

# Emission Sources - Maximum Allowable Emission Rates

Permit Number 5546

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)
302M331 & 302M460	Boilers – Combined Emissions 302M331 and 302M460 for the Propanol Unit (9)	VOC	0.59	0.68
	Boilers - Combined Emissions 302M331 and 302M460 for the Butanol Unit (9)	CO	84.40	82.40
		VOC	4.00	2.80
		PM <sub>10</sub>	2.60	4.60
		SO <sub>2</sub>	2.90	6.60
303M1239	Ethylene Flare (Propanol Unit) (6)	NOx	19.12	5.00
		VOC	74.11	5.34
		SO <sub>2</sub>	2.17	1.01
		CO	115.22	28.38
	Ethylene Flare (Butanol Unit Only) (6)	NOx	22.00	3.30
		VOC	153.60	24.60
		SO <sub>2</sub>	0.60	0.10
		CO	130.40	20.10
	Ethylene Flare (Start-Up, Shutdown, and Maintenance Operation, Butanol Unit) (6)	NOx	16.80	0.01
		VOC	123.90	0.20
		SO <sub>2</sub>	0.20	0.01
		CO	85.50	0.10

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Propanol Unit				
108A	Propanol Unit Analyzers	VOC	0.15	0.66
		CO	0.11	0.47
108C	Catalyst Emissions	VOC	1.31	0.19
108F	Fugitives (5) (8)	VOC	5.86	25.67
		CO	0.22	0.98
108F	Fugitives (5) (7)	VOC	3.32	14.55
		CO	0.22	0.98
251AV36	Tank 36	VOC	0.74	1.15
251AV39	Tank 39	VOC	0.74	1.04
251AV94	Tank 94	VOC	0.74	1.15
251CV646	Tank 646	VOC	1.06	0.61
108AV978	Tank 978	VOC	0.01	0.01
251V1307	Tank V1307	VOC	1.34	0.02
Butanol Unit				
100CAT	Catalyst Emissions	VOC	2.95	0.42
100GB	Guard Bed Regeneration	SO <sub>2</sub>	13.40	0.32
100ANAL	Butanol Unit Building 1 Vent Analyzer	VOC	1.26	5.53
		CO	0.18	0.77
100GRPTK	Combined Emission Points Tanks V30, V34, and V35	VOC	64.94	2.93
251AV37	Tank V-37	VOC	0.67	0.40
100V984	Tank V-984	VOC	0.80	0.40
100V865	Tank V-865	VOC	0.74	0.82
251AV866	Tank V-866	VOC	0.74	0.82
251AV994	Tank V-994	VOC	1.11	0.70
251AV995	Tank V-995	VOC	1.11	0.70
100V500	Tank V-500	VOC	0.74	1.40
100V501	Tank V-501	VOC	0.74	1.40

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100V502	Tank V-502	VOC	0.74	1.40
251AV38	Tank V-38	VOC	1.01	2.10
100V1034	Tank V-1034	VOC	1.07	2.40
251AV829	Tank V-829	VOC	1.04	2.16
100V23	Tank V-23	VOC	0.25	0.05
100V917	Tank V-917	VOC	0.01	0.05
251AV119	Tank V-119 (from T-104)	VOC	4.80	0.18
100F	Fugitives (5)	VOC	7.40	32.50
		CO	0.80	3.40
Permit by rule (PBR) sources incorporated by reference. Sources remain authorized by the PBR(s) as listed below:				
83278 (10)				
302M331 & 302M460	Boilers – Combined Emissions 302M331 and 302M460 for the Propanol Unit (9)	VOC	0.00	0.27
		NO <sub>x</sub>	0.00	5.40
		CO	0.00	3.02
		PM <sub>10</sub>	0.00	0.22
		SO <sub>2</sub>	0.00	0.09
84776 (11)				
302M331 & 302M460	Boilers – Combined Emissions 302M331 and 302M460 for the Propanol Unit (9)	VOC	0.02	0.06
		NO <sub>x</sub>	1.64	8.49
		CO	0.75	3.83
		PM <sub>10</sub>	0.07	0.37
		SO <sub>2</sub>	0.03	0.16
84782 (12)				
302M331 & 302M460	Boilers – Combined Emissions 302M331 and 302M460 for the Propanol	VOC	0.01	0.01
		NO <sub>x</sub>	0.13	0.17
		CO	0.06	0.08

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	Unit (9)			
85516 (13)				
302M331 & 302M460	Boilers – Combined Emissions 302M331 and 302M460 for the Butanol Unit (9)	NO <sub>x</sub>	0.01	0.06
		CO	0.01	0.03
91133 (14)				
302M331 & 302M460	Boilers – Combined Emissions 302M331 and 302M460 for the Butanol Unit (9)	VOC	0.01	0.08
91134 (15)				
302M331 & 302M460	Boilers – Combined Emissions 302M331 and 302M460 for the Butanol Unit (9)	VOC	0.06	0.03
		NO <sub>x</sub>	0.06	0.14
		CO	0.02	0.06
		PM <sub>10</sub>	0.01	0.01
		SO <sub>2</sub>	0.01	0.01
92863 (16)				
251 SCRUB	Water Scrubber	VOC	0.62	1.31
100F	Fugitives	VOC	0.03	0.11

(1) Emission point identification - either specific equipment designation or emission point number 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

NO<sub>x</sub> - oxides of nitrogen

CO - carbon monoxide

PM<sub>10</sub> - particulate matter (PM) equal to or less than 10 microns in diameter. Where PM is not listed, it shall be assumed that no PM greater than 10 microns is emitted.

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CO - carbon monoxide

SO<sub>2</sub> - sulfur dioxide

- (4) Compliance with annual emission limits (tons per year) is based on a 12 month rolling period.
- (5) Emission rate is an estimate and is enforceable through compliance with the applicable special condition(s) and permit application representations.
- (6) Other emissions from the flare are included in Permit Numbers 2175, 4449, 6105, and 25229.
- (7) This emission limit will become effective one hundred eighty days after the permit has been issued.
- (8) This emission limit remains effective until the Propanol Unit VOC fugitive emissions are controlled with 28MID.
- (9) Emissions of NOx, CO, SO<sub>2</sub>, and PM from the boilers are authorized under Permit Number 2175
- (10) There are increased flow rates due to increased efficiency in the reactors,
- (11) Increased operational stability from modifications to the reactor, additional instrumentation, and improved process control, Increased heat transfer through heat exchanger modifications, Improved performance and reliability by either modifying or replacing several pumps and adding pump redundancy, and Enhanced compressor reliability due to improvements to reduce liquid entrainment.
- (12) A second vaporizer instead of a thin film evaporator will be used to recover rhodium (Rh) from propionaldehyde (PrH), and
- (13) There are increased flow rates due to increased efficiency in contaminants such as butyraldehyde,
- (14) An increase in piping size results in greater flow,
- (15) A settling vessel, V-913, which is routed to control is added to recover Rhodium catalyst,
- (16) Iso-butyraldehyde loaded will replace the crude butyraldehyde

Date: August 14, 2012