



# Team Results for Clean Snowmobile Challenge 2016 Team 8



## 2016 Clean Snowmobile Competition - Lab Emission Event Emission Data Sheet

Test Date : 2016/03/11 08:24:04  
Team Name : Iowa  
Team Number : 8  
Model : Polaris  
Engine : Polaris  
Displacement[cc] : 795.00  
100% Speed : 6500  
100% Torque : 89.9  
No of Strokes : 2  
Fuel : GASOLINE H/C: 2.00 O/C: 0.03

ModeNum	:	1	2	3	4	5	RMC
Weighting	:	0.12	0.27	0.25	0.31	0.05	1.00
Power kW	:	55.6	26.6	15.0	7.7	0.0	16.9
HC_m g/hr	:	224.73	25.95	48.08	31.01	23.41	19.11
CO_m g/hr	:	7116.29	146.66	69.33	25.61	1102.88	524.29
NOx_m g/hr	:	126.54	161.02	26.33	5.02	0.07	58.19
Soot_m mg/hr	:	651.97	79.36	17.57	1.58	0.69	68.88
N2O_m mg/hr	:	0.19	0.03	0.00	0.00	0.03	0.02
CO2_m g/hr	:	56574.96	26965.40	17852.60	12002.50	3645.26	22645.18
CH4_m g/hr	:	56.66	3.69	3.71	2.46	4.42	6.83
W_HC g/hr	:	26.97	7.01	12.02	9.61	1.17	19.11
W_CO g/hr	:	853.96	39.60	17.33	7.94	55.14	524.29
W_NOx g/hr	:	15.18	43.47	6.58	1.56	0.00	58.19
W_HCNOx g/hr	:	42.15	50.48	18.60	11.17	1.17	77.30
W_Soot mg/hr	:	78.24	21.43	4.39	0.49	0.03	68.88
W_N2O g/hr	:	0.02	0.01	0.00	0.00	0.00	0.02
W_CO2 g/hr	:	6788.99	7280.66	4463.15	3720.77	182.26	22645.18
W_CH4 g/hr	:	6.80	1.00	0.93	0.76	0.22	6.83

Total Weighted Power [kW] 19.993

### Weighted Emissions

	HC	CO	NOx	HC+NOx
Total Mass [g/hr]	56.78	973.97	66.80	123.58
Specific Mass [g/kW-hr]	2.84	48.72	3.34	6.18
BSFC [g/kW-hr]	387.2			

Total Soot [mg/hr] 104.58 Specific Soot [mg/kW-hr] 5.23

### Not Used for Competition

Total N2O [mg/hr]	0.03	Specific N2O [mg/kW-hr]	0.00
Total CO2 [g/hr]	22435.84	Specific CO2 [g/kW-hr]	1122.20
Total CH4 [g/hr]	9.71	Specific CH4 [g/kW-hr]	0.49
RMC BSFC [g/kW-hr]	443.92		

### EMISSION TESTS:

	Value	Limit	Result
Power	61.18	<96.94 kW	PASS
Soot	5.23	<50 mg/kW-hr	PASS
CO	48.72	<275 g/kW-hr	PASS
HC + NOX	6.18	<90 g/kW-hr	PASS
E-Score	193.70	>175	PASS
Valid Data for All 5 Modes			PASS
RMC			PASS
LAB EMISSION TEST			PASS



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## Modal Raw Data : Engine / Environmental

ModeNum		1	2	3	4	5	RMC
Total Points	points	600	1200	1200	1200	1200	12032
PtsInMode	points	1210	3050	2720	3470	1480	12032
Speed	rpm	6500.46	5525.27	4876.22	4225.87	1863.96	4769.90
Torque	Nm	81.74	45.91	29.43	17.40	0.00	33.82
Power	kW	55.64	26.56	15.03	7.70	0.00	16.89
BSFC	g/kw-hr	392.09	327.26	384.13	502.37	**	443.92
Fuel	g/hr	21817.10	8692.64	5772.01	3868.75	1737.29	7498.13
T_int	degC	21.96	21.04	21.02	21.48	20.70	21.13
RelHumid	%	37.14	31.47	30.25	31.27	30.53	32.00
Baro	in Hg	29.13	29.12	29.12	29.13	29.12	29.12
Baro	mmHg	739.78	739.74	739.75	739.79	739.68	739.77
Pvap_kPa	kPa	0.82	0.66	0.63	0.67	0.63	0.68
Pvap_inHg	inHg	0.24	0.20	0.19	0.20	0.19	0.20
AbsHumidity	grains/lb	36.54	29.41	28.22	29.93	28.00	30.05
SatPres	kPa	97.81	97.96	97.99	97.96	97.98	97.95
Hum Factor		1.00	1.00	1.00	1.00	1.00	1.00
F_fac		1.01	1.00	1.00	1.00	1.00	1.00
K_fac		1.02	1.01	1.01	1.02	1.01	1.01
Humidity	g/kg	5.22	4.20	4.03	4.28	4.00	4.29
H2		0.83	0.04	0.02	0.01	1.99	0.15
WetDry Factor		0.86	0.87	0.87	0.87	0.88	1.00



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## Modal Emissions Concentrations

ModeNum		1	2	3	4	5	RMC
THC	ppmC1	1395.27	381.40	1026.26	980.74	1988.47	320.66
CO	%	2.21	0.11	0.07	0.04	4.69	0.44
N2O	ppm	3.71	1.32	0.16	0.05	9.22	1.09
CH4	ppm	308.35	47.57	69.44	68.28	329.28	100.44
CO2	%	11.19	12.63	12.14	12.10	9.87	12.11
O2	%	0.06	1.00	1.78	1.81	0.09	1.50
CNOx	ppm	239.51	721.52	171.32	48.38	1.69	297.72
AHC	ppm	29.37	3.60	8.93	8.52	41.06	15.52
C2H2	ppm	115.61	29.81	16.83	9.23	8.62	32.06
C2H4	ppm	140.46	57.32	162.86	128.75	123.98	118.68
C3H6	ppm	5.16	5.57	40.93	42.79	39.93	26.99
C4H6	ppm	4.36	1.95	8.13	7.68	1.93	5.91
ETOH	ppm	0.59	3.87	3.49	3.91	4.35	4.14
H2O	%	13.92	13.19	12.68	12.61	12.48	0.00
HCHO	ppm	7.13	17.78	66.12	56.22	6.99	35.72
HCN	ppm	7.49	5.14	0.98	0.50	0.75	2.76
HNCO	ppm	3.91	6.01	2.44	2.40	0.04	3.48
MECHO	ppm	0.46	0.59	12.56	11.97	0.05	6.92
NC5	ppm	3.08	1.56	12.74	21.61	137.99	16.63
NH3	ppm	17.77	0.19	0.01	0.02	5.78	2.53
NO	ppm	237.88	710.58	151.28	38.94	0.36	288.55
NO2	ppm	1.21	10.76	20.11	9.43	1.37	9.27
Soot	mg/m3	2.46	0.67	0.21	0.03	0.04	0.66
AFR	:1	12.72	14.68	15.06	15.12	11.61	14.91



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Measurement Accuracy (SAE paper 961804)

ModeNum	H2_XLS %	ModalHC_Dry %	ModalFTIR_H2O %	N2 %	Ar %	AFR :1	Tr_Eff -
1	0.962	0.162	13.917	79.337	0.917	13.583	0.997
2	0.042	0.044	13.188	83.317	0.963	15.446	0.949
3	0.028	0.118	12.682	83.081	0.960	16.012	0.910
4	0.015	0.112	12.614	82.775	0.957	16.067	0.908
5	2.273	0.227	12.480	75.525	0.873	12.468	0.995

ModeNum	ModalWHC %	ModalC1 %	ModalC8 %	ModalSUM_HC %	ModalT_Emiss %	ModalError %
1	224.731	0.116	0.014	0.130	97.014	2.986
2	25.948	-0.701	-0.088	-0.788	99.440	0.560
3	48.084	-1.150	-0.144	-1.294	98.820	1.180
4	31.006	-1.171	-0.146	-1.318	98.400	1.600
5	23.406	0.147	0.018	0.166	95.580	4.420

# Power Run

Team 8

TeamNumber	8
TeamName	Iowa
Model	Polaris
Engine	Polaris

Displacement cc	795.00
RatedSpeed	6500
RatedTorque	89.9

