Air Quality Dispersion Modeling Summary for Permit No. PSD-5217-M1

Project: Zia II Gas Plant

Township: 19S **Range:** 32E **Section:** 19 **County:** Lea

UTM Coordinates: 611720 **m East** 3612340 **m North** **Zone:** 13 **Datum:** NAD 83 **Elevation** 3557 **feet**

Brief:

DCP Midstream, LP, (DCP) is proposing to construct a new 230 MMscf/d gas plant, named the Zia II Gas Plant, in Lea County, New Mexico approximately 25 miles northeast of the city of Carlsbad. The site will be approximately 72 km from Carlsbad Caverns National Park.

The facility will be a major source for the Prevention of Significant Deterioration (PSD) and Title V Operating Permit programs and will be a major source of hazardous air pollutants (HAPs). The proposed facility will result in emissions of NOx, CO, VOC, PM10, SO2 and PM2.5 greater than PSD major source thresholds or their respective significant emission rates. The facility is also major for ozone. DCP has also determined that the greenhouse gas (GHG) emissions from the proposed project represents an initial major NSR permitting action with respect to greenhouse gas emissions.

With the construction and startup of the Zia II Gas Plant, the Lusk Booster Station will be shut down. Lusk Booster Station, also owned by DCP, is a PSD major source for NOx located one-half mile from the proposed Zia II site. Calculations for the Zia II Gas Plant show NOx and CO emissions will be less than the NOx and CO emissions emitted at Lusk Booster Station. This means with the construction of the Zia II Gas Plant, NOx and CO emissions will not be increasing in the area.

Startup, shutdown, and maintenance (SSM) emissions are also accounted for in this application. All SSM emissions are accounted for in units FL1 (Plant Flare) and FL2 (Acid Gas flare).

Modeling Assumptions:

Lusk Booster Station will not operate after the Zia II plant is up and running and was not modeled in this analysis.

Permit Conditions:

Facility may operate 24 hrs/day, seven days/wk, 52 wks/year, or 8760 hrs/yr.

Conclusion:

This modeling analysis demonstrates that normal operation of the facility does not cause or significantly contribute to any exceedances of applicable air quality standard. The standards relevant at this facility are NMAAQS for TSP, CO, SO2, and NO2 and NAAQS for PM 2.5, PM10, and SO2. PSD Class I and Class II impacts for SO2, NO2, PM2.5 and PM10 were also analyzed.

Action:

The permit can be issued based on this modeling analysis.
Modeling submitted by Trinity Consultants, dated June 19, 2015. The air quality analysis does demonstrate compliance with applicable regulatory requirements.

Model(s) Used:

AERMOD was used in all model runs.
Note: Complete modeling input and output files can be made available and are located on the computer Aurora in the directory ModelingArchives\PSD-5217-M1_DCP_Zia III Gas Plant in the files AQB.zip and Cons.zip.

Number of Model Runs:

A total of twenty one (21) model runs were made for this facility. Nine (9) ROI runs, eight (8) cumulative runs, and four (4) PSD Class I runs.

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Table 1: Table of Point Emissions and Stack Parameters

Source ID	Description	UTMH (m)	UTMV (m)	Elevation (m)	Height (m)	Temp (K)	ExitVel (m/s)	Dia (m)	NOx (lbs/hr)	SO2 (lbs/hr)	H2S (lb/hr)	CO (lbs/hr)	TSP (lbs/hr)	PM10 (lbs/hr)	PM25 (lbs/hr)
C1		611895	3612347	1081	15.24	730.9	23.07	0.91	5.22	0.45	0.00	0.54	0.3100	0.3100	0.3100
C2		611909	3612347	1082	15.24	730.9	23.07	0.91	5.22	0.45	0.00	0.54	0.3100	0.3100	0.3100
C3		611923	3612347	1082	15.24	730.9	23.07	0.91	5.22	0.45	0.00	0.54	0.3100	0.3100	0.3100
C4		611936	3612347	1083	15.24	730.9	23.07	0.91	5.22	0.45	0.00	0.54	0.3100	0.3100	0.3100
C5		611841	3612347	1080	15.24	730.9	23.07	0.91	5.22	0.45	0.00	0.54	0.3100	0.3100	0.3100
C6		611855	3612347	1080	15.24	730.9	23.07	0.91	5.22	0.45	0.00	0.54	0.3100	0.3100	0.3100
C7		611869	3612347	1080	15.24	730.9	23.07	0.91	5.22	0.45	0.00	0.54	0.3100	0.3100	0.3100
C8		611882	3612347	1081	15.24	730.9	23.07	0.91	5.22	0.45	0.00	0.54	0.3100	0.3100	0.3100
C9		611951	3612347	1083	15.24	731.5	31.07	0.56	2.60	0.23	0.00	1.00	0.1600	0.1600	0.1600
C10		611964	3612347	1083	15.24	731.5	31.07	0.56	2.60	0.23	0.00	1.00	0.1600	0.1600	0.1600
H1		611673	3612325	1080	6.10	660.9	8.62	0.91	1.27	0.37	0.00	2.14	0.1900	0.1900	0.1900
H3		611674	3612338	1080	5.49	654.3	4.73	0.76	0.49	0.14	0.00	0.82	0.0750	0.0750	0.0750
H4		611802	3612282	1081	39.32	539.8	2.98	2.74	5.90	1.43	0.00	4.06	0.7400	0.7400	0.7400
H5		611806	3612282	1081	39.32	539.8	2.98	2.74	5.90	1.43	0.00	4.06	0.7400	0.7400	0.7400
H6		611833	3612443	1083	7.62	588.7	9.30	0.30	0.17	0.05	0.00	0.29	0.0260	0.0260	0.0260
FL1		611603	3612397	1080	30.48	1273.2	20.00	0.64	0.17		0.00	0.92			
FL2		611603	3612351	1080	45.72	1273.2	20.00	0.64	0.16		0.00	0.84			
VCD1		611725	3612463	1083	9.14	1033.2	0.86	1.37	0.24		0.00	0.20			
FL1SSM		611603	3612397	1080	30.48	1273.2	20.00	25.07	799.20	14977.09	162.86	4348.79			
FL2SSM		611603	3612351	1080	45.72	1273.2	20.00	9.10	102.00	4409.79	47.95	554.75			
FL3		612008	3613308	1094	15.24	1273.2	20.00	0.36	0.16		0.00	0.84			
GEN1		611472	3612239	1081	2.04	674.3	65.41	0.08	0.51	0.00	0.00	0.58	0.0035	0.0035	0.0035
C1C	SSM(CB)	611895	3612347	1081	15.24	730.9	23.07	0.91			0.01				
C2C	SSM(CB)	611909	3612347	1082	15.24	730.9	23.07	0.91			0.01				
C3C	SSM(CB)	611923	3612347	1082	15.24	730.9	23.07	0.91			0.01				
C4C	SSM(CB)	611936	3612347	1083	15.24	730.9	23.07	0.91			0.01				

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Source ID	Description	UTMH (m)	UTMV (m)	Elevation (m)	Height (m)	Temp (K)	ExitVel (m/s)	Dia (m)	NOx (lbs/hr)	SO2 (lbs/hr)	H2S (lb/hr)	CO (lbs/hr)	TSP (lbs/hr)	PM10 (lbs/hr)	PM25 (lbs/hr)
C5C	SSM(CB)	611841	3612347	1080	15.24	730.9	23.07	0.91			0.00				
C6C	SSM(CB)	611855	3612347	1080	15.24	730.9	23.07	0.91			0.00				
C7C	SSM(CB)	611869	3612347	1080	15.24	730.9	23.07	0.91			0.00				
C8C	SSM(CB)	611882	3612347	1081	15.24	730.9	23.07	0.91			0.00				
C9C	SSM(CB)	611951	3612347	1083	15.24	731.5	31.07	0.56			0.01				
C10C	SSM(CB)	611964	3612347	1083	15.24	731.5	31.07	0.56			0.01				
SSMPV		611707	3612386	1080	7.60	697.0	32.60	0.30			7.30				
FL1SM1HR	tpy annual	611603	3612397	1080	30.48	1273.2	20.00	25.07	0.89	13.68					
FL2SM1HR	tpy annual	611603	3612351	1080	45.72	1273.2	20.00	9.10	0.27	5.03					

Table 1b: Table of Area Emissions and Parameters:

Source ID	Description	UTMH (m)	UTMV (m)	Elevation (m)	RelHgt (m)	EastLen (m)	NorthLen (m)	Angle (degs)	Vertical (m)	TSP (lbs/hr)	PM10 (lbs/hr)	PM25 (lbs/hr)	H2S (lbs/hr)
FUG		611752	3612282	1081	4	40	30	0	1.86				0.1548

Table 1c: Table of Volume Emissions and Parameters:

Source ID	Description	UTMH (m)	UTMV (m)	Elevation (m)	RelHgt (m)	Hor. σ (m)	Vert. σ (m)	TSP (lbs/hr)	PM10 (lbs/hr)	PM25 (lbs/hr)	H2S (lbs/hr)	TAPs (lbs/hr)
COOLTWR		611690	3612367	1080.00	2.71	1.22	0.98	0.00188	0.00005	0.00000		
2-way road 1-29 (each)		611473	3612569	1083.00	4.00	4.65	3.72	0.01019	0.00204	0.00050		
1-way roads 30-48 (each)		611738	3612504	1084.00	4.00	4.65	3.72	0.00510	0.00102	0.00025		

Modeling Parameters:

All regulatory default options in AERMOD were used for these model runs. The use of stack-tip downwash, the calms and missing data processing routines, and default wind profile exponents were used. Building downwash produced by buildings at the facility was also considered. The rural dispersion land use option was used.

Complex Terrain Data

Both simple and complex types of terrain were used to model the facility. Elevations of receptors and surrounding sources were obtained from the National Elevation Dataset available from the USGS website.

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Receptor Grid:

A nested grid of 50m spacing out to 500m, 100m spacing out to 1000m and 1000m spacing out to 50km was used for the ROI analysis. A subset of this grid consisting of only the significant receptors was used for each pollutants CIA analysis. A receptor grid of 1000m spacing inside the boundries of Carlsbad Caverns National Park was used for the PSD Class I analysis.

MET Data:

MET data collected at the Empire Abo facility in 1993-94 was used in the modeling analysis.

Adjacent Sources:

A total of 130 surrounding sources out to 25 km were identified and used for the cumulative and PSD modeling runs. 138 surrounding sources out to 65km around Carlsbad Caverns was used in the Class I PSD analysis for SO2 3-hr and 24-hr modeling.

Modeling Procedures:

First all pollutants were modeled for the facility alone to determine the ROI for each one. A subset of the original receptor grid using only significant receptors was used for each pollutants CIA and PSD analysis. The 1-Hr SO2 and NO2 modeling used the long term (TPY) emission rates for the ROI analyses and the full short term (max hourly) emission rate for the NAAQS analysis.

Setback Distance:

NA. This is a permanent facility.

NAAQS and NMAAQS:

Compliance with the annual, 1-hr, and 24-hr NO2, 1-hr and 8-hr CO, and 1-hr, 3-hr, 24-hr, and annual SO2 standards have been demonstrated as detailed in Table 2. For NO2 modeling a 75% conversion factor was used for the annual standard, a 40% conversion factor was used for the 24hr standard, and an 80% conversion factor was used for the 1-hr standard. 21.5 ug/m3 background was added to the PM 2.5 24 hr modeled value, 9.9 ug/m3 background was added to the PM 2.5 annual modeled value, 53.3 ug/m3 was added to both 24-hr and 30 day TSP modeled values and 24.3 ug/m3 was added to the annual TSP modeled value for the cumulative analysis. PM10 was not significant for the 24-hr standard so a cumulative analysis was not completed for that pollutant time period. An annual PM10 ROI run was made to determine only if a Class II analysis needed to be done as there is no annual PM10 NAAQS standard.

PSD Class I increment:

Class I analysis for PM10, PM2.5, NO2, and SO2 showed significant impact only for the 3-hr and 24-hr in the SIL modeling at Carlsbad Caverns. Flat terrain was used for all Class I modeling.

PSD Class II increment:

Baseline dates have been triggered in AQCR 155 so PSD Class II modeling is required if pollutants are above significance levels. The pollutants subject to PSD Class II increment analysis at this facility are NO2, SO2, PM10 and PM2.5. They were found to meet Class II standards as detailed in table 2.

Results / Discussion:

The analysis demonstrates that ambient impacts do not exceed applicable state and federal standards for annual and 24-hr NO2, PM2.5, PM10, and TSP, 1-hr and 8-hr CO, and 1-hr, 3-hr, 24-hr, and annual SO2, and 30-day TSP standards. PSD Class I and Class II impacts were also analyzed for significant pollutants. Results are detailed in Table 2.

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Table 2: Ambient Impact from Emissions

Pollutant	Contributing Sources	Avg'ing Period	Concentration (ug/m3)	Receptor Elevation (m)	UTMH (m)	UTMV (m)	Distance From Site (m)	Radius Of Impact (km)	Applicable Standard	Value of Standard	Units	Percentage of Standard
CO	Alone	1-hour	166.59	1081.1	611479	3612259	254	0.0	Significance	2000.00	ug/m3	8.3
CO	Alone	8-hour	93.16	1081.1	611479	3612259	254	0.0	Significance	500.00	ug/m3	18.6
H2S	Alone	1-hour	103.96	1083.9	611758	3612479	144	50.0	NMAAQS	0.10	ppm	84.1
H2S	SSMFL1	1-hour	103.96	1083.9	611758	3612479	144	50.0	NMAAQS	0.10	ppm	84.1
NO2	Alone	1-hour	109.77	1081.1	611479	3612259	254	26.4	NAAQS	0.10	ppm	58.4
NO2	SSMFL1	1-hour	116.20	1081.1	611479	3612184	287	26.4	NAAQS	0.10	ppm	61.8
NO2	Alone	24-hour	16.70	1086.9	611770	3612590	255	1.8	NMAAQS	0.10	ppm	10.0
NO2	SSMFL2	24-hour	25.68	1093.0	611320	3613440	1170	1.8	NMAAQS	0.10	ppm	15.4
NO2	Alone	annual	6.55	1087.2	611820	3612540	224	1.8	NMAAQS	0.05	ppm	7.8
NO2	SSMFL2	annual	14.56	1093.0	611320	3613440	1170	1.8	NMAAQS	0.05	ppm	17.4
NO2	PSD II	annual	14.56	1093.0	611320	3613440	1170	1.8	PSD Class II	25.00	ug/m3	58.2
NO2	PSD I	annual	0.01	0.0	559359	3560480	73696	0.0	Significance Class I	0.10	ug/m3	6.4
SO2	Alone	1-hour	123.09	1306.4	612470	3616490	735	0.7	NAAQS	0.08	ppm	68.8
SO2	SSMFL2	1-hour	129.56	1086.6	612470	3616490	735	0.7	NAAQS	0.08	ppm	72.4
SO2	Alone	3-hour	117.80	1092.1	612520	3612540	825	50.0	NAAQS	0.50	ppm	9.0
SO2	SSMFL2	3-hour	117.80	1092.1	612520	3612540	825	50.0	NAAQS	0.50	ppm	9.0
SO2	PSD II	3-hour	117.80	1092.1	612520	3612540	825	50.0	PSD Class II	512.00	ug/m3	23.0
SO2	PSD I	3-hour 2nd high	24.40	0.0	556271	3562480	74570	0.0	PSD Class I	25.00	ug/m3	97.6
SO2	Alone	24-hour	48.86	1086.0	612520	3612740	894	50.0	NMAAQS	0.10	ppm	21.0
SO2	SSMFL2	24-hour	49.57	1091.8	612620	3612740	985	50.0	NMAAQS	0.10	ppm	21.3
SO2	PSD II	24-hour	49.57	1091.8	612620	3612740	985	50.0	PSD Class II	91.00	ug/m3	54.5
SO2	PSD I	24-hour 2nd high	4.16	0.0	544932	3562050	83605	0.0	PSD Class I	5.00	ug/m3	83.2
SO2	Alone	annual	7.09	1090.0	611420	3612990	716	50.0	NMAAQS	0.02	ppm	15.2
SO2	SSMFL2	annual	7.55	1090.0	611420	3612990	716	50.0	NMAAQS	0.02	ppm	16.2
SO2	PSD II	annual	7.55	1090.0	611420	3612990	716	50.0	PSD Class II	20.00	ug/m3	37.7
SO2	PSD I	annual	0.09	0.0	559360	3560870	73422	0.0	Significance Class I	0.10	ug/m3	90.0
PM2.5	Alone	24-hour	2.71	1086.9	611770	3612590	255	1.0	NAAQS	35.00	ug/m3	7.7

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Pollutant	Contributing Sources	Avg'ing Period	Concentration (ug/m3)	Receptor Elevation (m)	UTMH (m)	UTMV (m)	Distance From Site (m)	Radius Of Impact (km)	Applicable Standard	Value of Standard	Units	Percentage of Standard
PM2.5	SS	24-hour	24.79	1082.0	611920	3611840	539	1.0	NAAQS	35.00	ug/m3	70.8
PM2.5	PSD II	24-hour	3.29	1082.0	611920	3611840	539	1.0	PSD Class II	9.00	ug/m3	36.5
PM2.5	PSD I	24-hour	0.02	0.0	558957	3561100	73549	0.0	Significance Class I	0.07	ug/m3	24.7
PM2.5	Alone	annual	0.81	1085.4	611720	3612540	200	1.0	NAAQS	12.00	ug/m3	6.8
PM2.5	SS	annual	10.98	1085.4	611720	3612540	200	1.0	NAAQS	12.00	ug/m3	91.5
PM2.5	PSD II	annual	1.08	1085.4	611720	3612540	200	1.0	PSD Class II	4.00	ug/m3	27.0
PM2.5	PSD 1	annual	0.00	0.0	558920	3560480	74009	0.0	Significance Class I	0.06	ug/m3	0.4
PM10	Alone	24-hour	3.69	1085.4	611720	3612540	200	0.4	Significance	5.00	ug/m3	73.9
PM10	PSD II	24-hour	5.75	1085.4	611720	3612540	200	0.4	PSD Class II	30.00	ug/m3	19.2
PM10	PSD 1	24-hour	0.02	0.0	558957	3561100	73549	0.0	Significance Class I	0.30	ug/m3	5.8
PM10	Alone	annual	1.67	1085.4	611720	3612540	200	0.4	Significance	1.00	ug/m3	167.1
PM10	PSD II	annual	2.03	1085.4	611720	3612540	200	0.4	PSD Class II	17.00	ug/m3	11.9
PM10	PSD 1	annual	0.00	0.0	559359	3560480	73696	0.0	Significance Class I	0.20	ug/m3	0.1
TSP	Alone	24-hour	16.78	1084.5	611770	3612490	158	0.5	NMAAQS	150.00	ug/m3	11.2
TSP	SS	24-hour	83.54	1083.9	611570	3612590	292	1.0	NMAAQS	150.00	ug/m3	55.7
TSP	Alone	30-day	7.87	1084.2	611680	3612534	198	0.5	NMAAQS	90.00	ug/m3	8.7
TSP	SS	30-day	65.40	1084.2	611680	3612534	198	1.0	NMAAQS	90.00	ug/m3	72.7
TSP	Alone	annual	6.36	1083.9	611620	3612590	269	0.5	NMAAQS	60.00	ug/m3	10.6
TSP	SS	annual	31.70	1083.9	611620	3612590	269	1.0	NMAAQS	60.00	ug/m3	52.8

For NOx sources

75% annual conversion of NOX to NO2 from EPA's Ambient Ratio Method (ARM) applied to calculate concentration.
40% 24-hour conversion of NOX to NO2 using NMED's short term conversion applied to calculate concentration.

Modeling Report PSD Additional Impacts Addendum for Permit # PSD_5217-M1

David Heath 8-28-2015

The following is a summary of the additional PSD analyses required for PSD major sources. For a more detailed write up see the consultants modeling report in the permit application package.

Growth Analysis

Given the temporary nature of the construction emissions and the lack of other source growth in the area, the proposed modifications are not expected to cause any adverse construction or growth related air quality impacts.

Soil and Vegetation Analysis

The results of the air quality analysis presented in the modeling report demonstrate that the modeled concentrations of NO_x, CO, SO_2, TSP, PM_{10}, and $PM_{2.5}$ for the DCP Zia II Gas Plant are demonstrated to be less than their respective NAAQS. Since the air quality analysis shows that emission impacts are below the NAAQS, the proposed Zia Gas II Gas Plant will not have an adverse impact on the soil and vegetation in the area surrounding the plant.

Water Impact Analysis

There are no jurisdictional waters of the U.S. or other surface water bodies, including any salt playas located within the proposed project area, therefore there are no direct impacts to surface waters.
There are relatively few groundwater level measurements in the vicinity of the project area. The few that are available indicate relatively deep groundwater levels, ranging from 100 to 400 feet below ground surface (NMOSE 2013a; NMOSE 2013b). The nearest groundwater level to the plant site is approximately 100 feet below ground surface so there would be no direct impact from construction or operational activities on groundwater resources.

Visibility Impairment Analysis

The results from the consultant's visibility model analysis show that The Level 1 VISCREEN results indicate no potential adverse visibility impact is projected for inside the Living Desert State Park which is the closest protected area to the facility.

Two principal air quality impacts are considered for Class I Areas: PSD increments for NO_x, SO_2, PM_{10}, and $PM_{2.5}$, and Air Quality Related Values (AQRV) including regional haze and acidic deposition. Class I PSD increments are presented along with regular emissions modeling elsewhere in the regular modeling report. The AQRV analysis is presented here.

In October 2010, *The Federal Land Managers Air Quality Related Values (AQRV) Workgroup (FLAG) Phase I Report – Revised* (2010) was issued, which established a threshold ratio of emissions to distance, *(10 D*

Rule) below which AQRV review is not required. Specifically, if Q (tpy)/d (km) < 10, no AQRV analysis is required.

Q is the emissions increase of SO_2, NO_x, and PM_{10}, combined in tpy and

d is the nearest distance to a Class I Area in km

Because the Q/d assessment results in Q/d ≤ 10 for all Class I areas within 100 km, the project will have no adverse impact on AQRV. Therefore, no additional analyses for AQRV are required.

Class I Area	Q (tpy)	Distance to Facility (km)	Q/d
Carlsbad Caverns National Park	403	73	5.52

Secondary Formation of PM 2.5

The Zia II Gas Plant facility in major for both NO2 and SO2 so secondary formation of PM 2.5 must be evaluated for both. Response factors were calculated for combined NO2 and SO2 emissions from which a calculated secondary PM 2.5 emission was added to the facilities modeled PM 2.5 primary impact and the monitored impact from surrounding monitors for 24-hr and annual impacts. All results were found to be within the NAAQS and PSD standards. See the consultant's modeling report for calculation details.

Ozone Impact Analysis

The ozone standard is based on an 8-hour averaging period which was used for NO_x modeling for ozone impacts. The evaluation was performed using the high 4th high of the ground level concentration of NO_x at a downwind distance of 13 km. The predicted modeled impact of NO_x (in µg/m3) will then be multiplied by the 90 % yield (NO_x availability rate) and then converted to ppm. The resulting NO_x concentration is then converted to an ozone concentration using the ozone to NO_x ratio of 3:1.

A linear interpolation was used to calculate a background ozone concentration at the proposed facility. The two monitors used for the interpolation were located at the Hobbs and Carlsbad sites. The total project plus background ozone concentration is 74.6 ppb (0.074 ppm) see below for summary calculations. This value is below the NAAQS standard of 75 ppb. In addition, as discussed it is anticipated that the regional ambient ozone concentration will benefit from the startup of the Zia II facility as the increased natural gas processing capacity which this facility will bring to the Permian Basin will decrease the precursor emissions generated by vented or flared natural gas and VOCs at well production facilities.

Ozone Calculations:

The interpolated ozone concentration at the facility location was calculated to be 0.069 ppm.

The modeled NOx concentration at 13km from the facility was 3.14 ug/m3

Multiplying 3.14 times 90% yield times 3:1 NO2 to ozone = 0.0056 ppm ozone from facility.

Adding to background gives 0.0746 ppm total ozone, which meets the standard.