

MEMORANDUM

TO: Michael Goldman
 FROM: David Harris
 SUBJECT: Landfill Gas Fired IC Engine with Oxidation Catalyst Emission Factors
 DATE: January 14, 2014
 cc: Kaitlin McNally, Ben Ellenberger

Background

J&A Santa Maria, LLC operates a landfill gas fired internal combustion cogeneration engine at the Marian Medical Center (2065 E. Main St., Santa Maria). The unit is a lean burn GE Jenbacher Type 3 Model J320 GS-C82 engine rated at 1,468 bhp. The engine is equipped with a Miratech OxiCat oxidation catalyst to reduce CO, ROC and toxic emissions. In April, 2013, Total Air Analysis, Inc. conducted source testing on this engine for several toxic pollutants in order to develop emission factors for use in a New Source Review Health Risk Assessment for a proposed second landfill gas fired IC engine at the Medical Center. The following toxic emission factors have been reviewed and approved by the District for landfill gas fired IC engines equipped with oxidation catalysts:

SBCAPCD Approved Emission Factors

Pollutant ^{1,3}	CAS	E.F. (lb/MMcf)
Benzene	71-43-2	9.48E-03
Benzo(a)anthracene	56-55-6	1.60E-06
Benzo(a)pyrene	50-32-8	2.70E-07
Benzo(b)fluoranthene	205-99-2	4.88E-07
Benzo(k)fluoranthene	207-08-9	2.70E-07
Carbon Tetrachloride	56-23-5	1.14E-04
Chloroform	67-66-3	1.13E-04
Chrysene	218-01-9	5.87E-06
Dibenz(a,h)anthracene	53-70-3	2.70E-07
Ethylene Dibromide	106-93-4	1.12E-04
Ethylene Dichloride ²	106-93-4	5.08E-03
Formaldehyde	50-00-0	1.49E+00
Hydrochloric Acid ²	7647-01-0	2.07E+00
Indeno(1,2,3-cd)pyrene	193-39-5	2.70E-07
Methyl Chloroform	71-55-6	1.11E-04
Methylene Chloride	75-09-2	1.30E-04
Naphtalene	91-20-3	7.38E-04
Perchloroethylene	127-18-4	5.84E-04
Trichloroethylene	79-01-6	1.49E-03
Vinyl Chloride	75-01-4	1.63E-04

Notes:

1. Emissions factors are from the attached source test. Emission factors for non-detect pollutants were set to the detection limit.
2. These pollutants were not included in the source test, but are included in the California Air Toxic Emissions Factors (CATEF) database for this source category. Therefore, the maximum CATEF emissions factors are utilized for these pollutants.
3. Only pollutants with health risk values are shown.

Attachments

1. Table 1.1 – Summary of Results – PAHs, Formaldehyde from *Marian Medical Center Toxics Source Test Report (April, 2013)*
2. Table 1.2 – Summary of Results – Toxics from *Marian Medical Center Toxics Source Test Report (April, 2013)*
3. Link to complete *Marian Medical Center Toxics Source Test Report (April, 2013)*:
[\\sbcapcd.org\toxics\Reference\SBAPCD Approved Toxics Emission Factors\Landfill Gas Fired IC Engines\Marian Medical Toxics Source Test Report \(4-12-2013\).pdf](https://sbcapcd.org/toxics/Reference/SBAPCD%20Approved%20Toxics%20Emission%20Factors/Landfill%20Gas%20Fired%20IC%20Engines/Marian%20Medical%20Toxics%20Source%20Test%20Report%20(4-12-2013).pdf)

1.1 SUMMARY OF RESULTS - PAHs, Formaldehyde

Facility: Marian Medical Center
Source: ICE - Landfill Gas
Load: Normal
Start Date: 4/12/2013

PAHs - CARB 429	ppmv	lb/hr	Lb/MMscf
Naphthalene	2.187E-03	1.07E-04	7.384E-04
Benzo (a) anthracene	2.654E-06	2.31E-07	1.596E-06
Chrysene	9.764E-06	8.51E-07	5.871E-06
Benzo (b) fluoranthene	7.353E-07	7.06E-08	4.880E-07
Benzo (k) fluoranthene	4.066E-07	3.89E-08	2.699E-07
Benzo (a) pyrene	4.061E-07	3.89E-08	2.699E-07
Indeno (1,2,3-cd) pyrene	3.712E-07	3.89E-08	2.699E-07
Dibenz (a,h) anthracene	3.681E-07	3.89E-08	2.699E-07
Formaldehyde	1.876E+01	2.142E-01	1.49E+00

Results are average of three samples

Non-Detect (nd) from Laboratory uses detection limit for calculations shown.

1.2 SUMMARY OF RESULTS - Toxics

Facility: Marian Medical Center
Source: ICE - Landfill Gas
Load: Normal
Start Date: 4/12/2013

Parameters	Exhaust		
	ppbv	lb/hr	Lb/MMscf
1,1,1-Trichloroethane	0.32	1.593E-05	1.11E-04
1,2-Dibromoethane (CAS# 106-93-4)	0.23	1.617E-05	1.12E-04
Benzene	46.00	1.365E-03	9.48E-03
Carbon tetrachloride	0.28	1.637E-05	1.14E-04
Chloroform	0.36	1.633E-05	1.13E-04
Methylene Chloride	0.50	1.874E-05	1.30E-04
Tetrachloroethene	1.25	7.897E-05	5.48E-04
Trichloroethene	4.31	2.144E-04	1.49E-03
Vinyl chloride	0.99	2.351E-05	1.63E-04

Results are average of three samples

Non-Detect (nd) from Laboratory uses detection limit for calculations shown.