

Air Dispersion Modeling Summary for Permit No. 6567M8

Report Date: 9/23/2021

NMED/AQB Modeler: Angela Raso

Facility Identification:

Project: Black River Gas Processing Plant Company: DLK Black River Midstream, LLC

Permit number: 6567M8 TEMPO ID: 36133

Location Information:

The facility is located 2.6 miles southwest of Loving, in Eddy County.

The facility is located 11.0 miles southeast of Carlsbad.

The facility is located 15.0 miles east-northeast of Carlsbad Caverns National Park.

UTM Coordinates: 581,750 m East, 3,570,090 m North, zone 13, Datum: NAD83

Elevation = 3139 feet

Air Quality Control Region (AQCR): 155

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Project Description:

Brief: DLK Black River Midstream, LLC has applied to the New Mexico Air Quality Bureau for a New Source Review air quality permit for the modification of the Black River Gas Processing Plant facility (the facility). The facility is a gas plant.

The following types of emission sources are included in the project: Inlet Gas Compressor Engines, Mole Sieve Heaters, Stabilizer Heaters, Amine Reboilers, Dehydrator Reboilers, Thermal Oxidizers, Flares, and Vapor Combustion Units. The emission units are described in Table 2: Table of Point Sources, below.

For this permit, modeling was required for the following pollutants: Carbon Monoxide (CO), Hydrogen Sulfide (H₂S), Nitrogen Dioxide (NO₂), Particulate Matter 2.5 micrometers or less in aerodynamic diameter (PM_{2.5}), Particulate Matter 10 micrometers or less in aerodynamic diameter (PM₁₀), and Sulfur Dioxide (SO₂).

Table 1: Table of Total Facility Emissions

NO ₂ Rate (lbs/hr)	CO Rate (lbs/hr)	SO ₂ Rate (lbs/hr)	H ₂ S Rate (lbs/hr)	PM ₁₀ Rate (lbs/hr)	PM _{2.5} Rate (lbs/hr)
966.970	1,903.938	37.380	7.109	2.251	1.848

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Table 2: Table of Point Sources

Stack Number	Description	Stack Ht. (ft)	Diameter (ft)	Velocity (ft/s)	Temp. (°F)	NO₂ Rate (lbs/hr)	CO Rate (lbs/hr)	SO₂ Rate (lbs/hr)	H₂S Rate (lbs/hr)	PM10 Rate (lbs/hr)	PM2.5 Rate (lbs/hr)
ENG_1	Inlet Gas Compressor Engine	26.0	1.3	130.2	1,085	3.100	3.100	0.210	0.010	0.160	0.160
ENG_2	Inlet Gas Compressor Engine	26.0	1.3	130.2	1,085	3.100	3.100	0.210	0.010	0.160	0.160
ENG_3	Inlet Gas Compressor Engine	26.0	1.3	130.2	1,085	3.100	3.100	0.210	0.010	0.160	0.160
ENG_4	Inlet Gas Compressor Engine	26.0	1.3	130.2	1,085	3.100	3.100	0.210	0.010	0.160	0.160
HT_101	Plant 1 - Mole Sieve Heater	33.0	1.6	26.3	624	0.645	0.542	0.004	0	0.049	0.037
HT_801	Plant 1 - Stabilizer Heater	33.0	1.6	28.1	624	0.644	0.541	0.004	0	0.049	0.037
HT_102	Plant 2 - Mole Sieve Heater	50.7	2.4	17.7	624	0.900	0.756	0.005	0	0.068	0.051
AR_1	Plant 3 - Amine Reboiler	33.8	2.1	40.4	624	1.949	1.637	0.010	0	0.148	0.111
DR_1	Plant 2 - Dehydrator Reboiler	25.0	2.0	6.4	624	0.268	0.225	0.002	0	0.020	0.015
HT_103	Plant 3 - Mole Sieve Heater	49.9	2.4	17.7	624	0.900	0.756	0.010	0	0.068	0.051
HT_802	Plant 3 - Stabilizer Heater 1	42.4	2.0	14.2	624	0.573	0.481	0.003	0	0.044	0.033

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HT_803	Plant 3 - Stabilizer Heater 2	42.4	2.0	19.4	624	0.570	1.857	0.003	0	0.168	0.126
AR_2	Plant 3 - Amine Reboiler	32.3	2.4	37.1	624	2.210	0.194	0.010	0	0.018	0.013
DR_2	Plant 3 - Dehydrator Unit	25.8	1.3	13.0	624	0.230	0.481	0.001	0	0.044	0.033
TO_1	Plant 2 - Thermal Oxidizer	42.5	7.0	7.2	1,600	1.386	1.287	12.294	0.130	0.494	0.371
TO_2	Plant 3 - Thermal Oxidizer	61.2	2.5	53.2	1,600	2.170	2.015	9.357	0.100	0.414	0.311
FL_1	Plant 1 - Flare SSM/M	76.8	34.4	65.6	1,832	276.191	551.349	1.598	0.017	0	0
FL_2A	Plant 2 - Dehy - 1	90.7	2.5	65.6	1,832	1.699	3.333	0.100	0.001	0	0
FL_2B	Plant 2 - SSM/M	90.7	38.5	65.6	1,832	346.429	691.587	2.029	0.021	0	0
FL_3	Plant 3 - SSM/M	55.0	27.4	65.6	1,832	316.349	631.587	11.109	0.121	0	0
VCU_1	Vapor Combustion Unit	33.2	5.3	0.1	1,400	1.457	2.907	0.001	0.000	0.027	0.020
TO1_SSM	Plant 2 - Thermal Oxidizer SSM	40.0	0.3	467.4	120	0	0	0	6.540	0	0
TO2_SSM	Plant 3 - Thermal Oxidizer SSM	16.0	0.3	7.0	120	0	0	0	0.050	0	0
DEHY1_SSM	Plant 2 - Dehydrator Unit SSM	11.0	0.3	19.3	120	0	0	0	0.050	0	0

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Table 3: Table of Volume Sources

Source ID	Description	Release Height (ft)	Horizontal Dimension (ft)	Vertical Dimension (ft)	H ₂ S Rate (lbs/hr)
SSM1A	Pig Launcher / Receiver (SSM-1 & 2)	3.3	0.2	1.5	0.004
FUG1	Plant 1 Fugitives	3.3	7.0	0.8	0.037
TL 2	Produced Water Truck Loading	12.0	0.1	5.6	0.000

All values copied or converted from Black River Gas Processing Plant Permit Application.

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Modeling Assumptions:

The facility operates continuously.

Permit Conditions:

No additional permit conditions are required by this modeling demonstration.

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 CO, NO₂, PM_{2.5}, PM₁₀, and SO₂; NMAAQs for CO, H₂S, NO₂, and SO₂; and Class I and Class II PSD increments for NO₂, PM_{2.5}, PM₁₀, and SO₂.

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

Modeling report submitted by Shankar Vaidhyanathan (dated 5/5/2021)

Modeling was last revised on 8/30/2021.

The air quality analysis demonstrates compliance with applicable regulatory requirements.

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

Note: Complete modeling input and output files can be made available and are located in the Modeling Archives in the folder, "6567M8_DLK_Black River Gas Processing Plant".

Modeling Parameters:

The AERMOD regulatory default parameters were included in assumptions made by the model.

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

Table 4: Table of Buildings

Building Name	Height (m)	Diagonal Length (m)
BLD1	6.1	24.7
BLD2	4.6	26.2
OFF2	3.7	17.3
TK 1	7.6	3.7
TK 2	7.6	3.7
TK 3	7.6	3.7
TK 4	7.6	3.7
TK 5	7.6	3.7
TK 6	7.6	3.7
TK 7	7.6	3.7
WARE1	3.7	17.9
WARE2	3.7	22.3

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Complex Terrain Data:

Both simple and complex types of terrain were used to model the facility. Elevations of receptors, facility sources, and surrounding sources were obtained from digitized USGS 1/3 arc-second maps.

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

Table 5: Table of Receptors

Grid Type	Description	Shape	Spacing	Radius or Length
Cartesian	Rough	Square	1000 meters	40 kilometers
Cartesian	Intermediate	Square	500 meters	5 kilometers
Cartesian	Fine	Square	100 meters	1 kilometers
Cartesian	Very fine	Contoured	50 meters	0.3 kilometers
Fence line	Very fine	Fence line	50 meters	Fence line

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

Meteorological Data: Five (2014-2018) years of meteorological data from the NMED monitor in Carlsbad. This data was processed by modeling staff and is available on the bureau website.

Adjacent Sources / Cumulative Analysis:

CO: Cumulative analysis was not required.

H₂S: The Division 's Modeling Guidance was used to select 38 sources within 50 km of the facility. The closest facilities that emit H₂S are: Sendero Carlsbad Plant (0.9km); Lucid Energy - Palo Duro Gas Processing Facility (2.2km); Lucid - Roadrunner Gas Processing Plant (2.23km).

NO₂: Cumulative analysis was accomplished with the addition of a background concentration.

PM_{2.5}: The Division 's Modeling Guidance was used to select 0 sources within 50 km of the facility. The closest facilities that emit PM_{2.5} are: Crestwood - Dublin Ranch Dew Point Plant (0.78km); Sendero Carlsbad Plant (0.9km); Matador - Warren Facility (1.15km); Matador - Charlie Sweeney Fed Com Facility (1.55km); Bounds Junction Booster Station (1.55km); Sendero - State Compressor Station (1.73km); Lucid - Roadrunner Gas Processing Plant (2.23km); Matador - Dr. K Facility (2.79km).

PM₁₀: Cumulative analysis was not required.

SO₂: Cumulative analysis was accomplished with the addition of a background concentration.

PSD Increment Information:

The facility is a minor source (for PSD purposes) located in AQCR 155. The minor source baseline dates here are 3/16/1988 for NO₂, 7/28/1978 for SO₂, 11/13/2013 for PM_{2.5}, and 2/20/1979 for PM₁₀.

The facility is 24.2 km from the Class I area Carlsbad Caverns National Park. Class I area modeling is required.

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Results Discussion:

CO Analysis:

The maximum 1-hour CO concentration ($293.33 \mu\text{g}/\text{m}^3$) was below the significance level ($2,000 \mu\text{g}/\text{m}^3$). No additional analysis is required.

The maximum 8-hour CO concentration ($178.16 \mu\text{g}/\text{m}^3$) was below the significance level ($500 \mu\text{g}/\text{m}^3$). No additional analysis is required.

H2S Analysis:

The maximum facility alone 1-hour H₂S concentration was $134.06 \mu\text{g}/\text{m}^3$. The facility was modeled with surrounding sources. The maximum total 1-hour H₂S concentration was $135.36 \mu\text{g}/\text{m}^3$. This was 97% of the NMAAQs for the Pecos-Permian Air Quality Control Region (for facilities greater than five miles from the corporate limits of municipalities having a population greater than twenty thousand).

NO₂ Analysis:

ARM2 was used with default options (0.5 minimum ratio, 0.9 maximum ratio) to determine the conversion of NO_x to NO₂.

The maximum facility alone 1-hour NO₂ concentration was $114.09 \mu\text{g}/\text{m}^3$. A background concentration of $38.70 \mu\text{g}/\text{m}^3$ was added from the monitor 5ZR, at 2811 Holland Street, Carlsbad, NM. The maximum total 1-hour NO₂ concentration was $152.79 \mu\text{g}/\text{m}^3$. This was 81.3% of the NAAQS.

Compliance with 1-hour NO₂ NAAQS automatically demonstrates compliance with 24-hour NO₂ NAAQS.

The maximum facility alone annual NO₂ concentration was $8.31 \mu\text{g}/\text{m}^3$. A background concentration of $5.00 \mu\text{g}/\text{m}^3$ was added from the monitor 5ZR, at 2811 Holland Street, Carlsbad, NM. The maximum total annual NO₂ concentration was $13.31 \mu\text{g}/\text{m}^3$. This was 14.1% of the NMAAQs.

Compliance with annual NO₂ NMAAQs automatically demonstrates compliance with annual NO₂ NAAQS.

The maximum total annual NO₂ concentration was $13.31 \mu\text{g}/\text{m}^3$. This was 53.2% of the PSD Class II increment.

The maximum annual NO₂ concentration ($0.067 \mu\text{g}/\text{m}^3$) at Carlsbad Caverns was below the Class I significance level ($0.1 \mu\text{g}/\text{m}^3$). No additional analysis is required.

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PM2.5 Analysis:

The maximum facility alone 8th high 24-hour PM2.5 concentration was 1.42 $\mu\text{g}/\text{m}^3$. The facility was modeled with surrounding sources. The maximum 24-hour PM2.5 concentration with surrounding sources was 2.88 $\mu\text{g}/\text{m}^3$. A background concentration of 13.40 $\mu\text{g}/\text{m}^3$ was added from the monitor 5ZS, at Hobbs - 2320 N. Jefferson St. Secondary formation of PM2.5 was accounted for using MERPS. Secondary formation accounts for 0.69 $\mu\text{g}/\text{m}^3$ of 24-hour PM2.5. The maximum total 24-hour PM2.5 concentration was 16.97 $\mu\text{g}/\text{m}^3$. This was 48.5% of the NAAQS.

The maximum facility alone 2nd high 24-hour PM2.5 concentration was 1.73 $\mu\text{g}/\text{m}^3$. The facility was modeled with surrounding sources. The maximum 24-hour PM2.5 concentration with increment consuming surrounding sources was 2.94 $\mu\text{g}/\text{m}^3$. Secondary formation of PM2.5 was accounted for using MERPS. Secondary formation accounts for 0.69 $\mu\text{g}/\text{m}^3$ of 24-hour PM2.5. The maximum total 24-hour PM2.5 concentration was 3.63 $\mu\text{g}/\text{m}^3$. This was 40.3% of the PSD Class II increment.

The maximum 24-hour PM2.5 concentration (0.025 $\mu\text{g}/\text{m}^3$) at Carlsbad Caverns was below the Class I significance level (0.27 $\mu\text{g}/\text{m}^3$). No additional analysis is required.

The maximum facility alone annual PM2.5 concentration was 0.38 $\mu\text{g}/\text{m}^3$. The facility was modeled with surrounding sources. The maximum annual PM2.5 concentration with surrounding sources was 1.32 $\mu\text{g}/\text{m}^3$. A background concentration of 5.90 $\mu\text{g}/\text{m}^3$ was added from the monitor 5ZS, at Hobbs - 2320 N. Jefferson St. Secondary formation of PM2.5 was accounted for using MERPS. Secondary formation accounts for 0.02 $\mu\text{g}/\text{m}^3$ of annual PM2.5. The maximum total 24-hour PM2.5 concentration was 7.24 $\mu\text{g}/\text{m}^3$. This was 60.4% of the NAAQS.

The maximum annual PM2.5 concentration with increment consuming surrounding sources was 1.03 $\mu\text{g}/\text{m}^3$. This was 26% of the PSD Class II increment.

The maximum annual PM2.5 concentration (0.001 $\mu\text{g}/\text{m}^3$) at Carlsbad Caverns was below the Class I significance level (0.05 $\mu\text{g}/\text{m}^3$). No additional analysis is required.

PM10 Analysis:

The maximum 24-hour PM10 concentration (3.03 $\mu\text{g}/\text{m}^3$) was below the significance level (5.0 $\mu\text{g}/\text{m}^3$). No additional analysis is required.

The maximum 24-hour PM10 concentration (0.009 $\mu\text{g}/\text{m}^3$) at Carlsbad Caverns was below the Class I significance level (0.3 $\mu\text{g}/\text{m}^3$). No additional analysis is required.

The maximum annual PM10 concentration (0.46 $\mu\text{g}/\text{m}^3$) was below the significance level (1.0 $\mu\text{g}/\text{m}^3$). No additional analysis is required.

The maximum annual PM10 concentration (0.0003 $\mu\text{g}/\text{m}^3$) at Carlsbad Caverns was below the Class I significance level (0.2 $\mu\text{g}/\text{m}^3$). No additional analysis is required.

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SO₂ Analysis:

The maximum facility alone 1-hour SO₂ concentration was 81.55 µg/m³. A background concentration of 47.00 µg/m³ was added from the monitor 483751025, at 4205 NE 24th Ave, Amarillo TX. The maximum total 1-hour SO₂ concentration was 128.55 µg/m³. This was 65.4% of the NAAQS.

Compliance with 1-hour SO₂ NAAQS automatically demonstrates compliance with 3-hour SO₂ NAAQS.

The maximum facility alone 3-hour SO₂ concentration was 86.93 µg/m³. A background concentration of 68.30 µg/m³ was added from the monitor 483751025, at 4205 NE 24th Ave, Amarillo TX. The maximum total 3-hour SO₂ concentration was 155.23 µg/m³. This was 30.3% of the PSD Class II increment.

The maximum 3-hour SO₂ concentration (0.45 µg/m³) at Carlsbad Caverns was below the Class I significance level (1.0 µg/m³). No additional analysis is required.

Compliance with 1-hour SO₂ NAAQS automatically demonstrates compliance with 24-hour SO₂ NMAAQs.

The maximum facility alone 24-hour SO₂ concentration was 32.58 µg/m³. A background concentration of 32.61 µg/m³ was added from the monitor 483751025, at 4205 NE 24th Ave, Amarillo TX. The maximum total 24-hour SO₂ concentration was 65.19 µg/m³. This was 71.6% of the PSD Class II increment.

The maximum 24-hour SO₂ concentration (0.09 µg/m³) at Carlsbad Caverns was below the Class I significance level (0.20 µg/m³). No additional analysis is required.

Compliance with 1-hour SO₂ NAAQS automatically demonstrates compliance with annual SO₂ NMAAQs.

The maximum facility alone annual SO₂ concentration was 3.59 µg/m³. A background concentration of 4.05 µg/m³ was added from the monitor 483751025, at 4205 NE 24th Ave, Amarillo TX. The maximum total 24-hour SO₂ concentration was 7.64 µg/m³. This was 38.2% of the PSD Class II increment.

The maximum annual SO₂ concentration (0.004 µg/m³) at Carlsbad Caverns was below the Class I significance level (0.10 µg/m³). No additional analysis is required.

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Table 6: Table of Ambient Impact from Emissions

Pollutant, Time Period, and Standard	Facility Alone Concentration (µg/m ³)	Concentration with Surrounding Sources (µg/m ³)	Secondary Formation (µg/m ³)	Background Concentration (µg/m ³)	Cumulative Concentration (µg/m ³)	Percent of Standard	Location		
							UTM E (m)	UTM N (m)	Elev. (ft)
CO 1-hour Significance Level	293.33 (1 st high)	-	-	-	293.33	14.7%	581,921	3,570,213	3,127
CO 8-hour Significance Level	178.16 (1 st high)	-	-	-	178.16	35.6%	581,921	3,570,213	3,127
H2S 1/2-hour NMAAQs	134.06	135.36	-	-	135.36	97.2%	581,783	3,570,508	3,127
NO ₂ 1-hour NAAQS	114.09 (8 th high)	-	-	38.70 (5ZR)	152.79	81.3%	581,920	3,570,263	3,127
NO ₂ 24-hour NMAAQs	Demonstrated by compliance with NO ₂ 1-hour NAAQS								
NO ₂ Annual NAAQS	Demonstrated by compliance with NO ₂ Annual NMAAQs								
NO ₂ Annual NMAAQs	8.31	-	-	5.00 (5ZR)	13.31	14.1	581,920	3,570,312	3,127
NO ₂ Annual PSD Class II Increment	8.31	-	-	5.00 (5ZR)	13.31	53.2	581,920	3,570,312	3,127
NO ₂ Annual PSD Class I Significance Level	0.067	-	-	-	0.067	0.67%	558,522	3,561,388	3,999
PM2.5 24-hour NAAQS	1.42 (8 th high)	2.88 (8 th high)	0.69	13.40 (5ZS)	16.97	48.5%	581,468	3,570,502	3,123
PM2.5 24-hour PSD Class II Increment	1.73 (2 nd high)	2.94 (2 nd high)	0.69	-	3.63	40.3%	581,418	3,570,550	3,121

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Pollutant, Time Period, and Standard	Facility Alone Concentration (µg/m ³)	Concentration with Surrounding Sources (µg/m ³)	Secondary Formation (µg/m ³)	Background Concentration (µg/m ³)	Cumulative Concentration (µg/m ³)	Percent of Standard	Location		
							UTM E (m)	UTM N (m)	Elev. (ft)
PM2.5 24-hour PSD Class I Significance Level	0.025 (1 st high)	-	-	-	0.025	9.3%	555,395	3,558,599	3,645
PM2.5 Annual NAAQS	0.38	1.32	0.02	5.90 (5ZS)	7.24	60.4	581,468	3,570,550	3,122
PM2.5 Annual PSD Class II Increment	0.38	1.01	0.02	-	1.03	25.8	581,468	3,570,550	3,122
PM2.5 Annual PSD Class I Significance Level	0.001	-	-	-	0.001	2.5	557,747	3,559,536	3,668
PM10 24-hour Class II Significance Level	3.03 (1 st high)	-	-	-	3.03	60.6%	581,919	3,570,461	3,126
PM10 24-hour PSD Class I Significance Level	0.009 (1 st high)	-	-	-	0.009	3.0%	557,747	3,559,536	3,668
PM10 Annual PSD Class II Increment	0.46	-	-	-	0.46	45.8%	581,518	3,570,550	3,123
PM10 Annual PSD Class I Significance Level	0.0003	-	-	-	0.0003	0.17%	557,747	3,559,536	3,668
SO ₂ 1-hour NAAQS	81.55 (4 th high)	-	-	47.00 (Amarillo)	128.55	65.4%	581,558	3,570,504	3,125
SO ₂ 3-hour NAAQS	Demonstrated by compliance with SO ₂ 1-hour NAAQS								

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							UTM E (m)	UTM N (m)	Elev. (ft)
SO ₂ 3-hour PSD Class II Increment	86.93 (1 st high)	-	-	68.30 (Amarillo)	155.23	30.3%	581,590	3,570,290	3,130
SO ₂ 3-hour PSD Class I Significance Level	0.45 (1 st high)	-	-	-	0.45	45.4%	556,951	3,561,379	3,766
SO ₂ 24-hour NMAAQs	Demonstrated by compliance with SO ₂ 1-hour NAAQS								
SO ₂ 24-hour Class II PSD Increment	32.58 (2 nd high)	-	-	32.61 (Amarillo)	65.19	71.6%	581,919	3,570,461	3,126
SO ₂ 24-hour PSD Class I Significance Level	0.09	-	-	-	0.09	47.5%	557,747	3,559,536	3,668
SO ₂ Annual NMAAQs	Demonstrated by compliance with SO ₂ 1-hour NAAQS								
SO ₂ Annual PSD Class II Increment	3.59	-	-	4.05 (Amarillo)	7.64	38.2%	581,558	3,570,504	3,125
SO ₂ Annual PSD Class I Significance Level	0.004	-	-	-	0.004	0.04%	557,747	3,559,536	3,668