)
$PM_{2.5}$ Annual H1H	2.01	2.15	-	5.1	7.25	12	60.4	438234.5	3698033.5	2208.74
PM_{10} 24 Hour H2H	29.7	29.9	-	94.7	124.6	150	83.1	438234.5	3698033.5	2208.74
PM_{10} 24 Hour Class II	29.7	29.8	-	-	29.8	30	99.3	438234.5	3698033.5	2208.74
PM_{10} Annual Class II	11.8	11.9	-	-	11.9	17	70.0	438234.5	3698033.5	2208.74
PM_{10} 24 Hour Class I	0.23	0.64	-	-	0.64	8	8.0	436950.0	3699650.0	2279.07
PM_{10} Annual Class I	0.018	-	-	-	-	SIL-0.2	9.0	437055.0	3699583.7	2222.57

16-X: Summary/conclusions	
1	A statement that modeling requirements have been satisfied and that the permit can be issued.
	Dispersion modeling was performed for all regulated sources at Roper Construction's Alto CBP. All facility pollutants with ambient air quality standards were modeled to show compliance with those standards. All results of this modeling analysis showed the facility is in compliance with applicable ambient air quality standards and PM_{10} and NO_2 PSD Class I and Class II increment limits. Based on the dispersion modeling analysis, the permit can be issued.

DISPERSION MODEL PROTOCOL
FOR ROPER CONSTRUCTION, INC.
ALTO CONCRETE BATCH PLANT
NSR MINOR SOURCE PERMIT APPLICATION

Alto, New Mexico

Prepared for

Roper Construction, Inc.

Dated April 29, 2021

Prepared by

Montrose Air Quality Services, LLC

MONTROSE
AIR QUALITY SERVICES

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1.0 INTRODUCTION

This dispersion modeling analysis will be conducted by Montrose Air Quality Services, LLC (Montrose) on behalf of Roper Construction, Inc. (Roper Construction), to evaluate ambient air quality impacts from the Alto Concrete Batch Plant (CBP), as part of a minor source NSR permitting action. This permit application is for a 125 cubic yard per hour (cuyd/hr) CBP.

The objective of this modeling evaluation is to predict if, operating at requested maximums, the facility operations would result in ambient air concentrations for nitrogen dioxide, (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), and particulate matter; both 10 microns or less (PM_{10}) and 2.5 microns or less ($PM_{2.5}$); would exceed the New Mexico and federal ambient air quality standards, NMAAQS and NAAQS respectively. Since Alto CBP is a minor source for NSR permitting and is located in AQRC Region 153, where the minor source baseline date has been triggered for NO_2 (08/02/1995) and PM_{10} (06/16/2000), a PSD Class I and II Increment analysis will be performed. One Class I areas are located within 50 km of the site (White Mountain Wilderness Area), so PSD Class I increment modeling will be performed for NO_2 and PM_{10}.

The dispersion modeling will be conducted using the American Meteorological Society/Environmental Protection Agency Regulatory Model Improvement Committee Dispersion Model (AERMOD), Version 19191. This model is recommended by EPA for determining Class II impacts within 50 km of the source being assessed. Additionally, AERMOD was developed to handle complex terrain. The objective of this evaluation is to determine whether ambient air concentrations from the maximum operation of the facility for nitrogen dioxide, (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), and particulate matter; both 10 microns or less (PM_{10}) and 2.5 microns or less ($PM_{2.5}$); are below Class II federal and state ambient air quality standards (NAAQS and NMAAQS) found in 40 CFR part 50 and the state of New Mexico's air quality regulation 20.2.3 NMAC from Alto CBP emission sources. Montrose employs the general modeling procedures outlined in "New Mexico Air Pollution Control Bureau, Dispersion Modeling Guidelines", revised 10/26/2020, and the most up to date EPA's *Guideline on Air Quality Models*.

1.1 FACILITY DESCRIPTION

Roper Construction's Alto CBP is a proposed site that will operate a concrete batch plant.
The 125 cubic yard per hour plant will include an aggregate/sand feed hopper, feed hopper conveyor, 4-compartment overhead aggregate/sand storage bin, aggregate/sand batcher and conveyor, split cement/fly ash storage silo with a baghouse for each side, cement/fly ash batcher, truck loading area, and 3-instant hot water heaters (199,900 Btu each). The plant will be powered by line power. Processed concrete will be transported from the CBP plant to off-site sales. The CBP plant will limit hourly processing rate to 125 cuyd/hr and 500,000 cubic yards per year (cuyd/yr). The hours of operation are presented below in Table 1. The monthly daily throughputs are presented in Table 2.

TABLE 1: CBP Plant Hours of Operation (MST)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
12:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	1	1	1	1	0	0	0	0
4:00 AM	0	0	0	1	1	1	1	1	1	0	0	0
5:00 AM	0	0	1	1	1	1	1	1	1	1	0	0
6:00 AM	0	0	1	1	1	1	1	1	1	1	0	0
7:00 AM	1	1	1	1	1	1	1	1	1	1	1	1
8:00 AM	1	1	1	1	1	1	1	1	1	1	1	1
9:00 AM	1	1	1	1	1	1	1	1	1	1	1	1
10:00 AM	1	1	1	1	1	1	1	1	1	1	1	1
11:00 AM	1	1	1	1	1	1	1	1	1	1	1	1
12:00 PM	1	1	1	1	1	1	1	1	1	1	1	1
1:00 PM	1	1	1	1	1	1	1	1	1	1	1	1
2:00 PM	1	1	1	1	1	1	1	1	1	1	1	1
3:00 PM	1	1	1	1	1	1	1	1	1	1	1	1
4:00 PM	1	1	1	1	1	1	1	1	1	1	1	1
5:00 PM	1	1	1	1	1	1	1	1	1	1	1	1
6:00 PM	0	0	1	1	1	1	1	1	1	1	0	0
7:00 PM	0	0	0	1	1	1	1	1	1	0	0	0
8:00 PM	0	0	0	1	1	1	1	1	1	0	0	0
9:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0	0	0	0	0
Total	11	11	14	17	18	18	18	18	17	14	11	11

TABLE 2: CBP Daily Production Rates and Corresponding Max Hours of Production

Season	Cubic Yards Per Day	At Max Hourly Throughput – Hours per Day
November - February	1125	9
March, October	1500	12
April, September	1750	14
May - August	1875	15

Table 3 presents the 3 model scenarios operating hours for showing compliance with the worst-case model operating scenarios.

TABLE 3: CBP Model Scenario Time Segments

Model Scenario	Time Segments 9-Hour Blocks November - February	Time Segments 12-Hour Blocks March & October	Time Segments 14-Hour Blocks April & September	Time Segments 15-Hour Blocks May - August
1	7 AM to 4 PM	5 AM to 5 PM	4 AM to 6 PM	3 AM to 6 PM
2	9 AM to 6 PM	7 AM to 7 PM	6 AM to 8 PM	5 AM to 8 PM
3	9 AM to 6 PM	7 AM to 7 PM	7 AM to 9 PM	6 AM to 9 PM

1.2 FACILITY IDENTIFICATION AND LOCATION

Roper Construction's Alto CBP is located off Highway 220, near Alto, north of Ruidoso in Lincoln County, New Mexico. The exact location of the facility will be UTM Zone 13, UTM Easting 438,235, UTM Northing 3,697,950, NAD 83. The approximate location of this site is 0.35 miles east of the intersection of Highways 48 and 220 north of Ruidoso, NM in Lincoln County.

Figure 1 below presents a layout of the site showing the layout of the CBP plant. Figure 2 shows the facility boundary in relation to the surrounding area.

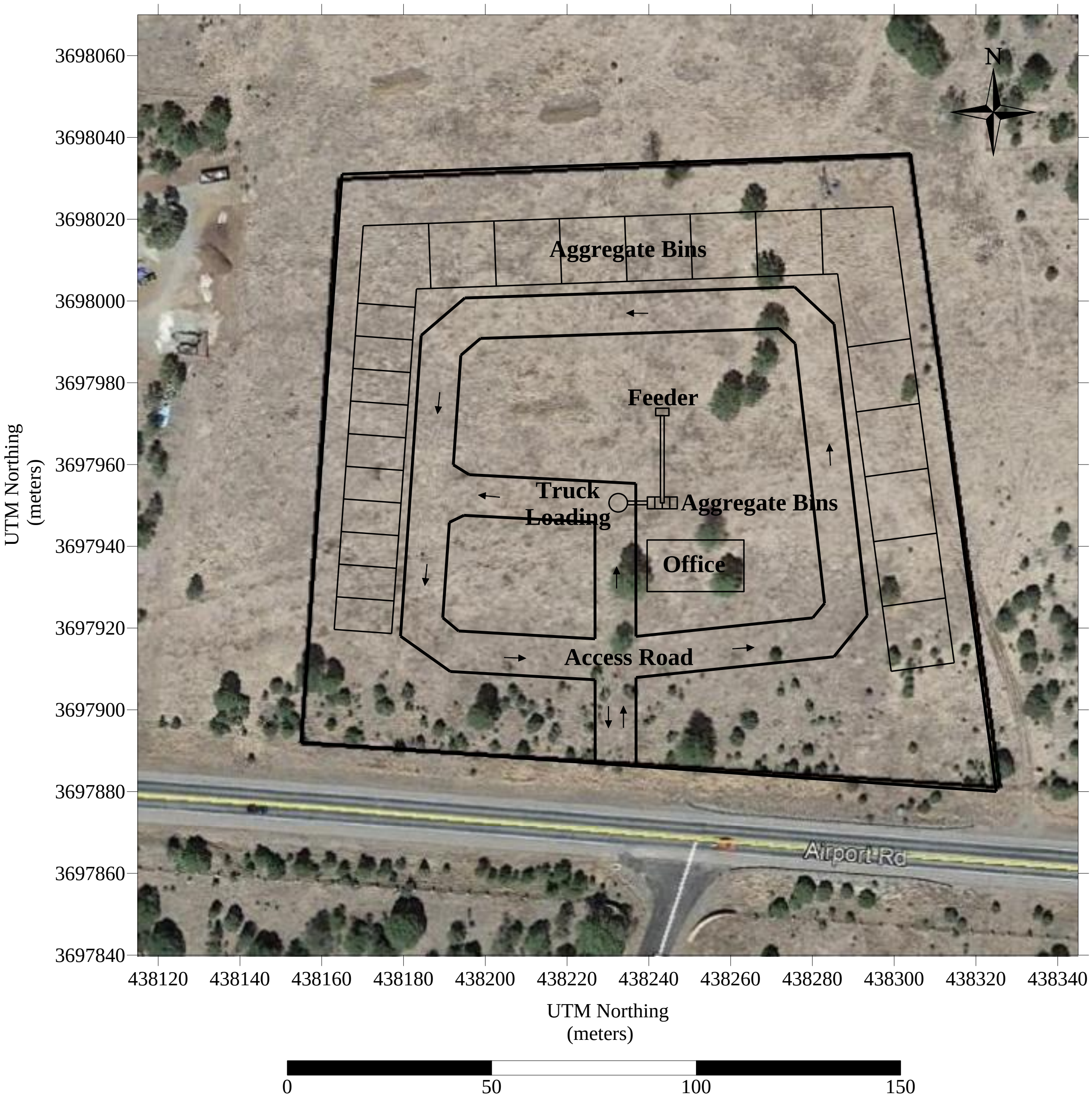

Figure 1: Roper Construction's Alto CBP Site Aerial View

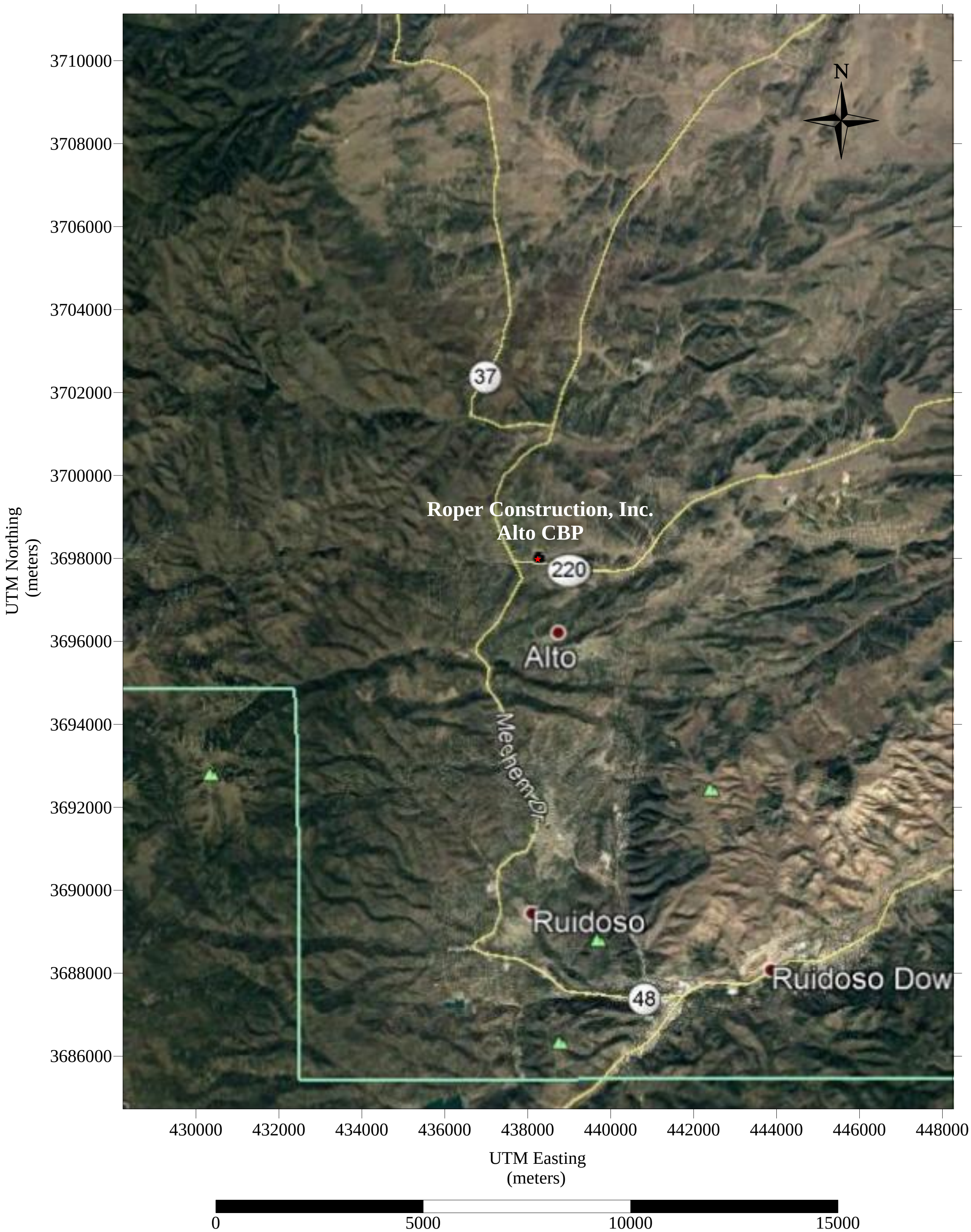

Figure 2: Roper Construction's Alto CBP Aerial View showing Surrounding Terrain

2.0 SIGNIFICANT MODELING AIR QUALITY IMPACT ANALYSIS

This section identifies the technical approach and dispersion model inputs that will be used for the Class II federal and State ambient air quality standards and PM_{10}, and NO_2 PSD Class I and II Increment impacts for this stationary source. NMED AQB requires that all applicable criteria pollutant emissions be modeled using the most recent versions of US EPA's approved models and be compared with National Ambient Air Quality Standards (NAAQS), and New Mexico Ambient Air Quality Standards (NMAAQS). Table 4 shows the NAAQS and NMAAQS (without footnotes) that the source's ambient impacts must meet in order to demonstrate compliance. Table 4 also lists the Class I and II Significant Impact Levels (SILs) which are used to assess whether a source will have a significant impact at downwind receptors. Table 5 lists ambient air quality standards in which modeling is not required.

The dispersion modeling analysis will be performed to estimate concentrations resulting from the operation of the Alto CBP using the maximum hourly emission rates while all emission sources are operating. The modeling will determine maximum off site concentrations for nitrogen dioxide, (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), and particulate matter with aerodynamic diameter less than 10 micrometers (PM_{10}) and particulate matter with aerodynamic diameter less than 2.5 micrometers ($PM_{2.5}$), for comparison with modeling significance levels, and national/New Mexico ambient air quality standards (AAQS). Additionally, modeling will determine maximum off-site concentrations for NO_2 annual average; and PM_{10} 24 hour and annual average PSD Class I and II increment limits. The modeling will follow the guidance and protocols outlined in the NMED - AQB "Air Dispersion Modeling Guidelines" (October 26, 2020), and the most up to date EPA's *Guideline on Air Quality Model.*

Initial modeling will be performed with Alto CBP sources only to determine pollutant and averaging periods that exceeds pollutant SILs. If initial modeling for any pollutant and averaging period exceeds the SILs, then cumulative modeling will be performed for those pollutants and averaging periods and will include significant neighboring sources along with background ambient concentrations as defined in the NMED's modeling guidelines.

TABLE 4: National and New Mexico Ambient Air Quality Standard Summary

Pollutant	Avg. Period	Sig. Lev. (µg/m^3)	Class I Sig. Lev. (µg/m^3)	NAAQS	NMAAQS	PSD Increment Class I	PSD Increment Class II
CO	8-hour	500		9,000 ppb(1)	8,700 ppb(2)		
	1-hour	2,000		35,000 ppb(1)	13,100 ppb(2)		
NO_2	annual	1.0	0.1	53 ppb(3)	50 ppb(2)	2.5 µg/m^3	25 µg/m^3
	24-hour	5.0			100 ppb(2)		
	1-hour	7.52		100 ppb(4)			
$PM_{2.5}$	annual	0.2	0.05	12 µg/m^3(5)		1 µg/m^3	4 µg/m^3
	24-hour	1.2	0.27	35 µg/m^3(6)		2 µg/m^3	9 µg/m^3
PM_{10}	annual	1.0	0.2			4 µg/m^3	17 µg/m^3
	24-hour	5.0	0.3	150 µg/m^3(7)		8 µg/m^3	30 µg/m^3
SO_2	annual	1.0	0.1		20 ppb(2)	2 µg/m^3	20 µg/m^3
	24-hour	5.0	0.2		100 ppb(2)	5 µg/m^3	91 µg/m^3
	3-hour	25.0	1.0	500 ppb(1)		25 µg/m^3	512 µg/m^3
	1-hour	7.8		75 ppb(8)			

Standards converted from ppb to µg/m^3 use a reference temperature of 25° C and a reference pressure of 760 millimeters of mercury.
(1) Not to be exceeded more than once each year.
(2) Not to be exceeded.
(3) Annual mean.
(4) 98th percentile of 1-hour daily maximum concentrations, averaged over 3 years.
(5) Annual mean, averaged over 3 years.
(6) 98th percentile, averaged over 3 years.
(7) Not to be exceeded more than once per year on average over 3 years.
(8) 99th percentile of 1-hour daily maximum concentrations, averaged over 3 years.

TABLE 5: Standards for Which Modeling Is Not Required by NMED AQB.

Standard not Modeled	Surrogate that Demonstrates Compliance
CO 8-hour NAAQS	CO 8-hour NMAAQS
CO 1-hour NAAQS	CO 1-hour NMAAQS
NO_2 annual NAAQS	NO_2 annual NMAAQS
NO_2 24-hour NMAAQS	NO_2 1-hour NAAQS
O_3 8-hour	Regional modeling
SO_2 annual NMAAQS	SO_2 1-hour NAAQS
SO_2 24-hour NMAAQS	SO_2 1-hour NAAQS
SO_2 3-hour NAAQS	SO_2 1-hour NAAQS

2.1 DISPERSION MODEL SELECTION

The dispersion modeling will be conducted using the American Meteorological Society/Environmental Protection Agency Regulatory Model Improvement Committee Dispersion Model (AERMOD), *Version 19191*. This model is recommended by EPA for determining Class II impacts within 50 km of the facility being assessed. Additionally, AERMOD was developed to handle complex terrain. In this analysis, AERMOD will be used to estimate pollutant concentrations of CO, NO_2, PM_{10}, $PM_{2.5}$ and SO_2 in the ambient air from the CBP facility modeled emission sources.

AERMOD is a Gaussian plume dispersion model that is based on planetary boundary layer principles for characterizing atmospheric stability. The model evaluates the non-Gaussian vertical behavior of plumes during convective conditions with the probability density function and the superposition of several Gaussian plumes. AERMOD modeling system has three components: AERMAP, AERMET, and AERMOD. AERMAP is the terrain preprocessor program. AERMET is the meteorological data preprocessor. AERMOD includes the dispersion modeling algorithms and was developed to handle simple and complex terrain issues using improved algorithms. AERMOD uses the dividing streamline concept to address plume interactions with elevated terrain.

AERMOD CIA modeling will be run using all the following regulatory default options including use of:

- Gradual Plume Rise
- Stack-tip Downwash
- Buoyancy-induced Dispersion
- Calms and Missing Data Processing Routine
- Upper-bound downwash concentrations for super-squat buildings
- Default wind speed profile exponents
- Calculate Vertical Potential Temperature Gradient
- No use of gradual plume rise
- Rural Dispersion

These regulatory default options are found in the AERMOD User's Manual. The model will incorporate local terrain into the calculations.

For ROI modeling, the model will run in non-default mode using flat terrain mode as discussed on NMED modeling guidelines Section 7.1.1. For CIA modeling, the model will run in non-default mode using flat terrain mode for non-buoyant fugitive sources as discussed on NMED modeling guidelines Section 4.5.1.

2.2 BUILDING WAKE EFFECTS

AERMOD can account for building downwash and cavity zone effects. Evaluation of building downwash on adjacent stack sources is deemed necessary, since all stack source heights are below Good Engineering Practice (GEP) heights. The formula for GEP height estimation is:

$H_s = H_b + 1.50L_b$

where: H_s = GEP stack height

H_b = building height

L_b = the lesser building dimension of the height, length, or width

The effects of aerodynamic downwash due to buildings and other structures will be accounted for by using wind direction-specific building parameters calculated by the USEPA-approved Building Parameter Input Program Prime (BPIP-Prime (*Version 04274*)) and the algorithms included in the AERMOD air dispersion model. The facility office and split storage silo are located at the site that will cause building wake effects for facility point sources, so building downwash will be evaluated.

2.3 METEOROLOGICAL DATA

Dispersion model meteorological input files were created from meteorological data collected at Holloman AFB, NM for the years 2016 - 2020, about 45 miles south-southwest from the site. The similar elevation, topography, terrain, vegetation, and climate of both sites make this meteorological data representative of the model area. Figure 3 shows wind rose diagram of the meteorological wind speed versus direction data that has been collected for the years 2016 - 2020.

AERMET wind speed threshold for surface data is 0.5 meters per second.

Santa Teresa Airport 2016-2020 data was used for upper air.

Since the meteorological input data does not include turbulence data, the adjust U* option in AERMET was used during processing of the meteorological data.

AERMET/AERMOD requires that several additional parameters be input during data processing in AERMET:

- Surface roughness length (m)
- Albedo
- Bowen Ratio

The surface roughness length influences the surface shear stress and is an important factor in determining the magnitude of mechanical turbulence and the stability of the boundary layer. The albedo is the fraction of total incident solar radiation reflected by the surface back to space without absorption. The daytime Bowen ratio, an indicator of surface moisture, is the ratio of sensible heat flux to latent heat flux and, together with albedo and other meteorological observations, is used for determining planetary boundary layer parameters for convective conditions driven by the surface sensible heat flux.

These parameters would be obtained using AERSURFACE (*Version 20060*). AERSURFACE requires the input of land cover data from the U.S. Geological Survey (USGS) National Land Cover Data (NLCD) 2016 archives, which it uses to determine the land cover types for the Alamogordo airport-specified location. AERSURFACE matches the 2016 NLCD land cover categories to seasonal values of albedo, Bowen ratio, and surface roughness. Values of surface characteristics are calculated based on the land cover data for the study area and output in a format for input into AERMET Stage 3.

Site descriptive questions required by AERSURFACE include:

- Meteorological data from airport
- Continuous snowcover for a month in winter
- Arid climate
- Dry climate

For the Holloman AFB meteorological data, YES was checked for airport data, NO was checked for continuous snowcover in winter, YES was checked for arid climate, and YES was checked for dry climate. For each parameter, data was extracted from land cover data for each month of the year and 12 equal sectors radiating from the Alamogordo Airport.

The meteorological data was processed using AERMET (*Version 19191)* and upper air from Santa Teresa Airport for the same time period. The upper air and surface data are considered to be representative and comparable with both the Holloman AFB and Roper Construction's Alto CBP site. The Holloman AFB meteorological data files, Santa Teresa upper air files, and Holloman AFB surface air file are submitted to the NMED-AQB Modeling Section for review with this modeling protocol.

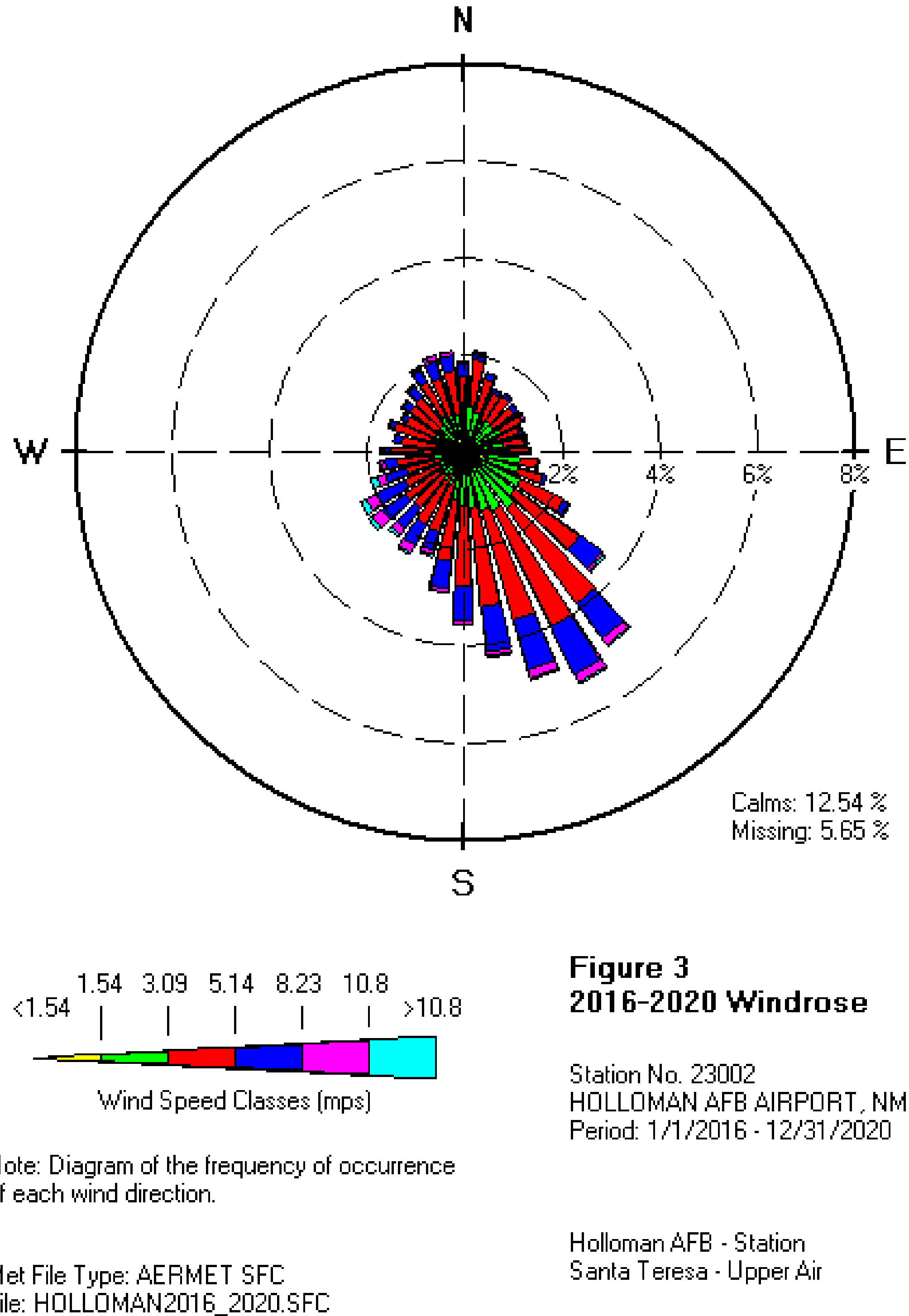

Figure 3: Wind Rose Holloman AFB Meteorological Data 2016-2020

2.4 RECEPTORS AND TOPOGRAPHY

For each pollutant, the radius of significant impact around the facility is established using a Cartesian grid. A 25-meter grid spacing is used for the facility boundary receptors. A 50-meter spacing and 100-meter spacing are extended to 500-meters and 1-km beyond the facility boundary, respectively from the facility boundary in each direction for a very fine grid resolution. Receptors for a fine grid resolution are placed with 250-meter spacing to a distance of 3-km from the facility boundary.

Receptors for PSD Class I modeling will include the boundary and interior area of White Mountain Wilderness Area. The receptor spacing in the White Mountain Wilderness Area boundary is 100 meters and the interior area is 250 meters. Since the further away from the source the plume will disperse, the receptor grid only extends 7 kilometers from the wilderness areas east boundary.

AERMAP (*Version 18081*) will be used to calculate the receptor elevations and the controlling hill heights. Terrain files for the area will be obtained from the National Elevation Data (NED). The AERMAP domain will be large enough to encompass the 10 percent slope factor required for calculating the controlling hill height.

2.5 MODELED EMISSION SOURCES INPUTS

Alto CBP operates 7 days per week and 52 weeks per year or 365 days per year. Requested hours of operation for each plant are discussed in Section 1.1. Based on modeling experience, early morning and late afternoon hours with low wind speeds are typically determined to represent the highest modeled hourly concentrations for low release fugitive emission sources.

2.5.1 Alto CBP Road Vehicle Traffic Model Inputs

The access road fugitive dust for truck traffic is modeled as a line of volume sources. The AQB's approved procedure for Modeling Haul Roads was followed to develop modeling input parameters for access haul roads. Volume source characterization followed the steps described in the Air Quality Bureau's Guidelines Tables 28 and 29.

2.5.2 Alto CBP Material Handling Volume Source Model Inputs

Material handling and processing for the CBP plant will follow the procedure found in AQB's Modeling Guidelines for Fugitive Equipment Sources (Section 5.3.2, Table 27).

2.5.3 Alto CBP Point Source Model Inputs

Model input parameters are based on release height, release diameter, release velocity or flow rate, and release temperature. For exhaust releases at ambient temperature, the modeled temperature input will be zero Kelvin. For horizontal or raincap releases, the AERMOD option for horizontal and raincap releases will be used with actual release parameters.

2.6 PARTICLE SIZE DISTRIBUTION

PM_{10} emissions may be modeled using plume depletion. Plume deposition simulates the effect of gravity as particles "fall-out" from the plume to the ground as the plume travels downwind. Therefore, the farther the plume travels from the emission point to the receptor, the greater the effect of plume deposition and the greater the decrease in modeled impacts or concentrations. Particle size distribution, particle mass fraction, and particle density are required inputs to the model to perform this function.

The particle size distribution data used in the modeling for material handling of aggregate will be based upon data obtained from the City of Albuquerque AQB's "Air Dispersion Modeling Guidelines for Air Quality Permitting", revised 02/03/2016, Table 1. Particle size distribution for fugitive road dust on unpaved roads; lime silo baghouse exhaust; CBP asphalt particulate emissions; and combustion will use the particle size distribution found in the NMED Modeling Section approved values.

The mass-mean particle diameters were calculated using the formula:

$$d = ((d^3_1 + d^2_1 d_2 + d_1 d^2_2 + d^3_2) / 4)^{1/3}$$

Where: d = mass-mean particle diameter
d_1 = low end of particle size category range
d_2 = high end of particle size category range

Representative average particle densities were obtained from NMED accepted values.

Material	Density (g/cm^3)	Reference
Road Dust – Roper Construction	2.5	NMED Value
Cement – Roper Construction	3.3	NMED Value
Fly Ash – Roper Construction	1.04	NMED Value
Combustion – Roper Construction and Neighbor	1.5	NMED Value
Fugitive Dust – Roper Construction and Neighbor	2.5	NMED Value

The densities and size distribution for PM_{10} emission sources are presented in Tables 6 - 10.

TABLE 6: Unpaved Road Vehicle Fugitive Dust Depletion Parameters

Particle Size Category (μm)	Mass Mean Particle Diameter (μm)	Mass Weighted Size Distribution (%)	Density (g/cm³)
PM10			
0 – 2.5	1.57	25.0	2.5
2.5 – 10	6.91	75.0	2.5

Based on NMED Particle Size Distribution Spreadsheet – April 25, 2007

TABLE 7: Cement Baghouse Source Depletion Parameters

Particle Size Category (μm)	Mass Mean Particle Diameter (μm)	Mass Weighted Size Distribution (%)	Density (g/cm³)
PM10			
0-2.5	1.57	25	3.3
2.5-10	6.91	75	3.3

Parameters based on baghouse exhaust capture percentages.

TABLE 8: Fly Ash Baghouse Source Depletion Parameters

Particle Size Category (μm)	Mass Mean Particle Diameter (μm)	Mass Weighted Size Distribution (%)	Density (g/cm³)
PM10			
0-2.5	1.57	25	3.3
2.5-10	6.91	75	3.3

Parameters based on baghouse exhaust capture percentages

TABLE 9: Combustion Source Depletion Parameters

Particle Size Category (μm)	Mass Mean Particle Diameter (μm)	Mass Weighted Size Distribution (%)	Density (g/cm³)
PM10			
0 - 2.5	1.57	100	1.5

Based on NMED Particle Size Distribution Spreadsheet – April 25, 2007

TABLE 10: Fugitive Dust Source Depletion Parameters

Particle Size Category (µm)	Mass Mean Particle Diameter (µm)	Mass Weighted Size Distribution (%)	Density (g/cm³)
PM10			
2.5 – 5	3.88	22.6	2.5
5 – 10	7.77	77.4	2.5

Parameters based on values from the Albuquerque Air Quality Division Modeling Guidelines.

2.7 NO_2 DISPERSION MODELING ANALYSIS

The AERMOD model predicts ground-level concentrations of any generic pollutant without chemical transformations. Thus, the modeled NO_X emission rate will give ground-level modeled concentrations of NO_X. NAAQS and NMAAQS values are presented as NO_2. If modeling shows exceedance with the NO_2 1-hour and annual SILs, CIA modeling will be performed.

EPA has a three-tier approach to modeling NO_2 concentrations.

- Tier I – total conversion, or all NOx = NO_2
- Tier II – Ambient Ratio Method 2
- Tier III – case-by-case detailed screening methods, such as OLM (Ozone Limiting Method) and Plume Volume Molar Ratio Method (PVMRM)

For the ROI NO_2 modeling approach, the Tier II ARM2 will be used.

Tier III NO_2 modeling approach, OLM or PVMRM, considers the basic chemical assumptions, the titration of NO by ozone to form NO_2. Both use the NO_2/NO_X in-stack ratio (ISR) and information about the ambient ozone in the determination of the amount of titration that will occur in the plume. The primary difference between the two methods is the way in which the amount of ozone available for conversion of NO to NO_2 is determined. OLM assumes that all the ambient ozone is available for NO titration (i.e., instantaneous complete mixing with background air), regardless of the source or plume characteristics. In contrast, PVMRM determines the amount of ozone within the plume volume (computed from the source to the receptor) and limits the conversion of NO to NO_2 based on the ozone entrained in the plume. The calculation of the plume volume is done for an individual source or group of sources and on an hourly basis for each source/receptor combination, taking into account the plume dispersion for that hour. For this modeling analysis, if the Tier III methodology is required, PVMRM will be selected.

For PVMRM, three inputs can be selected in the model, the ISR, the NO_2/NO_X equilibrium ratio for the ambient air, and the ambient ozone concentration. The ISR will be determined for each source or group of sources. The NO_2/NO_X equilibrium ratio will be the EPA default of 0.90.

Ozone input will be from monitored ozone data collected from the Carlsbad monitoring station (Monitoring Station 5ZR) which is the monitoring site nearest to the project (150.5 $\mu g/m^3$).

For heater natural gas, to be conservative, the EPA default ISR of 0.50 will be used. Table 11 summarizes the ISR selected for each NO_X source in the NO_2 1-hour modeling.

TABLE 11: Summary of Selected ISR

Source Description	Selected ISR
Roper Construction CBP Hot Water Heater	0.50

2.8 $PM_{2.5}$ SECONDARY EMISSIONS MODELING

Particulate matter includes both “primary” PM, which is directly emitted into the air, and “secondary” PM, which forms indirectly from fuel combustion and other sources. Primary PM consists of carbon (soot)—emitted from cars, trucks, heavy equipment, forest fires, and burning waste—and crustal material from unpaved roads, stone crushing, construction sites, and metallurgical operations. Secondary PM forms in the atmosphere from gases. Some of these reactions require sunlight and/or water vapor. Secondary PM includes:

- Sulfates formed from sulfur dioxide emissions from power plants and industrial facilities;
- Nitrates formed from nitrogen oxide emissions from cars, trucks, industrial facilities, and power plants; and
- Carbon formed from reactive organic gas emissions from cars, trucks, industrial facilities, forest fires, and biogenic sources such as trees.

AERMOD does not account for secondary formation of $PM_{2.5}$ for near-field modeling. Any secondary contribution of the Roper Construction’s source emissions is not explicitly accounted for in the model results. While representative background monitoring data for $PM_{2.5}$ should adequately account for secondary contribution from existing background sources, the Roper Construction assessment of their potential contribution to cumulative impacts as secondary $PM_{2.5}$ was performed based on guidance from the NMED Modeling Section. Total permit modification Roper Construction emissions of precursors include:

- Nitrogen Oxides (NO_X) – 0.28 tons per year (below SER)
- Sulfur Dioxides (SO_2) – 0.0030 tons per year (below SER)
- Volatile Organic Carbon (VOC) – 0.031 tons per year (below SER).
- $PM_{2.5}$ – 0.37 tons per year (below SER)

$PM_{2.5}$ secondary emission concentration analysis will follow EPA and NMED AQB guidelines. Since all pollutants involved in secondary PM conversion are below SER, no secondary emission analysis will be included in the $PM_{2.5}$ modeling analysis.

2.9 SIGNIFICANT NEIGHBORING BACKGROUND SOURCES

For all Cumulative Impact Analysis (CIA) combustion emissions dispersion modeling (NO_X, CO, SO_2), only monitored background will be included. For all CIA combustion emissions dispersion modeling for 1-hour standards (NO_X, SO_2), will include only neighboring sources. CIA particulate dispersion modeling will include all significant neighboring sources within 10 kilometers of Alto CBP plus regional monitored background. PSD Increment Analysis dispersion modeling will include all PSD increment consuming neighboring sources within 25 kilometers and increment consuming neighboring sources with pollutant emission rates over 1000 lbs/hr out to 50 kilometers of Alto CBP. These sources will be obtained from the Air Quality Bureau's database. Neighboring sources located within the model receptor grid will have the input data verified for accuracy of location, emission rates, and model inputs parameters.

2.10 REGIONAL BACKGROUND CONCENTRATIONS

Ambient background concentrations represent the contribution of pollutant sources that are not included in the modeling analysis, including naturally occurring sources. If the modeled concentration of a criteria pollutant is above the modeling significance level, the background concentration for each criteria pollutant will be added to the maximum modeled concentration to calculate the total estimated pollutant concentration for comparison with the AAQS.

The ambient background concentrations are listed in the Air Quality Bureau Guidelines for NO_2, CO, SO_2, PM_{10}, and $PM_{2.5}$. For $PM_{2.5}$, Roper Construction is proposing using backgrounds from Las Cruces District Office (Monitor ID 6Q). For PM_{10}, Roper Construction is proposing using backgrounds from Las Cruces City Well #46 (Monitor ID 6WM). For SO_2, Roper Construction is proposing using backgrounds from Bloomfield (Monitor ID 1ZB). For NO_2, Roper Construction is proposing using backgrounds from Carlsbad (Monitor ID 5ZR). For CO, Roper Construction is proposing using backgrounds from the rest of New Mexico (Monitor ID 350010023).

	$PM_{2.5}$ (µg/m^3)	PM_{10} (µg/m^3)	NO_2 (µg/m^3)	CO (µg/m^3)	SO_2 (µg/m^3)
1 Hour			38.7	2203	8.84
8 Hour				1524	
24 Hour	14.9	94.7			
Annual	5.1		5.0		