

Emission Factors for Alternative Fueled Yard Hostlers
ICTF Modernization Project, Long Beach, CA

CHE Model Emission Factors (g/bhp-hr)										
Yard Hostler, 2012 Model Year										
Calendar			Annual							
Year	Fuel	HP	Usage	Load	ROG	CO	NOX	SOX	PM10	DPM
2012	LPG/LNG ⁽¹⁾	175	365	0.65	0.226	16.785	1.676	0.000	0.060	0.000
2012	B20 ⁽²⁾	175	365	0.65	0.093	2.451	2.356	0.060	0.009	0.009
2014	LPG/LNG ⁽¹⁾	175	365	0.65	0.324	17.414	1.869	0.000	0.060	0.000
2014	B20 ⁽²⁾	175	365	0.65	0.099	2.547	2.437	0.060	0.010	0.010
2016	LPG/LNG ⁽¹⁾	175	365	0.65	0.422	18.043	2.062	0.000	0.060	0.000
2016	B20 ⁽²⁾	175	365	0.65	0.106	2.643	2.518	0.060	0.011	0.011

Notes:

(1) LPG/LNG emission factors calculated using the CARB CHE spreadsheet model. The spreadsheet model is based on the OFFROAD model. The OFFROAD model does not distinguish between the 2 fuels.

(2) B20 = 20% plant-based biodiesel blend. B20 adjustment to diesel exhaust based on on-road diesel impacts from the 2002 EPA study, *A Comprehensive Analysis of Biodiesel Impacts on Exhaust Emissions* (EPA420-P-02-001).

Biodiesel Properties⁽¹⁾		
Property	Diesel (Federal)	Biodiesel (100%)
Fuel Standard	ASTM D975	ASTM D6751
Lower Heating Value, BTU/gal	~129,050	~118,170
Kinematic Viscosity, @40°C	1.3-4.1	4.0-6.0
Specific Gravity kg/l @60°F	0.85	0.88
Density, lb/gal @15°C	7.079	7.328
Water and Sediment, vol%	0.05 max	0.05 max
Carbon, wt%	87	77
Hydrogen, wt%	13	12
Oxygen, by dif. wt%	0	11
Sulfur, wt%	0.05 max	0.0 to 0.0024
Boiling Point, °C	180 - 340	315 - 350
Flash Point, °C	60 to 80	100 to 170
Cloud Point, °C	-15 to 5	-3 to 12
Pour Point, °C	-35 to -15	-15 to 10
Cetane Number	40-55	48-65
Lubricity SLBOCLE, grams	2000-5000	>7000
Lubricity HFRR, microns	300-600	<300

Notes:

(1) Source: *2004 Biodiesel Handling and Use Guidelines*, DOE/GO-102004-1999, U.S. Department of Energy, October 2004.

Properties of LNG/LPG⁽¹⁾

Property	LPG	LNG
Carbon, wt%	82	75
Hydrogen, wt%	18	25
Specific Gravity kg/l @60°F	0.508	0.424
Density, lb/gal @60°F	4.22	1.07
Boiling Point, °F	-44	-259
Reid vapor pressure, psi	208	2,400
Freezing Point, °F	-305.8	-296
Flash Point, closed cup, °F	-100 to -150	-300
Autoignition temperature, °F	850-950	1,004
Flammability limit, lower, vol%	2.2	5.3
Flammability limit, higher, vol%	9.5	15.0

Notes:

(1) Source: *Alternatives to Traditional Transportation Fuels: An Overview*, DOE/EIA-0585/O, U.S. Department of Energy, June 1994.