Air Dispersion Modeling Summary for Permit No. 8245 **April 1, 2020**
NMED/AQB Modeler: Angela Raso

Facility Identification:
Project: Husky CDP Company: XTO Energy, Inc
Permit number: 8245 TEMPO ID: 38899

Location Information:
The facility is located 14.4 miles northeast of Loving, in Eddy County.
The facility is located 16.5 miles northeast of Malaga.
UTM Coordinates: 602,774 m East, 3,587,363 m North, zone 13, Datum: NAD83
Elevation = feet Air Quality Control Region (AQCR): 155 Airshed: Pr

Project Description:
XTO Energy, Inc has applied to the New Mexico Air Quality Bureau for a New Source Review air quality permit for the construction of the Husky CDP facility (the facility). The facility is a gas processing plant. There are two possible construction scenarios reviewed here: with cogeneration turbines (CoGen), and without cogeneration turbines (NoCoGen). Emission sources and results for these construction scenarios are described and reviewed separately for clarity.

For this permit, modeling was required for the following pollutants: Carbon Monoxide (CO), Nitrogen Dioxide (NO_2), Ozone (O_3), Particulate Matter 2.5 micrometers or less in aerodynamic diameter ($PM_{2.5}$), Particulate Matter 10 micrometers or less in aerodynamic diameter (PM_{10}), and Sulfur Dioxide (SO_2).

Modeling Assumptions:
The facility operates continuously. No more than three of the emergency generators may operate at any time.

Permit Conditions:
No more than three of generators 1-8 may operate at any time. Generators 6-8 may not operate for more than one hour at a time.

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, NO_2, O_3, $PM_{2.5}$, PM_{10}, and SO_2; NMAAQS for CO, NO_2, and SO_2; and Class I and Class II PSD increments for NO_2, PM_{10}, $PM_{2.5}$, and SO_2.

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

Modeling report submitted by Bruce Ferguson (dated 11/15/2020)
The air quality analysis demonstrates compliance with applicable regulatory requirements.

Model(s) Used: AERMOD version 19191 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, "8245_XTO Energy, Inc_Husky CDP".

Number of Model Runs: AERMOD – Five modeling runs were conducted by NMED to review significant impact analysis. Two modeling runs were conducted by NMED to review cumulative analysis for particulate matter (PM_{10} and $PM_{2.5}$). Additional cumulative impacts were evaluated through the addition of background concentrations to significant impact analysis results.

Modeling Parameters:
The AERMOD version 19191 was used with regulatory default parameters was used. Building downwash produced by buildings at the facility was considered. The following buildings were included in the modeling.

Table 1: Table of Buildings

Building Name	Height (m)	Diagonal Length (m)
BLD_49	9.1	98.2
BLD_50	9.1	34.2
CF	10.7	84.7
CHTR1	15.5	27.4
CHTR2	15.5	27.4
CHTR3	15.5	27.4
ECD1	12.2	2.8
GBS1	7.3	4.7
HRSG1	21.3	32.4
HRSG2	21.3	32.4
HRSG3	21.3	32.4
HRSG4	21.3	32.4
IFR1	12.8	45.7
IFR2	12.8	45.8
IFR3	12.8	45.7
IFR4	12.8	45.8
NGLC1	4.8	31.5
NGLC2	4.8	31.7
NGLC3	4.8	31.4
OTK1	7.3	7.6
OTK2	7.3	7.6
OTK3	7.3	7.6
OTK4	7.3	7.6
OTK5	7.3	7.6
OTK6	7.3	7.6
OTK7	4.9	4.7
PTWK1	7.3	4.7
PTWK2	7.3	4.7
RHTR1	7.5	13.6
RHTR2	7.5	13.6

Building Name	Height (m)	Diagonal Length (m)
RHTR3	7.5	13.6
SHTR1	7.5	13.6
SHTR10	7.5	13.6
SHTR11	7.5	13.6
SHTR12	7.5	13.6
SHTR2	7.5	13.6
SHTR3	7.5	13.6
SHTR4	7.5	13.6
SHTR5	7.5	13.6
SHTR6	7.5	13.6
SHTR7	7.5	13.6
SHTR8	7.5	13.6
SHTR9	7.5	13.6
TK	4.9	3.9
TK_AMINE	7.3	5.5
TK_DW	7.3	5.2
TK_LO	7.3	5.5
TK_LO2	4.9	3.1
TK_MUW	7.3	5.4
TK_RW1	7.3	5.5
TK_RW2	7.3	5.5
TK_RW3	7.3	5.5
TK_UW	4.9	3.8
TK_WLO	4.9	3.1
TO1	17.1	2.1
TO2	17.1	2.2
TO3	17.1	2.1
TS1	45.7	4.9
TS2	45.7	4.9
TS3	45.7	4.9

Building Name	Height (m)	Diagonal Length (m)
TS4	45.7	4.9
TURBINE1	15.2	16.8
TURBINE2	15.2	16.6

Building Name	Height (m)	Diagonal Length (m)
TURBINE3	15.2	14.2
TURBINE4	15.2	13.1

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 2: Table of Receptors

Grid Type	Description	Shape	Spacing	Radius or Length
Polar	Class I – in the direction of Carlsbad Caverns Class I area	Semicircular 195° - 285°	1°	50 kilometers
Cartesian	Rough	Circle	1000 meters	50 kilometers
Cartesian	Intermediate	Circle	500 meters	6 kilometers
Cartesian	Intermediate	Circle	250 meters	4 kilometers
Cartesian	Fine	Circle	100 meters	2 kilometers
Cartesian	Very fine	Circle	50 meters	1 kilometer
Fence line	Very fine	Fence line	50 meters	Fence line

Receptors below the significant impact level were discarded for the surrounding source runs.

Meteorological Data: Five years (2014-2018) of meteorological data from NMED monitor 5ZR Carlsbad was used. This data was processed using AERMET version 19191. Secondary meteoritical data from the National Weather Service site at Cavern City Air Terminal (in Carlsbad) was used to fill for missing data. Upper air data from Santa Teresa NM was used. Processed meteorological data is available on NMED AQB's website.

Adjacent Sources:
The Division 's Modeling Guidance was used to select 684 sources of PM_{10} and $PM_{2.5}$ within 25 km of the facility.
The facility is 1.0 km from United Salt Carlsbad LLC - United Salt Lake Site Dryer. The facility is 2.7 km from Mosaic Potash Carlsbad Inc. The facility is 3.6 km from XTO - Pearl Compressor Station. The facility is 24.7 km from Enterprise - South Carlsbad Compressor Station. The facility is 26.6 km from Zia II Gas Plant.

Secondary Pollutant Formation:
Impacts of secondary pollutant formation for ozone (O_3) and $PM_{2.5}$ were evaluated using Modeled Emission Rates for Precursors (MERPs). The use of MERPs as a Tier 1 demonstration tool follows EPA's final "Guidance on the Development of Modeled Emission Rates for

Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and PM2.5 under the PSD Permitting Program" published April 30, 2019.

EPAs hypothetical facility located in Terry County Texas was selected as a representative facility. More information about this selection is available in the permit application modeling report. MERP values used are found in Table 3 below.

Table 3: MERPs Utilized for Assessing Secondary Impacts

Precursor	Secondary Pollutant	Averaging Period	Hypothetical Stack Height (m)	Hypothetical Emissions (TPY)	MERP (TPY)
NO_x	O_3	8-hour	10	500	417
VOC	O_3	8-hour	10	500	15669
NO_x	$PM_{2.5}$	24-hour	10	500	7331
SO_2	$PM_{2.5}$	24-hour	10	500	2170
NO_x	$PM_{2.5}$	Annual	10	500	26780
SO_2	$PM_{2.5}$	Annual	10	500	25929

Secondary impacts were calculated using the equation 1, adapted from EPA's guidence

$$Secondary\ Impact\ \left(\frac{\mu g}{m^3}\right) = SIL\ \left(\frac{\mu g}{m^3}\right) * \left(\frac{Precursor\ 1\ Emmissions\ (TPY)}{MERP\ (TPY)} + \frac{Precursor\ 2\ Emmissions\ (TPY)}{MERP\ (TPY)}\right)$$

PSD Increment Information:

The facility is a PSD major source located in AQCR 155. The major source baseline dates here are 2/8/1988 for NO_2, 1/6/1975 for SO_2, 1/6/1975 for PM_{10}, and 10/20/2010 for $PM_{2.5}$.
The minor source baseline dates here are 3/16/1988 for NO_2, 7/28/1978 for SO_2, and 11/13/2013 for $PM_{2.5}$, 2/20/1979 for PM_{10}.

The facility is 50.6 km from the Class I area Carlsbad Caverns National Park. The facility is 91.3 km from the Class I area Guadalupe Mountains National Park. The facility is 134.6 km from the Class I area Salt Creek. The facility is 199.9 km from the Class I area White Mountain Wilderness Area. Class I area analysis is required.

Emission Sources for CoGen Scenario:

The following types of emission sources are included in the CoGen scenario: hot oil heaters (for stabilization and amine regeneration), SSM/emergency flares, an enclosed combustion device, thermal oxidizers, turbines, and emergency generators. The emission units are described in Table 5: Table of Emissions and Stack Parameters (CoGen scenario), below.

Table 4: Table of Total Facility Emissions (CoGen scenario)

CO Rate (lbs/hr)	NO_2 Rate (lbs/hr)	NO_2 Rate (TPY)	VOC Rate (TPY)	SO_2 Rate (lbs/hr)	SO_2 Rate (TPY)	$PM_{2.5}$ Rate (lbs/hr)	PM_{10} Rate (lbs/hr)
404.80 (243.7)	217.26 (154.5)	259.9	543.2	11.73	51.2	48.81 (45.2)	48.81 (45.8))

Table 5: Table of Point Sources (CoGen scenario)[1]

Stack Number	Description	Stack Height (ft)	Diameter (ft)	Velocity (ft/s)	Temp. (°F)	NO_2 Rate (lbs/hr)	CO Rate (lbs/hr)	SO_2 Rate (lbs/hr)	$PM_{2.5}$ Rate (lbs/hr)	PM_{10} Rate (lbs/hr)
SHTR1	Stabilization Hot Oil Htr	33.0	4.0	38.6	488	1.731	1.057	0.143	0.483	0.483
SHTR2	Stabilization Hot Oil Htr	32.6	4.0	38.6	488	1.731	1.057	0.143	0.483	0.483
RHTR1	Amine Regen Hot Oil Htr	28.5	2.7	57.5	470	1.045	0.638	0.086	0.292	0.292
RHTR2	Amine Regen Hot Oil Htr	28.5	2.7	57.5	470	1.045	0.638	0.086	0.292	0.292
RHTR3	Amine Regen Hot Oil Htr	28.5	2.7	57.5	470	1.045	0.638	0.086	0.292	0.292
FL1	SSM/Emergency Flare 1	170.0	20.9	65.6	1,832	103.764	207.149	0.051	5.358	5.358
FL2	SSM/Emergency Flare 2	170.0	15.3	65.6	1,832	62.852	125.474	0	3.393	3.393
ECD1	Combustor	40.0	8.4	39.5	1,450	1.593	3.180	0	0.086	0.086
TO1	Thermal Oxidizer	57.0	4.1	51.9	1,600	2.519	2.088	0.862	0.235	0.235
TO2	Thermal Oxidizer	57.0	4.1	51.9	1,600	2.519	2.088	0.862	0.235	0.235
TO3	Thermal Oxidizer	57.0	4.1	51.9	1,600	2.519	2.088	0.862	0.235	0.235
TUR1	Turbine	150.0	16.0	38.3	185	8.400	5.100	2.135	9.200	9.200
TUR2	Turbine	150.0	16.0	38.3	185	8.400	5.100	2.135	9.200	9.200
TUR3	Turbine	150.0	16.0	38.3	185	8.400	5.100	2.135	9.200	9.200
TUR4	Turbine	150.0	16.0	38.3	185	8.400	5.100	2.135	9.200	9.200
GEN1	Emergency Generator	14.0	1.0	285.5	815	7.600	12.770	0.05	0.210	0.210
GEN2	Emergency Generator	14.0	1.0	285.5	815	7.600	12.770	0.05	0.210	0.210
GEN3	Emergency Generator	14.0	1.0	285.5	815	7.600	12.770	0.05	0.210	0.210

Table 6: Table of Volume Sources (CoGen scenario)[1]

Source ID	Description	Release Height (ft)	Horizontal Dimension (ft)	Vertical Dimension (ft)	$PM_{2.5}$ Rate (lbs/hr)	PM_{10} Rate (lbs/hr)
L0000001-L0000075	Haul Road	11.2	19.8	10.4	0.070 (total)	0.700 (total)

[1] All values copied or converted from Husky CDP Permit Application.

CoGen Results and Discussion:

CO Analysis:

The 1-hour high 1st high CO concentration was 208.8 µg/m^3. This was below the significance level (2000 µg/m^3). No cumulative analysis is required.

The 8-hour high 1st high CO concentration was 137.4 µg/m^3. This was below the significance level (500 µg/m^3). No cumulative analysis is required.

NO_2 Analysis:

ARM2 was used with default options (0.5 minimum ratio, 0.9 maximum ratio) to determine the conversion of NO_X to NO_2.

The maximum high 8th high facility alone 1-hour NO_2 concentrations was 77.7 µg/m^3, which occurred on the northern fence line of the facility. A background concentration of 64.2 µg/m^3 was added from NMED monitor 5ZS, at Hobbs - 2320 N. Jefferson St. The maximum total 1-hour NO_2 concentration was 141.9 µg/m^3. This was 75.5% of the NAAQS.

Compliance with 1-hour NO_2 NAAQS automatically demonstrates compliance with NO_2 24-hour NMAAQS.

The maximum facility alone annual NO_2 concentrations was 4.97 µg/m^3, which occurred on the northern fence line of the facility. A background concentration of 8.10 µg/m^3 was added from the monitor 5ZS, at Hobbs - 2320 N. Jefferson St. The maximum total annual NO_2 concentration was 13.07 µg/m^3. This was 13.9% of the NMAAQS.

Compliance with annual NO_2 NMAAQS automatically demonstrates compliance with NO_2 annual NAAQS.

The maximum total annual NO_2 concentration was 13.07 µg/m^3. This was 52.3% of the PSD Class II increment.

The maximum high 1st high facility alone annual NO_2 concentration in the direction of Carlsbad Caverns Class I Area was 0.015 µg/m^3. This was below the Class I significance level (0.1 µg/m^3). No cumulative analysis is required.

O_3 Analysis:
Secondary ozone impacts were calculated using MERPs as in described in the secondary pollutant formation section, above.

$$Secondary\ Ozone\ \left(\frac{\mu g}{m^3}\right) = 1.96\left(\frac{\mu g}{m^3}\right) * \left(\frac{259.9\ TPY\ NO_x}{417\ TPY} + \frac{543.2\ TPY\ VOC}{15669\ TPY}\right)$$

$$= 1.29\left(\frac{\mu g}{m^3}\right)$$

This was below the significance level (1.96 µg/m^3). No cumulative analysis is required.

$PM_{2.5}$ Analysis:
The maximum high 8th high facility alone 24-hour $PM_{2.5}$ concentration was 2.45 µg/m^3, which occurred near the northern fence line of the facility. The facility was modeled with surrounding sources. The maximum high 8th high 24-hour $PM_{2.5}$ concentration with surrounding sources was 11.1 µg/m^3, which occurred 1150 m southwest (250 degrees) from the center of the facility. A background concentration of 13.4 µg/m^3 was added from the monitor 5ZS, at Hobbs - 2320 N. Jefferson St. The facility is a significant source of both NO_x and SO_x, which form secondary $PM_{2.5}$. Secondary $PM_{2.5}$ formation from the facility is estimated using MERPs as described in the secondary pollutant formation section, above.

$$Secondary\ 24hour\ PM_{2.5}\left(\frac{\mu g}{m^3}\right) = 1.2\ \left(\frac{\mu g}{m^3}\right) * \left(\frac{259.9\ TPY\ NO_x}{7331\ TPY} + \frac{51.2\ TPY\ SO_2}{2170\ TPY}\right)$$

$$= 0.07\left(\frac{\mu g}{m^3}\right)$$

The maximum total 24-hour $PM_{2.5}$ concentration was 24.6 µg/m^3. This was 70.3% of the NAAQS.

The maximum high 2nd high facility alone 24-hour $PM_{2.5}$ concentration was 3.88 µg/m^3, which occurred near the northern fence line of the facility. The facility was modeled with surrounding sources. The maximum high 2nd high 24-hour $PM_{2.5}$ concentration with surrounding sources was 8.07 µg/m^3, which occurred 1150 m southwest (250 degrees) from the center of the facility. Secondary $PM_{2.5}$ formation of 0.07 µg/m^3 was added to the maximum concentrations. The maximum total 24-hour $PM_{2.5}$ concentration was 8.14 µg/m^3. This was 90.4% of the PSD Class II increment.

The maximum high 1st high facility alone 24-hour $PM_{2.5}$ concentration in the direction of Carlsbad Caverns Class I Area was 0.19 µg/m^3. Secondary PM2.5 formation of 0.7 µg/m^3 was added for a cumulative concentration of 0.26 µg/m^3. This was below the Class I significance level (0.27 µg/m^3). No cumulative analysis is required.

The maximum facility alone annual $PM_{2.5}$ concentration was 0.75 µg/m^3, which occurred near the northern fence line of the facility. The facility was modeled with surrounding sources. The maximum annual $PM_{2.5}$ concentration with surrounding sources was 3.90 µg/m^3, which occurred

1150 m southwest (250 degrees) from the center of the facility. A background concentration of 5.90 µg/m^3 was added from the monitor 5ZS, at Hobbs - 2320 N. Jefferson St. Secondary $PM_{2.5}$ formation from the facility is estimated MERPs as described in the secondary pollution formations section, above.

$$Secondary\ annual\ PM_{2.5}\left(\frac{\mu g}{m^3}\right) = 0.2\ \left(\frac{\mu g}{m^3}\right) * \left(\frac{259.9\ TPY\ NO_x}{26780\ TPY} + \frac{51.2\ TPY\ SO_2}{25929\ TPY}\right)$$

$$= 0.002\left(\frac{\mu g}{m^3}\right)$$

The maximum total annual $PM_{2.5}$ concentration was 9.80 µg/m^3. This was 81.7% of the NAAQS.

The maximum total annual $PM_{2.5}$ concentration with increment consuming surrounding sources was 2.35 µg/m^3, 1150 m southwest (250 degrees) from the center of the facility. This was 58.8% of the PSD Class II increment.

The maximum facility alone annual $PM_{2.5}$ concentration in the direction of Carlsbad Caverns Class I Area was 0.0048 µg/m^3. Secondary $PM_{2.5}$ formation of 0.002 µg/m^3 was added for a cumulative concentration of 0.0068 µg/m^3. This was below the Class I significance level (0.05 µg/m^3). No cumulative analysis is required.

PM_{10} Analysis:
The maximum high 2nd high facility alone 24-hour PM_{10} concentration was 20.7 µg/m^3, which occurred on the southwestern fence line of the facility. The facility was modeled with surrounding sources. The maximum high 2nd high 24-hour PM_{10} concentration with surrounding sources was 25.0 µg/m^3, which occurred on the southern fence line of the facility. A background concentration of 37.3 µg/m^3 was added from the monitor 5ZS, at Hobbs - 2320 N. Jefferson St. The maximum total 24-hour $PM_{2.5}$ concentration was 62.3 µg/m^3. This was 41.5% of the NAAQS.

The maximum high 2nd high 24-hour PM_{10} concentration with increment consuming surrounding sources was 23.9 µg/m^3, which occurred on the southern fence line of the facility. This was 79.7% of the PSD Class II increment.

The maximum high 1st high facility alone 24-hour PM_{10} concentration in the direction of Carlsbad Caverns Class I Area was 0.19 µg/m^3. This was below the Class I significance level (0.3 µg/m^3). No cumulative analysis is required.

The maximum source alone annual PM_{10} concentration was 3.98 µg/m^3, which occurred on the southern fence line of the facility. The maximum annual PM_{10} concentration with increment consuming surrounding sources was 7.30 µg/m^3, which occurred on the southern fence line of the facility. This was 42.9% of the PSD Class II increment.

The maximum high 1st high facility alone annual PM_{10} concentration in the direction of Carlsbad

Caverns Class I Area was 0.0049 µg/m^3. This was below the Class I significance level (0.2 µg/m^3). No cumulative analysis is required.

SO_2 Analysis:
The 1-hour high 1st high SO_2 concentration was 3.41 µg/m^3. This was below the significance level (7.8 µg/m^3). No cumulative analysis is required.

The 3-hour high 1st high SO_2 concentration 5.94 µg/m^3. This was below the significance level (25.0 µg/m^3). No cumulative analysis is required.

The maximum high 1st high facility alone 3-hour SO_2 concentration in the direction of Carlsbad Caverns Class I Area was 0.28 µg/m^3. This was below the Class I significance level (1.0 µg/m^3). No cumulative analysis is required.

The 24-hour high 1st high SO_2 concentration was 1.94 µg/m^3. This was below the significance level (5.0 µg/m^3). No cumulative analysis is required.

The maximum high 1st high facility alone 24-hour SO_2 concentration in the direction of Carlsbad Caverns Class I Area was 0.049 µg/m^3. This was below the Class I significance level (0.2 µg/m^3).

The annual SO_2 concentration was 0.31 µg/m^3. This was below the significance level(1.0 µg/m^3). No cumulative analysis is required.

The maximum facility alone annual SO_2 concentration in the direction of Carlsbad Caverns Class I Area was 0.0014 µg/m^3. This was below the Class I significance level (0.1 µg/m^3). No cumulative analysis is required.

Table 7: Table of Ambient Impact from Emissions (CoGen scenario)

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	Cumulative Concentration	Percent of Standard	Location		
							UTM E (m)	UTM N (m)	Elev. (ft)
CO 1-hour Significance Level	208.8 (1st high)	-	-	-	208.8	10.4	603,166	3,588,194	963
CO 8-hour Significance Level	137.4 (1st high)	-	-	-	137.4	27.5	603,067	3,588,194	963
NO_2 1-hour NAAQS	77.7 (8th high)	-	-	64.2	141.9	75.5	603,166	3,588,194	963
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	4.97	-	-	8.1	13.07	13.9	603,067	3,588,194	963
NO_2 Annual PSD Class II Increment	4.97	-	-	8.1	13.07	52.3	603,067	3,588,194	963
NO_2 Annual PSD Class I Significance Level	0.015	-	-	-	0.015	15.0	554,749	3,599,919	1,027
O_3 8-hour Significance Level	-	-	1.29	-	1.29	65.8	-	-	-
$PM_{2.5}$ 24-hour NAAQS	2.45 (8th high)	11.1 (8th high)	0.07	13.4	24.6	70.3	602,200	3,587,400	962
$PM_{2.5}$ 24-hour PSD Class II Increment	3.88 (2nd high)	8.07 (2nd high)	0.07	-	8.14	90.4	602,200	3,587,400	962
$PM_{2.5}$ 24-hour PSD Class I Significance Level	0.11 (1st high)	-	0.07	-	0.18	66.7	553,454	3,592,180	1,078

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	Cumulative Concentration	Percent of Standard	Location		
							UTM E (m)	UTM N (m)	Elev. (ft)
$PM_{2.5}$ Annual NAAQS	0.75	3.90	0.002	5.90	9.80	81.7	602,200	3,587,400	962
$PM_{2.5}$ Annual PSD Class II Increment	0.75	2.35	0.002	-	2.35	58.8	602,200	3,587,400	962
$PM_{2.5}$ Annual PSD Class I Significance Level	0.0048	-	0.002	-	0.0068	13.6	554,356	3,598,218	1,039
PM_{10} 24-hour NAAQS	20.7 (2nd high)	25.0 (2nd high)	-	37.3	62.3	41.5	602,909	3,587,355	957
PM_{10} 24-hour PSD Class II Increment	20.7 (2nd high)	23.9 (2nd high)	-	-	23.9	79.7	602,909	3,587,355	957
PM_{10} 24-hour PSD Class I Significance Level	0.19 (1st high)	-	-	-	0.19	63.3	560,861	3,561,327	1,087
PM_{10} Annual PSD Class II Increment	3.98	7.30	-	-	7.30	42.9	602,909	3,587,356	957
PM_{10} Annual PSD Class I Significance Level	0.0049	-	-	-	0.0049	2.5	554,749	3,599,919	1,027
SO_2 1-hour Significance Level	3.41 (1st high)	-	-	-	3.41	43.7	603,450	3,587,450	950
SO_2 3-hour NAAQS	Demonstrated by compliance with SO_2 1-hour NAAQS								
SO_2 3-hour PSD Class II Significance Level	5.94 (1st high)	-	-	-	5.94	23.8	603,216	3,588,194	963

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	Cumulative Concentration	Percent of Standard	Location		
							UTM E (m)	UTM N (m)	Elev. (ft)
SO_2 3-hour PSD Class I Significance Level	0.28 (1st high)	-	-	-	0.28	28.0	560,862	3,561,327	1,087
SO_2 24-hour NMAAQS	Demonstrated by compliance with SO_2 1-hour NAAQS								
SO_2 24-hour PSD Class II Significance Level	1.94 (1st high)	-	-	-	1.94	38.8	603,550	3,587,350	950
SO_2 24-hour PSD Class I Significance Level	0.049 (1st high)	-	-	-	0.049	24.5	560,861	3,561,327	1,087
SO_2 Annual NMAAQS	Demonstrated by compliance with SO_2 1-hour NAAQS								
SO_2 Annual PSD Class II Significance Level	0.31	-	-	-	0.31	31.0	603,200	3,588,250	966
SO_2 Annual PSD Class I Significance Level	0.0014	-	-	-	0.0014	1.4	554,749	3,599,919	1,027

Emission Sources for NoCoGen Scenario:

The following types of emission sources are included in the NoCoGen scenario: hot oil heaters (for stabilization, amine regeneration, and cryp), SSM/emergency flares, an enclosed combustion device, thermal oxidizers, and emergency generators. The emission units are described in Table 9: Table of Emissions and Stack Parameters (CoGen scenario), below.

Table 8: Table of Total Facility Emissions (NoCoGen scenario)

CO Rate (lbs/hr)	NO_2 Rate (lbs/hr)	NO_2 Rate (TPY)	VOC Rate (TPY)	SO_2 Rate (lbs/hr)	SO_2 Rate (TPY)	PM_{10} Rate (lbs/hr)	$PM_{2.5}$ Rate (lbs/hr)
400.06	232.89	234.1	408.9	5.45	23.0	19.17	19.17

Table 9: Table of Point Sources (NoCoGen scenario)[1]

Stack Number	Description	Stack Height (ft)	Diameter (ft)	Velocity (ft/s)	Temp. (°F)	NO_2 Rate (lbs/hr)	CO Rate (lbs/hr)	SO_2 Rate (lbs/hr)	PM_{10} Rate (lbs/hr)	$PM_{2.5}$ Rate (lbs/hr)
SHTR1	Stabilization Hot Oil Heater	33.0	4.0	38.6	488	1.731	1.057	0.143	0.483	0.483
SHTR2	Stabilization Hot Oil Heater	32.6	4.0	38.6	488	1.731	1.057	0.143	0.483	0.483
SHTR3	Stabilization Hot Oil Heater	32.6	4.0	38.6	488	1.731	1.057	0.143	0.483	0.483
SHTR4	Stabilization Hot Oil Heater	32.6	4.0	38.6	488	1.731	1.057	0.143	0.483	0.483
SHTR5	Stabilization Hot Oil Heater	32.6	4.0	38.6	488	1.731	1.057	0.143	0.483	0.483
SHTR6	Stabilization Hot Oil Heater	32.6	4.0	38.6	488	1.731	1.057	0.143	0.483	0.483
SHTR7	Stabilization Hot Oil Heater	32.6	4.0	38.6	488	1.731	1.057	0.143	0.483	0.483
SHTR8	Stabilization Hot Oil Heater	32.6	4.0	38.6	488	1.731	1.057	0.143	0.483	0.483
SHTR9	Stabilization Hot Oil Heater	32.6	4.0	38.6	488	1.731	1.057	0.143	0.483	0.483
SHTR10	Stabilization Hot Oil Heater	32.6	4.0	38.6	488	1.731	1.057	0.143	0.483	0.483
SHTR11	Stabilization Hot Oil Heater	32.6	4.0	38.6	488	1.731	1.057	0.143	0.483	0.483
SHTR12	Stabilization Hot Oil Heater	32.6	4.0	38.6	488	1.731	1.057	0.143	0.483	0.483
CHTR1	Cryo Hot Oil Heater	76.9	4.0	71.8	599	3.473	1.695	0.229	0.775	0.775
CHTR2	Cryo Hot Oil Heater	76.9	4.0	71.8	599	3.473	1.695	0.229	0.775	0.775

Stack Number	Description	Stack Height (ft)	Diameter (ft)	Velocity (ft/s)	Temp. (°F)	NO_2 Rate (lbs/hr)	CO Rate (lbs/hr)	SO_2 Rate (lbs/hr)	PM_{10} Rate (lbs/hr)	$PM_{2.5}$ Rate (lbs/hr)
CHTR3	Cryo Hot Oil Heater	76.9	4.0	71.8	599	3.473	1.695	0.229	0.775	0.775
RHTR1	Amine Regen Hot Oil Heater	28.5	2.7	57.5	470	1.045	0.638	0.086	0.292	0.292
RHTR2	Amine Regen Hot Oil Heater	28.5	2.7	57.5	470	1.045	0.638	0.086	0.292	0.292
RHTR3	Amine Regen Hot Oil Heater	28.5	2.7	57.5	470	1.045	0.638	0.086	0.292	0.292
FL1	SSM/Emergency Flare 1	170.0	20.9	65.6	1,832	103.764	207.149	0.051	5.358	5.358
FL2	SSM/Emergency Flare 2	170.0	15.3	65.6	1,832	62.852	125.474	0	3.393	3.393
ECD1	Combustor	40.0	8.4	39.5	1,450	1.593	3.180	0	0.086	0.086
TO1	Thermal Oxidizer	57.0	4.1	51.9	1,600	2.519	2.088	0.862	0.235	0.235
TO2	Thermal Oxidizer	57.0	4.1	51.9	1,600	2.519	2.088	0.862	0.235	0.235
TO3	Thermal Oxidizer	57.0	4.1	51.9	1,600	2.519	2.088	0.862	0.235	0.235
GEN1	Emergency Generator	14.0	1.0	285.5	815	7.600	12.770	0.050	0.210	0.210
GEN2	Emergency Generator	14.0	1.0	285.5	815	7.600	12.770	0.050	0.210	0.210
GEN3	Emergency Generator	14.0	1.0	285.5	815	7.600	12.770	0.050	0.210	0.210

Table 10: Table of Volume Sources (NoCoGen scenario)[1]

Source ID	Description	Release Height (ft)	Horizontal Dimension (ft)	Vertical Dimension (ft)	$PM_{2.5}$ Rate (lbs/hr)	PM_{10} Rate (lbs/hr)
L0000001-L0000075	Haul Road	11.2	19.8	10.4	0.070 (total)	0.700 (total)

[1] All values copied or converted from Husky CDP Permit Application.

NoCoGen scenario Results and Discussion:

CO Analysis:

The 1-hour high 1st high CO concentration was 209.0 µg/m^3. This was below the significance level (2000 µg/m^3). No cumulative analysis is required.

The 8-hour high 1st high CO concentration was 138.0 µg/m^3. This was below the significance level (500 µg/m^3). No cumulative analysis is required.

NO_2 Analysis:

ARM2 was used with default options (0.5 minimum ratio, 0.9 maximum ratio) to determine the conversion of NO_X to NO_2.

The maximum high 8th high facility alone 1-hour NO_2 concentrations was 79.9 µg/m^3, which occurred on the northern fence line of the facility. A background concentration of 64.2 µg/m^3 was added from NMED monitor 5ZS, at Hobbs - 2320 N. Jefferson St. The maximum total 1-hour NO_2 concentration was 144.1 µg/m^3. This was 76.6% of the NAAQS.

Compliance with 1-hour NO_2 NAAQS automatically demonstrates compliance with NO_2 24-hour NMAAQS.

The maximum facility alone annual NO_2 concentrations was 7.0 µg/m^3, which occurred on the northern fence line of the facility. A background concentration of 8.1 µg/m^3 was added from the monitor 5ZS, at Hobbs - 2320 N. Jefferson St. The maximum total annual NO_2 concentration was 15.1 µg/m^3. This was 16.1% of the NMAAQS.

Compliance with annual NO_2 NMAAQS automatically demonstrates compliance with NO_2 annual NAAQS.

The maximum total annual NO_2 concentration was 15.1 µg/m^3. This was 60.4% of the PSD Class II increment.

The maximum high 1st high facility alone annual NO_2 concentration in the direction of Carlsbad Caverns Class I Area was 0.017 µg/m^3. This was below the Class I significance level (0.1 µg/m^3). No cumulative analysis is required.

O_3 Analysis:

Secondary ozone impacts were calculated using MERPs as in described in the secondary pollutant formation section, above.

$$Secondary\ Ozone\ \left(\frac{\mu g}{m^3}\right) = 1.96\left(\frac{\mu g}{m^3}\right) * \left(\frac{234.1\ TPY\ NO_x}{417\ TPY} + \frac{408.9\ TPY\ VOC}{15669\ TPY}\right)$$

$$= 1.15\left(\frac{\mu g}{m^3}\right)$$

This was below the significance level (1.96 µg/m^3). No cumulative analysis is required.

PM$_{2.5}$ Analysis:

The maximum high 8th high facility alone 24-hour PM$_{2.5}$ concentration was 4.70 µg/m^3, which occurred near the northern fence line of the facility. The facility was modeled with surrounding sources. The maximum high 8th high 24-hour PM$_{2.5}$ concentration with surrounding sources was 11.08 µg/m^3, which occurred 1150 m southwest (250 degrees) from the center of the facility. A background concentration of 13.4 µg/m^3 was added from the monitor 5ZS, at Hobbs - 2320 N. Jefferson St. The facility is a significant source of both NO$_x$ and SO$_x$, which form secondary PM$_{2.5}$. Secondary PM$_{2.5}$ formation from the facility is estimated using MERPs as described in the secondary pollutant formation section, above.

$$Secondary\ 24hour\ PM_{2.5}\left(\frac{\mu g}{m^3}\right) = 1.2\ \left(\frac{\mu g}{m^3}\right) * \left(\frac{234.1\ TPY\ NO_x}{7331\ TPY} + \frac{23.0\ TPY\ SO_2}{2170\ TPY}\right)$$

$$= 0.05\left(\frac{\mu g}{m^3}\right)$$

The maximum total 24-hour PM$_{2.5}$ concentration was 24.53 µg/m^3. This was 70.1% of the NAAQS.

The maximum high 2nd high facility alone 24-hour PM$_{2.5}$ concentration was 6.11 µg/m^3, which occurred near the northern fence line of the facility. The facility was modeled with surrounding sources. The maximum high 2nd high 24-hour PM$_{2.5}$ concentration with surrounding sources was 8.04 µg/m^3, which occurred 1150 m southwest (250 degrees) from the center of the facility. Secondary PM$_{2.5}$ formation of 0.05 µg/m^3 was added to the maximum concentrations. The maximum total 24-hour PM$_{2.5}$ concentration was 8.09 µg/m^3. This was 89.9% of the PSD Class II increment.

The maximum high 1st high facility alone 24-hour PM$_{2.5}$ concentration in the direction of Carlsbad Caverns Class I Area was 0.19 µg/m^3. Secondary PM2.5 formation of 0.7 µg/m^3 was added for a cumulative concentration of 0.26 µg/m^3. This was below the Class I significance level (0.27 µg/m^3). No cumulative analysis is required.

The maximum facility alone annual PM$_{2.5}$ concentration was 1.32 µg/m^3, which occurred near the northern fence line of the facility. The facility was modeled with surrounding sources. The maximum annual PM$_{2.5}$ concentration with surrounding sources was 3.86 µg/m^3, which occurred 1150 m southwest (250 degrees) from the center of the facility. A background concentration of 5.90 µg/m^3 was added from the monitor 5ZS, at Hobbs - 2320 N. Jefferson St. Secondary PM$_{2.5}$ formation from the facility is estimated MERPs as described in the secondary pollution formations section, above.

$$Secondary\ annual\ PM_{2.5}\left(\frac{\mu g}{m^3}\right) = 0.2\ \left(\frac{\mu g}{m^3}\right) * \left(\frac{234.1\ TPY\ NO_x}{26780\ TPY} + \frac{23.0\ TPY\ SO_2}{25929\ TPY}\right)$$

$$= 0.002\left(\frac{\mu g}{m^3}\right)$$

The maximum total annual $PM_{2.5}$ concentration was 9.76 µg/m^3. This was 81.3% of the NAAQS.

The maximum total annual $PM_{2.5}$ concentration with increment consuming surrounding sources was 2.55 µg/m^3, 1150 m southwest (250 degrees) from the center of the facility. This was 63.7% of the PSD Class II increment.

The maximum facility alone annual $PM_{2.5}$ concentration in the direction of Carlsbad Caverns Class I Area was 0.002 µg/m^3. Secondary $PM_{2.5}$ formation of 0.002 µg/m^3 was added for a cumulative concentration of 0.004 µg/m^3. This was below the Class I significance level (0.05 µg/m^3). No cumulative analysis is required.

PM_{10} Analysis:
The maximum high 2nd high facility alone 24-hour PM_{10} concentration was 20.8 µg/m^3, which occurred on the southwestern fence line of the facility. The facility was modeled with surrounding sources. The maximum high 2nd high 24-hour PM_{10} concentration with surrounding sources was 24.9 µg/m^3, which occurred on the southern fence line of the facility. A background concentration of 37.3 µg/m^3 was added from the monitor 5ZS, at Hobbs - 2320 N. Jefferson St. The maximum total 24-hour $PM_{2.5}$ concentration was 62.2 µg/m^3. This was 41.5% of the NAAQS.

The maximum high 2nd high 24-hour PM_{10} concentration with increment consuming surrounding sources was 23.8 µg/m^3, which occurred on the southern fence line of the facility. This was 79.3% of the PSD Class II increment.

The maximum high 1st high facility alone 24-hour PM_{10} concentration in the direction of Carlsbad Caverns Class I Area was 0.09 µg/m^3. This was below the Class I significance level (0.3 µg/m^3). No cumulative analysis is required.

The maximum source alone annual PM_{10} concentration was 3.89 µg/m^3, which occurred on the southern fence line of the facility. The maximum annual PM_{10} concentration with increment consuming surrounding sources was 7.21 µg/m^3, which occurred on the southern fence line of the facility. This was 42.4% of the PSD Class II increment.

The maximum high 1st high facility alone annual PM_{10} concentration in the direction of Carlsbad Caverns Class I Area was 0.002 µg/m^3. This was below the Class I significance level (0.2 µg/m^3). No cumulative analysis is required.

SO_2 Analysis:
The 1-hour high 1st high SO_2 concentration (7.43 µg/m^3) was below the significance level (7.8 µg/m^3). No cumulative analysis is required.

The 3-hour high 1st high SO_2 concentration was 8.59 µg/m^3. This was below the significance level (25.0 µg/m^3). No cumulative analysis is required.

The maximum high 1st high facility alone 3-hour SO_2 concentration in the direction of Carlsbad Caverns Class I Area was 0.24 µg/m^3. This was below the Class I significance level (1.0 µg/m^3). No cumulative analysis is required.

The 24-hour high 1st high SO_2 concentration was 3.60 µg/m^3. This was below the significance level (5.0 µg/m^3). No cumulative analysis is required.

The maximum high 1st high facility alone 24-hour SO_2 concentration in the direction of Carlsbad Caverns Class I Area was 0.03 µg/m^3. This was below the Class I significance level (0.2 µg/m^3).

The annual SO_2 concentration was 0.55 µg/m^3. This was below the significance level (1.0 µg/m^3). No cumulative analysis is required.

The maximum facility alone annual SO_2 concentration in the direction of Carlsbad Caverns Class I Area was 0.0009 µg/m^3. This was below the Class I significance level (0.1 µg/m^3). No cumulative analysis is required.

Table 11: Table of Ambient Impact from Emissions (NoCoGen scenario)

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	Cumulative Concentration	Percent of Standard	Location		
							UTM E (m)	UTM N (m)	Elev. (ft)
CO 1-hour Significance Level	209.0 (1st high)	-	-	-	209.9	10.5	603,166	3,588,194	963
CO 8-hour Significance Level	138.0 (1st high)	-	-	-	138.0	27.6	603,067	3,588,194	963
NO_2 1-hour NAAQS	79.9 (8th high)	-	-	64.2	144.1	76.6	603,512	3,588,194	962
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	7.0	-	-	8.1	15.1	16.1	603,166	3,588,194	963
NO_2 Annual PSD Class II Increment	7.0	-	-	8.1	15.1	60.4	603,166	3,588,194	963
NO_2 Annual PSD Class I Significance Level	0.017	-	-	-	0.017	17	554,749	3,599,919	1,027
O_3 8-hour Significance Level	-	-	1.15	-	1.15	58.7	-	-	-
$PM_{2.5}$ 24-hour NAAQS	4.70 (8th high)	11.08 (8th high)	0.05	13.4	24.53	70.1	602,200	3,587,400	962
$PM_{2.5}$ 24-hour PSD Class II Increment	6.11 (2nd high)	8.04 (2nd high)	0.05	-	8.09	89.9	602,200	3,587,400	962
$PM_{2.5}$ 24-hour PSD Class I Significance Level	0.06	-	0.05	-	0.11	40.7	554,024	3,596,505	1,042

Air Dispersion Modeling Summary for Permit No. 8245

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	Cumulative Concentration	Percent of Standard	Location		
							UTM E (m)	UTM N (m)	Elev. (ft)
$PM_{2.5}$ Annual NAAQS	1.32	3.86	0.002	5.9	9.76	81..3	602,200	3,587,400	962
$PM_{2.5}$ Annual PSD Class II Increment	1.32	2.55	0.002	-	2.55	63.7	603,216	3,588,194	963
$PM_{2.5}$ Annual PSD Class I Significance Level	0.002	-	0.002	-	0.004	8.0	554,749	3,599,919	1,027
PM_{10} 24-hour NAAQS	20.8 (2nd high)	24.9 (2nd high)	-	37.3	62.2	41.5	602,909	3,587,355	957
PM_{10} 24-hour PSD Class II Increment	20.8 (2nd high)	23.8 (2nd high)	-	-	23.8	79.3	602,909	3,587,355	957
PM_{10} 24-hour PSD Class I Significance Level	0.09	-	-	-	0.09	30	554,024	3,596,505	1,042
PM_{10} Annual PSD Class II Increment	3.89	7.21	-	-	7.21	42.4	602,909	3,587,356	957
PM_{10} Annual PSD Class I Significance Level	0.002	-	-	-	0.002	1.0	554,749	3,599,919	1,027
SO_2 1-hour NAAQS	7.43	-	-	-	7.43	95.2	603,216	3,588,194	963
SO_2 3-hour NAAQS	Demonstrated by compliance with SO_2 1-hour NAAQS								
SO_2 3-hour PSD Class II Significance Level	8.59	-	-	-	8.59	34.4	603,216	3,588,194	963

Air Dispersion Modeling Summary for Permit No. 8245

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	Cumulative Concentration	Percent of Standard	Location		
							UTM E (m)	UTM N (m)	Elev. (ft)
SO_2 3-hour PSD Class I Significance Level	0.24	-	-	-	0.24	24.0	562,813	3,558,434	1,039
SO_2 24-hour NMAAQS	Demonstrated by compliance with SO_2 1-hour NAAQS								
SO_2 24-hour PSD Class II Significance Level	3.60	-	-	-	3.60	72.0	603,216	3,588,194	963
SO_2 24-hour PSD Class I Significance Level	0.03	-	-	-	0.03	15.0	554,023	3,596,505	1,042
SO_2 Annual NMAAQS	Demonstrated by compliance with SO_2 1-hour NAAQS								
SO_2 Annual PSD Class II Significance Level	0.55	-	-	-	0.55	55.0	603,216	3,588,194	963
SO_2 Annual PSD Class I Significance Level	0.0009	-	-	-	0.0009	0.9	554,749	3,599,919	1,027