

US EPA ARCHIVE DOCUMENT

# Emissions Calculation Check

## Elevated Flare

## Elevated Flares

	Natural Gas Pilot	Elevated Flare 1 st	Elevated Flare 2nd	MSS Olefins	MSS PDH	Total
CO2	212	16581.00	545.00	29495.00	21955.00	68788.00
CH4	4.00E-03	50.05	1.64	11.00	263.00	325.69
N2O	4.00E-04	0.17	0.01	0.90	0.90	1.98
<b>Total</b>						<b>69115.67</b>

  

Emission Factor		GHG Mass Emissions TPY (Metric)	Short tons	GWP	CO2e CO2e metric	CO2e short
CO2	53.02	68788.00	75825.79	1	68788	75825.79
CH4	1.00E-03	325.69	359.02	25	8142.35	8975.40
N2O	1.00E-04	1.98	2.18	298	590.1592	650.54
<b>Total</b>					<b>85451.73</b>	

## Cracking Furnaces

	Fuel	Natural Gas	Total
CO2	65604	29161	94765.00
CH4	1.38	0.55	1.93
N2O	0.14	0.06	0.20
<b>Total</b>			<b>94767.13</b>

## Cracking Furnaces

Emission Factor	GHG Mass Emissions TPY (Metric)	GHG Mass Emissions TPY Metric X 14		Short Tons X 14		GWP	CO2e metric	CO2e metric X 14	CO2e short	CO2e short X 14
		Short tons	Short tons	Short tons	Short tons					
CO2	53.02	94765.00	1326710.00	104460.53	1462447.44	1.00	94765.00	1326710.00	104460.5	1462447.44
CH4	1.00E-03	1.93	27.02	2.13	29.78	25.00	48.25	675.50	53.2	744.61
N2O	1.00E-04	0.20	2.80	0.22	3.09	298.00	59.60	834.40	65.7	919.77
<b>Total</b>								<b>1328219.90</b>	<b>104579.4</b>	<b>1464111.82</b>

14 Furnaces

## PDH Reactors

	Fuel	Natural Gas	Total
CO2	34075	19246	53321
CH4	1.31	0.36	1.67
N2O	0.13	0.04	0.17
<b>Total</b>			<b>53322.84</b>

## PDH Reactors

Emission Factor	GHG Mass Basis (metric)	GHG Mass Emissions TPY Metric X 4		Short Tons X 4		GWP	CO2e metric	CO2e metric X 4	CO2e short	CO2e short X 4
		Short tons	Short tons	Short tons	Short tons					
CO2	53.02	53321	213284	58776.34	235105.37	1.00	53321.00	213284.00	58776.34	235105.37
CH4	1.00E-03	1.67	6.68	1.84	7.36	25.00	41.75	167.00	46.02	184.09
N2O	1.00E-04	0.17	0.68	0.19	0.75	298.00	50.66	202.64	55.84	223.37

**Total** **213653.64** **58878.21** **235512.82**

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**Steam Boilers**

	Fuel	Naural Gas	Total
CO2	128525	57156	<b>185681.00</b>
CH4	2.7	1.08	<b>3.78</b>
N2O	0.27	0.11	<b>0.38</b>
<b>Total</b>			<b>185685.16</b>

**Steam Boilers**

	Emission Factor	GHG Mass Basis (metric)	GHG Mass Emissions		Short Tons X		CO2e metric	CO2e metric		CO2e short X 4
			TPY Metric X 4	Short tons	4	GWP		X 4	CO2e short 4	
CO2	53.02	185681.00	742724.00	204678.27	818713.07	1.00	185681.00	742724.00	204678.27	818713.07
CH4	1.00E-03	3.78	15.12	4.17	16.67	25.00	94.50	378.00	104.17	416.67
N2O	1.00E-04	0.38	1.52	0.42	1.68	298.00	113.24	452.96	124.83	499.30
<b>Total</b>								<b>743554.96</b>	<b>204907.26</b>	<b>819629.04</b>

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**Low Pressure Flare**

	Natural Gas Pilot	Low Pressure Flare each	
CO2	212	8094	8306
CH4	4.00E-03	24.43	24.434
N2O	4.00E-04	8.09E-02	0.0813
<b>Total</b>			<b>8330.52</b>

**Low Pressure Flare 1 or 2**

	Emission Factor	GHG Mass Basis (metric)	GHG Mass		GWP	CO2e	
			Short tons	X2		metric	CO2e short
CO2	53.02	8306.00	9155.80	18311.60	1	8306.00	9155.80
CH4	1.00E-03	24.43	26.93	53.87	25	610.85	673.35
N2O	1.00E-04	0.08	0.09	0.18	298	24.23	26.71
<b>Total</b>				<b>18365.64</b>			<b>9855.85</b>
<b>x2</b>							<b>19711.70</b>

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**OL3 Generator**

	Emission Factor	GHG Mass Basis (metric)	GHG Mass		GWP	CO2e	
			Short tons			CO2e metric	short
CO2	53.02	405	446.436081		1	405	446.44
CH4	1.00E-03	1.64E-02	0.01807791		25	0.41	0.45
N2O	1.00E-04	3.29E-03	0.0036266		298	0.98042	1.08
<b>Total</b>							<b>447.97</b>

	Emission Factor	GHG Mass			CO2e	
		Basis (metric)	Short tons	GWP	CO2e metric	short
<b>PDH Generator</b>						
CO2	53.02	405	446.436081	1	405	446.44
CH4	1.00E-03	0.02	0.02204623	25	0.5	0.55
N2O	1.00E-04	0	0	298	0	0.00
<b>Total</b>						<b>447.0</b>

**NG  
Fug  
OL3**

	Emission Factor	GHG Mass			CO2e	
		Basis (metric)	Short tons	GWP	CO2e metric	short
CO2	53.02		0.25	1		0.25
CH4	1.00E-03		4.58	25		114.5
N2O	1.00E-04					
<b>Total</b>						<b>114.75</b>

**NG  
Fug  
PDH**

	Emission Factor	GHG Mass			CO2e	
		Basis (metric)	Short tons	GWP	CO2e metric	short
CO2	53.02		0.25	1		0.25
CH4	1.00E-03		0.92	25		23
N2O	1.00E-04					
<b>Total</b>						<b>23.25</b>

**Decoking**

	Emission Factor	GHG Mass			CO2e	
		Basis (metric)	Short tons	GWP	CO2e metric	short
CO2	53.02	298	328.49	1	298	328.49
CH4	1.00E-03	0		25		
N2O	1.00E-04	0		298		
<b>Total</b>						<b>328.49</b>

**OL3 MSS Vessel Opening**

	Emission Factor	GHG Mass			CO2e	
		Basis (metric)	Short tons	GWP	CO2e metric	short
CO2	53.02					CO2e
CH4	1.00E-03					
N2O	1.00E-04					
<b>Total</b>					<b>49.6</b>	<b>54.67</b>

**PDH MSS Vessel Opening**

Emission Factor	GHG Mass Basis (metric)	Short tons	GWP	CO2e	
				metric	short
CO2	53.02				
CH4	1.00E-03				
N2O	1.00E-04				
<b>Total</b>				<b>8.36</b>	<b>9.22</b>

Total	
CO2	<b>2611625.12</b>
CH4	<b>472.24</b>
N2O	<b>7.88</b>
CO2e	<b>2625842.46</b>