Akimel Smoke Shop
GRIC Permit No. 17-###
Fuel Throughput & Emissions

DRAFT

				Uncontrolled VOC Emissions				Controlled VOC Emissions					Fugitive
Tank ID	Actual Throughput (gal)	Actual Throughput Per Tank [1] (gal)	Permitted Throughput [1] (gal)	Tank Working Losses [2] (lbs/yr)	Tank Breathing Losses [2] (lbs/yr)	Vehicle Filling Loss [3] (lbs/yr)	Total (lbs/yr)	Tank Working Losses [4] (lbs/yr)	Tank Breathing Losses [4] (lbs/yr)	Vehicle Filling Loss [5] (lbs/yr)	Total (lbs/yr)	Total (tons/yr)	Spillage VOC Emissions [6] (lbs/yr)
#1 Regular			6,500,000	15,694.58	0.00	71,500.00	87,194.58	1,569.46	0.00	17,875.00	19,444.46	9.72	4,550.00
#2 Premium			3,970,000	10,457.36	0.00	43,670.00	54,127.36	1,045.74	0.00	10,917.50	11,963.24	5.98	2,779.00
TOTAL Gasoline			**10,470,000**	**26,151.94**	**0.00**	**115,170.00**	**141,321.94**	**2,615.19**	**0.00**	**28,792.50**	**31,407.69**	**15.70**	**7,329.00**

Notes:

1. From permit application, rounded up to nearest 1,000 gallons
2. Uncontrolled VOC emissions calculated using EPA TANKS 4.01d software model with RVP 10 gasoline (working and breathing losses).
3. Displacement Loss = (Throughput * EF):

   Displacement loss VOC EF (uncontrolled) = 11 lb/1000 gal. Source: AP-42, Chapter 5, Table 5.2-7

   Displacement losses are from refilling vehicle fuel tanks.
4. An assumed control efficiency of **90%** is applied to the working loss portion of tank emissions only due to Stage I Vapor Recovery
5. An assumed control efficiency of **75%** is applied to vehicle filling loss due to use of Onboard Refueling Vapor Recovery (ORVR Efficiency Percentage for 2012 in Table 1 of EPA–HQ–OAR–2010–1076 published 5/16/12)
6. Spillage VOC Emissions = (Throughput * EF):

   Spillage VOC EF = 0.7 lb/1000 gal. Source: AP-42, Chapter 5, Table 5.2-7
7. Permitted Emissions Limits are determined by rounding up the calculated emissions as follows: a) to the nearest 0.5 lb for calculated emissions <10 lbs; b) to the nearest 1 lb for calculated emissions >10 lbs and <100 lbs; c) to the nearest 10 lbs for calculated emissions >100 lbs and <1,000 lbs; d) to the nearest 100 lbs for calculated emissions >1,000 lbs
8. HAP emissions from displacement losses = (ratios of the individual HAP emissions to the total VOC emissions from tank working losses as determined in Note 3) * (total VOC emissions from displacement losses). Displacement losses are controlled with ORVR

	Uncontrolled HAP Emissions				Controlled HAP Emissions			
HAP Compound	Tank 1 Working Losses [2] (lbs/yr)	Tank 2 Working Losses [2] (lbs/yr)	Vehicle Filling Loss [8] (lbs/yr)	Total (lbs/yr)	Tank 1 Working Losses [4] (lbs/yr)	Tank 2 Working Losses [4] (lbs/yr)	Vehicle Filling Loss [8] (lbs/yr)	Total (lbs/yr)
Hexane (-n)	87.14	58.06	639.44	784.64	8.71	5.81	159.86	174.38
Benzene	97.66	65.07	716.64	879.37	9.77	6.51	179.16	195.43
Toluene	111.72	74.44	819.83	1,005.99	11.17	7.44	204.96	223.57
Ethylbenzene	7.67	5.11	56.28	69.06	0.77	0.51	14.07	15.35
Xylene (-m)	32.05	21.35	235.17	288.57	3.21	2.14	58.79	64.13
Total HAPS	**336.24**	**224.03**	**2,467.36**	**3,027.63**	**33.62**	**22.40**	**616.84**	**672.87**

Permitted Emission Limits [7]	
Pollutant	lbs/yr
VOCs	31,500
HAPs	680

Emission Factors (lb/gal)	
VOCs	3.00E-03
HAPs	6.43E-05

Akimel Smoke Shop

DRAFT

GRIC Permit No. 17-###

COMPRESSION IGNITION GENERATORS 176-300 HP (Insignificant)

Operating Parameters

Unit ID	Generator Name (Manufacture Date)	Power (kW)	Power (hp)	Hours of Operation (annually)	Total hp-hrs	Total kW-hrs
ICE1	Emergency Generator (1/29/13)	200	268	100	26,800	20,000
					26,800	**20,000**

CRITERIA EMISSIONS

Pollutant	Notes	ICE1 Emissions			
		Emission Factor (g/hp-hr)	(lb/day) (4)	(lbs/yr) (5)	(tons/yr)
NOx	1	2.80	3.97E+01	1.65E+02	8.27E-02
VOC	1	0.1998	2.83E+00	1.18E+01	5.90E-03
CO	1	2.6	3.69E+01	1.54E+02	7.68E-02
SOx	2	0.00205	2.91E-02	1.21E-01	6.06E-05
PM10	1, 3	0.15	2.13E+00	8.86E+00	4.43E-03
PM	1, 3	0.15	2.13E+00	8.86E+00	4.43E-03

HAP EMISSIONS

Hazardous Air Pollutant	CAS Number	AP-42 Emission Factor (6)		ICE1 Emissions		
		(lb/MMBtu)	lb/hp-hr (7)	(lb/day) (4)	(lbs/yr) (5)	(tons/yr)
Benzene	71-43-2	9.33E-04	2.37E-06	1.53E-02	6.36E-02	3.18E-05
Toluene	108-88-3	4.09E-04	1.04E-06	6.69E-03	2.79E-02	1.39E-05
Xylene	1330-20-7	2.85E-04	7.25E-07	4.66E-03	1.94E-02	9.72E-06
Formaldehyde	50-00-0	1.18E-03	3.00E-06	1.93E-02	8.05E-02	4.02E-05
Acetaldehyde	75-07-0	7.67E-04	1.95E-06	1.26E-02	5.23E-02	2.62E-05
Acrolein	107-02-8	9.25E-05	2.35E-07	1.51E-03	6.31E-03	3.15E-06
Naphthalene	91-20-3	8.48E-05	2.16E-07	1.39E-03	5.78E-03	2.89E-06
Acenaphthylene	203-96-8	5.06E-06	1.29E-08	8.28E-05	3.45E-04	1.73E-07

HAP EMISSIONS

Hazardous Air Pollutant	CAS Number	AP-42 Emission Factor [6]		ICE1 Emissions		
		(lb/MMBtu)	lb/hp-hr [7]	(lb/day) [4]	(lbs/yr) [5]	(tons/yr)
Acenaphthene	83-32-9	1.42E-06	3.61E-09	2.32E-05	9.68E-05	4.84E-08
Fluorene	86-73-7	2.92E-05	7.43E-08	4.78E-04	1.99E-03	9.96E-07
Phenanathrene	85-01-8	2.94E-05	7.48E-08	4.81E-04	2.00E-03	1.00E-06
Anthracene	120-12-7	1.87E-06	4.76E-09	3.06E-05	1.28E-04	6.38E-08
Fluoranthene	204-44-0	7.61E-06	1.94E-08	1.25E-04	5.19E-04	2.59E-07
Pyrene	120-00-0	4.78E-06	1.22E-08	7.82E-05	3.26E-04	1.63E-07
Benz(a)anthracene	56-55-3	1.68E-06	4.27E-09	2.75E-05	1.15E-04	5.73E-08
Chrysene	218-01-9	3.53E-07	8.98E-10	5.78E-06	2.41E-05	1.20E-08
Benzo(b)fluoranthene	205-99-2	9.91E-08	2.52E-10	1.62E-06	6.76E-06	3.38E-09
Benzo(k)fluoranthene	205-82-3	1.55E-07	3.94E-10	2.54E-06	1.06E-05	5.28E-09
Benzo(a)pyrene	50-32-8	1.88E-07	4.78E-10	3.08E-06	1.28E-05	6.41E-09
Indeno(1,2,3-cd)pyrene	193-39-5	3.75E-07	9.54E-10	6.14E-06	2.56E-05	1.28E-08
Dibenzo(a,h)anthracene	53-70-3	5.83E-07	1.48E-09	9.54E-06	3.98E-05	1.99E-08
Benzo(g,h,i)perylene	191-24-2	4.89E-07	1.24E-09	8.00E-06	3.33E-05	1.67E-08
1,3-Butadiene	87-68-3	3.91E-05	9.95E-08	6.40E-04	2.67E-03	1.33E-06
			TOTAL:	**6.34E-02**	**2.64E-01**	**1.32E-04**

Notes:

1) Emission Factor Source: Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition, Report No. NR-009d (EPA-420-R-10-018), Tables 1 and 8, dated July 2010. Emission factor units in "g/hp-hr"

2) Emission Factor Source: AP-42 5th Ed., Chapter 3.3 Table 3.3-1, dated October 1996. Emission factor units in "lb/hp-hr"

3) Since particulate emissions from diesel fuel combustion are assumed to be less than 1.0 micrometer in diameter, PM and PM10 emissions are assumed to be the same, as stated in note b to Table 3.3-1 of AP-42, Section 3.3, Final Section, dated October 1996

4) Daily Emissions (lb/day) = Emission Factor (g/hp-hr) / 453g x Daily Operating Hours (hrs/day) x Generator Rating (hp) **or** Emission Factor (g/kW-hr) / 453.6 (g/lb) x Daily Operating Hours (hrs/day) x Generator Rating (kW)

5) Annual Emissions (lb/yr) = Emission Factor (lb/hp-hr) x Annual Operating Hours (hrs/yr) x Generator Rating (hp) **or** Emission Factor (g/kW-hr) x Annual Operating Hours (hrs/yr) x Generator Rating (kW)

6) Emission Factor Source: AP-42 5th Ed., Chapter 3.3 Table 3.3-2, dated October 1996

7) Emission Factor (lb/MMBTU) converted to Emission Factor (lb/hp-hr) based on 1 BTU = 0.000393 hp-hrs