

## Emission Sources - Maximum Allowable Emission Rates

Permit Numbers 36644, PSDTX903M5, and N007M1

This table lists the maximum allowable emission rates and all sources of air contaminants on the applicant's property covered by this permit. The emission rates shown are those derived from information submitted as part of the application for permit and are the maximum rates allowed for these facilities, sources, and related activities. Any proposed increase in emission rates may require an application for a modification of the facilities covered by this permit.

### Air Contaminants Data

Emission Point No. (1)	Source Name (2)	Air Contaminant Name (3)	Emission Rates	
			lbs/hour	TPY (4)
N-1	Recycle Ethane Cracking Furnace H-0100	NO <sub>x</sub> (7) (10)	48.32	-
		NO <sub>x</sub> (7)	24.16	79.37
		SO <sub>2</sub> (7)	2.21	4.83
		CO (7) (11)	46.50	-
		CO (7)	23.25	101.85
		PM <sub>10</sub> (7)	1.51	6.61
		VOC (7)	0.57	2.51
N-2	Fresh Feed Cracking Furnace H-0200	NO <sub>x</sub> (7) (10)	70.68	-
		NO <sub>x</sub> (7)	35.34	116.08
		SO <sub>2</sub> (7)	3.22	7.07
		CO (7) (11)	68.02	-
		CO (7)	34.01	148.97
		PM <sub>10</sub> (7)	2.21	9.67
		VOC (7)	0.84	3.68

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N-3	Fresh Feed Cracking Furnace H-0300	NO <sub>x</sub> (7) (10)	70.68	-
		NO <sub>x</sub> (7)	35.34	116.08
		SO <sub>2</sub> (7)	3.22	7.07
		CO (7) (11)	68.02	-
		CO (7)	34.01	148.97
		PM <sub>10</sub> (7)	2.21	9.67
		VOC (7)	0.84	3.68
N-4	Fresh Feed Cracking Furnace H-0400	NO <sub>x</sub> (7) (10)	70.68	-
		NO <sub>x</sub> (7)	35.34	116.08
		SO <sub>2</sub> (7)	3.22	7.07
		CO (7) (11)	68.02	-
		CO (7)	34.01	148.97
		PM <sub>10</sub> (7)	2.21	9.67
		VOC (7)	0.84	3.68
N-5	Fresh Feed Cracking Furnace H-0500	NO <sub>x</sub> (7) (10)	70.68	-
		NO <sub>x</sub> (7)	35.34	116.08
		SO <sub>2</sub> (7)	3.22	7.07
		CO (7) (11)	68.02	-
		CO (7)	34.01	148.97
		PM <sub>10</sub> (7)	2.21	9.67
		VOC (7)	0.84	3.68
N-6	Fresh Feed Cracking Furnace H-0600	NO <sub>x</sub> (7) (10)	70.68	-
		NO <sub>x</sub> (7)	35.34	116.08
		SO <sub>2</sub> (7)	3.22	7.07

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		CO (7) (11)	68.02	-
		CO (7)	34.01	148.97
		PM <sub>10</sub> (7)	2.21	9.67
		VOC (7)	0.84	3.68
N-7	Fresh Feed Cracking Furnace H-0700	NO <sub>x</sub> (7) (10)	70.68	-
		NO <sub>x</sub> (7)	35.34	116.08
		SO <sub>2</sub> (7)	3.22	7.07
		CO (7) (11)	68.02	-
		CO (7)	34.01	148.97
		PM <sub>10</sub> (7)	2.21	9.67
		VOC (7)	0.84	3.68
N-8	Fresh Feed Cracking Furnace H-0800	NO <sub>x</sub> (7) (10)	70.68	-
		NO <sub>x</sub> (7)	35.34	116.08
		SO <sub>2</sub> (7)	3.22	7.07
		CO (7) (11)	68.02	-
		CO (7)	34.01	148.97
		PM <sub>10</sub> (7)	2.21	9.67
		VOC (7)	0.84	3.68
N-9	Fresh Feed Cracking Furnace H-0900 (487.5 MMBtu/hr maximum)	NO <sub>x</sub> (7) (10)	48.75	-
		NO <sub>x</sub> (7)	12.19	21.35
		SO <sub>2</sub> (7)	5.60	24.53
		CO (7) (11)	34.13	-
		CO (7)	17.06	74.73
		PM <sub>10</sub> (7)	3.63	15.91

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		VOC (7)	2.63	11.51
		NH <sub>3</sub>	1.98	8.68
N-16	Fresh Feed Cracking Furnace H-1000 (487.5 MMBtu/hr maximum)	NO <sub>x</sub> (7) (10)	49.80	-
		NO <sub>x</sub> (7)	12.45	21.81
		SO <sub>2</sub> (7)	4.48	8.72
		CO (7) (11)	69.72	-
		CO (7)	17.43	76.34
		PM (7)	2.49	10.91
		PM <sub>10</sub> (7)	2.49	(15)
		PM <sub>2.5</sub> (7)	2.49	(15)
		VOC (7)	2.69	11.76
		NH <sub>3</sub>	1.98	8.68
N-10	Catalyst Regeneration Effluent	VOC (7)	15.83	0.08
		CO	373.33	1.89
N-11	Reactor Regeneration Effluent (Startup, Shutdown, and Maintenance) 0.11	CO	161.43	135.57 0.13
		VOC (7)	0.13	0.11
N-12	DP Reactor Feed Heater	NO <sub>x</sub> (7)	5.01	13.71
		SO <sub>2</sub> (7)	0.44	0.95
		CO (7)	4.40	12.26
		PM <sub>10</sub> (7)	0.38	1.64
		VOC (7)	0.17	0.74
	DP Reactor Feed Heater Startup Emission Rate	CO (7)	14.50	1.74
N-13	DP Reactor Regeneration Heater	NO <sub>x</sub> (7)	1.73	1.42

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		SO <sub>2</sub> (7)	0.14	0.10
		CO (7)	2.37	3.13
		PM <sub>10</sub> (7)	0.13	0.17
		VOC (7)	0.06	0.08
N-14	Auxiliary Boiler	NO <sub>x</sub>	13.60	
		SO <sub>2</sub>	1.24	
		CO	15.60	
		PM <sub>10</sub>	1.58	
		VOC	1.58	
N-20A	GTG HRSG Unit 1 GE Frame 6B, 310.4 MMBtu/hr Duct Burner (with SCR)	NO <sub>x</sub>	17.65	
		SO <sub>2</sub>	4.53	
		CO	89.51	
		PM <sub>10</sub>	5.55	
		PM <sub>2.5</sub>	5.55	
		VOC	4.09	
		NH <sub>3</sub>	7.61	28.20
N-20B	GTG HRSG Unit 2 GE Frame 6B, 310.4 MMBtu/hr Duct Burner (with SCR)	NO <sub>x</sub>	17.65	
		SO <sub>2</sub>	4.53	
		CO	89.51	
		PM <sub>10</sub>	5.55	
		PM <sub>2.5</sub>	5.55	
		VOC	4.09	
		NH <sub>3</sub>	7.61	28.20
Emission Point Nos. N-14, N-20A, and N-20B are subject to the following combined annual emission caps for the specified pollutants:				
N-14, N-20A, and N-20B	Annual Emission Caps	NO <sub>x</sub>	-	102.96

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		SO <sub>2</sub>	-	8.27
		CO	-	349.85
		PM <sub>10</sub>	-	46.78
		PM <sub>2.5</sub>	-	(15)
		VOC	-	32.17
N-15 and N-15A	Flare System Emission Limits Applicable During Routine Operations exclusive of planned turnarounds (8)(9)	VOC (7)	631.04	169.93
		NOx (7)	252.68	45.51
		CO (7)	1,046.42	175.70
		SO <sub>2</sub> (7)	0.56	1.32
		H <sub>2</sub> S	<0.01	<0.01
N-15 and N-15A	Flare System Emission Limits Applicable to MSS Activities, Including Planned Major and Minor Plant Turnarounds(8)(9)	VOC (7)	6,788.14	168.91
		NOx (7)	1,068.91	35.82
		CO (7)	5,276.94	174.13
		SO <sub>2</sub> (7)	17.12	1.46
		H <sub>2</sub> S	0.19	0.02
N-15 and N-15A	Acetylene Converter Swaps	NOx (7)(16)	364.76	---
		CO (7)(16)	2,634.43	---
		VOC (7)(16)	2,778.73	---
N-18	Decoking Drum	CO (7)	3360.00	204.09
		PM <sub>10</sub> (7)	78.73	3.98
		PM <sub>2.5</sub> (7)	78.73	(15)

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N-19	Thermal Oxidizer	NO <sub>x</sub> (7)	0.24	0.88
		SO <sub>2</sub> (7)	0.08	0.28
		CO (7)	0.21	0.77
		PM <sub>10</sub> (7)	0.04	0.13
		VOC (7)	0.03	0.14
N-21A	Fire Pump Diesel Engine (6)	NO <sub>x</sub> (7)	15.81	1.23
		SO <sub>2</sub> (7)	1.05	0.08
		CO (7)	3.41	0.27
		PM <sub>10</sub> (7)	1.12	0.09
		VOC (7)	1.26	0.10
N-21B	Fire Pump Diesel Engine (6)	NO <sub>x</sub> (7)	15.81	1.23
		SO <sub>2</sub> (7)	1.05	0.08
		CO (7)	3.41	0.27
		PM <sub>10</sub> (7)	1.12	0.09
		VOC (7)	1.26	0.10
N-22	Carbon Bed Adsorber	Benzene	0.31	0.11
N-23	Ammonia Scrubber	NH <sub>3</sub>	0.12	0.51

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N-24A	Boiler B-7280 (425.4 MMBtu/hr)	VOC (7)	1.70	6.66
		NO <sub>x</sub> (Routine)	4.25	16.64
		NO <sub>x</sub> (Startup)	17.02	1.23
		CO (7)	14.89	18.31
		SO <sub>2</sub>	7.91	16.67
		PM <sub>10</sub> (7)	2.13	8.32
		PM <sub>2.5</sub> (7)	2.13	(15)
		NH <sub>3</sub>	1.87	7.33
N-24B	Boiler B-7290 (425.4 MMBtu/hr)	VOC (7)	1.70	6.66
		NO <sub>x</sub> (Routine)	4.25	16.64
		NO <sub>x</sub> (Startup)	17.02	1.23
		CO (7)	14.89	18.31
		SO <sub>2</sub>	7.91	16.67
		PM <sub>10</sub> (7)	2.13	8.32
		PM <sub>2.5</sub> (7)	2.13	(15)
		NH <sub>3</sub>	1.87	7.33
N-24A and N-24B	Annual Cap - Boilers B-7280 and B-7290	SO <sub>2</sub>	-	23.42
N-1 through N-9, N-14, N-15, N-15A, N-16, N-19, N-20A, and N-20B	Fresh Feed Cracking Furnaces, Auxiliary Boiler, Flare System, Cogeneration Facility, and Thermal Oxidizer (9)	Mercury (9)	0.63	0.039
TK-2501	IFR Spent Caustic	VOC (7)	0.32	0.35
TK-8001	IFR WW Equalization	VOC (7)	0.39	0.62
TK-8101	EFR Contaminated Storm water	VOC (7)	0.49	0.49



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TK-7702	Sulfuric Acid Tank	H <sub>2</sub> SO <sub>4</sub>	0.01	0.01
		SO <sub>3</sub>	0.01	0.01
F-1	Fugitives (12)	VOC (7)	9.43	41.31
F-2 and F-2A	Cooling Tower System	PM <sub>10</sub> (7)	2.13	2.76
		VOC (5) (7)	25.00	42.45
		Benzene	0.50	1.99
F-4	Benzene/Toluene Process Fugitives (12)	VOC (7)	0.67	2.94
		H <sub>2</sub> S	0.01	0.02
F-5	C4 Huntsman Pipeline Fugitives (12)	VOC	0.01	0.03
BOIL-AMM	Fugitives: Boilers 7280 and 7290 - Ammonia Injection System (12)	NH <sub>3</sub>	0.01	0.02
COG-AMM-1	Ammonia Fugitives: Storage Tank and Vaporizer (12)	NH <sub>3</sub>	0.01	0.06
COG-AMM-2	Ammonia Fugitives: GTG/HRSG Unit 2 SCR - Ammonia Injection System (12)	NH <sub>3</sub>	0.01	0.01
COG-AMM-3	Ammonia Fugitives: GTG/HRSG Unit 1 SCR - Ammonia Injection System (12)	NH <sub>3</sub>	0.01	0.01
FURN-AMM	Ammonia Fugitives: Fresh Feed Cracking Furnaces H-0900 and H-1000- Ammonia Injection System (12)	NH <sub>3</sub>	0.03	0.11
<b>PLANNED TURNAROUND AND MSS CAPs</b>				
TA CAP	Turnaround CAP (Non-Flare)	VOC	16.03	4.61
		PM	0.30	2.08
		PM <sub>10</sub>	0.02	(15)
		PM <sub>2.5</sub>	0.01	(15)
MSS Cap	MSS CAP (Non-Flare)	VOC	17.52	4.72
		PM	0.74	1.43

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		PM <sub>10</sub>	0.49	(15)
		PM <sub>2.5</sub>	0.03	(15)
N-1	Recycle Ethane Cracking Furnace H-0100 Startup	NO <sub>x</sub>	48.32	(13)
		CO	93.02	(13)
N-2	Fresh Feed Cracking Furnace H-0200 Startup	NO <sub>x</sub>	70.68	(13)
		CO	136.04	(13)
N-3	Fresh Feed Cracking Furnace H-0300 Startup	NO <sub>x</sub>	70.68	(13)
		CO	136.04	(13)
N-4	Fresh Feed Cracking Furnace H-0400 Startup	NO <sub>x</sub>	70.68	(13)
		CO	136.04	(13)
N-5	Fresh Feed Cracking Furnace H-0500 Startup	NO <sub>x</sub>	70.68	(13)
		CO	136.04	(13)
N-6	Fresh Feed Cracking Furnace H-0600 Startup	NO <sub>x</sub>	70.68	(13)
		CO	136.04	(13)
N-7	Fresh Feed Cracking H-0700 Startup	NO <sub>x</sub>	70.68	(13)
		CO	136.04	(13)
N-8	Fresh Feed Cracking H-0800 Startup	NO <sub>x</sub>	70.68	(13)
		CO	136.04	(13)
N-9	Fresh Feed Cracking H-0900 Startup	NO <sub>x</sub>	48.75	(13)
		CO	34.13	(13)
N-16	Fresh Feed Cracking H-1900 Startup	NO <sub>x</sub>	49.80	(13)
		CO	69.72	(13)

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N-12	DP Reactor Feed Heater Startup	NO <sub>x</sub>	15.02	(13)
		CO	14.52	(13)
N-13	DP Reactor Regeneration Heater	NO <sub>x</sub>	3.45	(13)
		CO	4.74	(13)
N-14	Auxiliary Boiler Startup	NO <sub>x</sub>	27.12	(13)
		CO	31.19	(13)
N-20A	GTG HRSG Unit 1 Startup	NO <sub>x</sub>	123.53	(13)
		CO	716.12	(13)
N-20B	GTG HRSG Unit 2 Startup	NO <sub>x</sub>	123.53	(13)
		CO	716.12	(13)
N-24A	Boiler B-7280 Startup	NO <sub>x</sub>	17.02	(13)
		CO	29.78	(13)
N-24B	Boiler B-7290 Startup	NO <sub>x</sub>	17.02	(13)
		CO	29.78	(13)
GTGENG-1	Cogen Starting Engine Unit #20A (14)	VOC	0.01	0.01
		NO <sub>x</sub>	16.48	0.79
		CO	5.17	0.25
		SO <sub>2</sub>	0.01	0.01
		PM <sub>10</sub>	0.71	0.03
		PM <sub>2.5</sub>	0.71	(15)
GTGENG-2	Cogen Starting Engine Unit #20B (14)	VOC	0.01	0.01
		NO <sub>x</sub>	16.48	0.79
		CO	5.17	0.25
		SO <sub>2</sub>	0.01	0.01
		PM <sub>10</sub>	0.71	0.03
		PM <sub>2.5</sub>	0.71	(15)

Emission Sources - Maximum Allowable Emission Rates

- (1) Emission point identification - either specific equipment designation or EPN from plot plan.
- (2) Specific point source name. For fugitive sources, use area name or fugitive source name.
- (3)

VOC	-	volatile organic compounds as defined in Title 30 Texas Administrative Code § 101.1
CO	-	carbon monoxide
NO <sub>x</sub>	-	total oxides of nitrogen
SO <sub>2</sub>	-	sulfur dioxide
SO <sub>3</sub>	-	sulfur trioxide
PM	-	total particulate matter (PM), suspended in the atmosphere, including PM <sub>10</sub> and PM <sub>2.5</sub> , as represented
PM <sub>10</sub>	-	total PM equal to or less than 10 microns in diameter, including PM <sub>2.5</sub> , as represented
PM <sub>2.5</sub>	-	PM equal to or less than 2.5 microns in diameter
H <sub>2</sub> S	-	hydrogen sulfide
H <sub>2</sub> SO <sub>4</sub>	-	sulfuric acid
NH <sub>3</sub>	-	ammonia
- (4) Compliance with annual emission limits (tons per year) is based on a 12-month rolling period.
- (5) The VOC emission rates from the cooling tower are for total VOC, including benzene.
- (6) Emissions from the fire pump diesel engines are based on 156 hours per year operation. Non-emergency fire pump operations shall only occur between the hours of 8:00 a.m. and 5:00 p.m. (one engine at any one time.)
- (7) These emissions are permitted under PSD or Nonattainment review in addition to State.
- (8) Major and Minor plant turnarounds as defined in Special Condition No. 3A. Consistent with the plant's original design basis, planned major plant turnarounds are expected at nominal intervals of once every five years for purposes such as catalyst replacement, equipment inspection, and equipment repair or replacement.
- (9) Mercury shall be calculated and expressed as elemental mercury in any form or phase and shall include the mercury contained in any compound.
- (10) Emissions from startups and spikes in the short-term rate are authorized at this rate for up to 150 total hours in any 12-month period during which emissions from one or more furnaces (EPNs N-1 through N-8, N-9, and N-16) exceed the routine lbs/hr emission limit. Annual emissions are included in the rates of normal operations.
- (11) Emissions from startups and spikes in the short-term rate are authorized at this rate for up to 876 total hours in any 12-month period. Annual emissions are included in the rates of normal operations.
- (12) Emission rate is an estimate and compliance is demonstrated by meeting the requirements of the applicable special conditions and permit application representations.
- (13) Annual emission rates are included in each EPN's respective routine emission rates.

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- (14) Each engine is authorized to operate for up to 96 total hours in any 12-month period.
- (15) Annual emission rates of PM<sub>10</sub> and PM<sub>2.5</sub> are included in PM annual emissions. Annual emission rates of PM<sub>2.5</sub> are included in PM<sub>10</sub> annual emissions.
- (16) Annual emissions are included in the Flare Systems' annual Emission Limits.

Date: November 17, 2016