



Team Results for Clean Snowmobile Challenge 2017 Team 12



2017 Clean Snowmobile Competition - Lab Emission Event Emission Data Sheet

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Test Date       : 2017/03/08 17:11:36
Team Name      : Buffalo
Team Number    : 12
Model          : Polaris
Engine         : Polaris
Displacement[cc] : 700.00
100% Speed     : 6453
100% Torque    : 68.5
No of Strokes  : 4
Fuel           : Gasoline           H/C: 2.38       O/C: 0.24
  
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ModeNum	:	1	2	3	4	5	RMC
Weighting	:	0.12	0.27	0.25	0.31	0.05	1.00
Power kW	:	41.7	20.3	11.5	5.7	0.0	12.5
HC_m g/hr	:	184.42	113.81	21.97	14.35	50.28	26.50
CO_m g/hr	:	14954.00	8698.93	326.64	192.96	13.28	2883.10
NOx_m g/hr	:	65.40	31.19	130.01	44.65	1.64	77.04
Soot_m mg/hr	:	163.03	50.83	46.99	42.95	1.84	74.99
N2O_m mg/hr	:	0.62	0.36	0.05	0.03	0.00	0.14
CO2_m g/hr	:	39765.22	20675.25	17076.53	11040.84	2273.46	19682.93
CH4_m g/hr	:	41.25	16.59	3.32	1.84	0.54	8.31
W_HC g/hr	:	22.13	30.73	5.49	4.45	2.51	26.50
W_CO g/hr	:	1794.48	2348.71	81.66	59.82	0.66	2883.10
W_NOx g/hr	:	7.85	8.42	32.50	13.84	0.08	77.04
W_HCNOx g/hr	:	29.98	39.15	38.00	18.29	2.60	103.54
W_Soot mg/hr	:	19.56	13.72	11.75	13.31	0.09	74.99
W_N2O g/hr	:	0.07	0.10	0.01	0.01	0.00	0.14
W_CO2 g/hr	:	4771.83	5582.32	4269.13	3422.66	113.67	19682.93
W_CH4 g/hr	:	4.95	4.48	0.83	0.57	0.03	8.31

Total Weighted Power [kW] 15.099

Weighted Emissions

	HC	CO	NOx	HC+NOx
Total Mass [g/hr]	65.32	4285.33	62.69	128.01
Specific Mass [g/kW-hr]	4.33	283.81	4.15	8.48
BSFC [g/kW-hr]	541.3			

Total Soot [mg/hr] 58.44 Specific Soot [mg/kW-hr] 3.87

Not Used for Competition

Total N2O [mg/hr]	0.19	Specific N2O [mg/kW-hr]	0.01
Total CO2 [g/hr]	18159.61	Specific CO2 [g/kW-hr]	1202.67
Total CH4 [g/hr]	10.86	Specific CH4 [g/kW-hr]	0.72
RMC BSFC [g/kW-hr]	638.29		

EMISSION TESTS:

	Value	Limit	Result
Power	46.29	<96.94 kW	PASS
Soot	3.87	<50 mg/kW-hr	PASS
CO	283.81	<275 g/kW-hr	FAIL
HC + NOX	8.48	<90 g/kW-hr	PASS
E-Score	133.40	>175	FAIL
Valid Data for All 5 Modes			PASS
RMC			PASS
LAB EMISSION TEST			FAIL



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Modal Raw Data : Engine / Environmental

ModeNum		1	2	3	4	5	RMC
Total Points	points	600	1200	655	1200	1200	12032
PtsInMode	points	1210	3050	2720	3470	1480	12032
Speed	rpm	6448.19	5541.53	4840.95	4193.01	1292.20	4593.75
Torque	Nm	61.72	34.95	22.60	12.92	0.00	25.91
Power	kW	41.68	20.28	11.46	5.67	0.00	12.46
BSFC	g/kw-hr	501.44	560.09	504.59	657.38	**	638.29
Fuel	g/hr	20897.85	11358.69	5781.33	3728.69	801.50	7954.46
T_int	degC	24.26	16.47	15.99	13.90	23.25	17.62
RelHumid	%	24.54	26.14	28.13	23.81	25.64	25.28
Baro	in Hg	28.64	28.66	28.65	28.65	28.65	28.65
Baro	mmHg	727.50	727.86	727.71	727.61	727.74	727.65
Pvap_kPa	kPa	0.61	0.43	0.45	0.34	0.61	0.44
Pvap_inHg	inHg	0.18	0.13	0.13	0.10	0.18	0.13
AbsHumidity	grains/lb	27.73	19.22	20.14	15.13	27.43	19.85
SatPres	kPa	96.38	96.61	96.57	96.67	96.42	96.57
Hum Factor		0.82	0.79	0.80	0.78	0.82	0.79
F_fac		1.03	1.00	1.00	1.00	1.02	1.01
K_fac		1.04	1.02	1.02	1.02	1.04	1.03
Humidity	g/kg	3.96	2.75	2.88	2.16	3.92	2.84
H2		2.73	3.04	0.15	0.14	0.03	1.07
WetDry Factor		0.84	0.84	0.84	0.84	0.88	1.00



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Modal Emissions Concentrations

ModeNum		1	2	3	4	5	RMC
THC	ppmC1	1242.13	1429.68	484.12	494.28	6321.14	423.78
CO	%	5.18	5.62	0.37	0.34	0.09	2.37
N2O	ppm	13.64	14.89	3.47	2.95	0.56	7.29
CH4	ppm	250.25	187.69	65.82	57.07	61.01	119.71
CO2	%	8.77	8.50	12.32	12.45	9.36	10.31
O2	%	0.00	0.00	0.18	0.32	5.34	1.10
CNOx	ppm	137.98	122.72	897.21	481.55	64.56	385.89
AHC	ppm	18.49	31.96	5.62	5.15	2.40	15.13
C2H2	ppm	25.67	25.57	11.34	16.60	6.59	18.03
C2H4	ppm	141.89	115.86	48.63	44.63	118.61	84.15
C3H6	ppm	18.15	20.45	7.66	7.07	15.26	13.45
C4H6	ppm	5.70	6.25	1.22	1.43	2.63	3.56
ETOH	ppm	43.18	71.94	26.47	31.36	1433.51	124.53
H2O	%	16.13	16.16	16.43	16.07	12.09	0.01
HCHO	ppm	8.40	6.53	13.84	15.80	86.20	19.21
HCN	ppm	3.68	6.15	3.91	2.97	0.27	3.91
HNCO	ppm	3.88	3.09	4.83	3.98	10.50	4.01
MECHO	ppm	34.74	36.41	15.24	14.45	182.54	46.77
NC5	ppm	13.19	38.53	6.53	6.96	300.12	42.47
NH3	ppm	112.64	113.60	10.30	7.77	0.00	54.13
NO	ppm	169.28	155.71	1125.39	617.18	62.77	485.49
NO2	ppm	0.52	0.37	0.36	0.44	17.61	1.37
Soot	mg/m3	0.69	0.40	0.60	0.85	0.14	0.72
AFR	:1	8.90	8.71	11.03	11.10	12.68	10.76



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Measurement Accuracy (SAE paper 961804)

ModeNum	H2_XLS %	ModalHC_Dry %	ModalFTIR_H2O %	N2 %	Ar %	AFR :1	Tr_Eff -
1	3.257	0.148	16.127	80.421	0.930	12.562	1.000
2	3.620	0.171	16.163	80.302	0.928	12.339	1.000
3	0.179	0.058	16.425	87.280	1.009	15.203	0.991
4	0.164	0.059	16.074	87.384	1.010	15.299	0.984
5	0.039	0.719	12.095	84.876	0.981	19.328	0.733

ModeNum	ModalWHC %	ModalC1 %	ModalC8 %	ModalSUM_HC %	ModalT_Emiss %	ModalError %
1	184.418	0.148	0.019	0.167	101.429	1.429
2	113.813	0.171	0.021	0.192	101.909	1.909
3	21.973	-0.085	-0.011	-0.095	103.911	3.911
4	14.354	-0.189	-0.024	-0.212	104.040	4.040
5	50.280	-2.344	-0.293	-2.637	100.081	0.081

Power Run

Team 12

TeamNumber	12
TeamName	Buffalo
Model	Polaris
Engine	Polaris

Displacement cc	700.00
RatedSpeed	6453
RatedTorque	68.5

