



Team Results for Clean Snowmobile Challenge 2015 Team 8



2015 Clean Snowmobile Competition - Lab Emission Event Emission Data Sheet

```

Test Date       : 2015/03/05 13:25:18
Team Name      : Duluth
Team Number    : 8
Model         : Yamaha
Engine        : 130FI
Displacement[cc] : 1049.00
100% Speed    : 9067
100% Torque   : 75.5
No of Strokes : 4
Fuel          : GASOLINE           H/C: 1.92       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	:	70.7	31.0	17.8	8.3	0.0	20.7
HC_m g/hr	:	244.45	28.28	0.73	7.62	30.66	15.92
CO_m g/hr	:	12425.38	1252.07	13.17	179.86	743.03	1546.50
NOx_m g/hr	:	66.89	5.80	27.32	1.44	0.02	14.04
Soot_m mg/hr	:	27.61	4.70	1.52	14.31	0.53	14.44
N2O_m mg/hr	:	0.37	0.04	0.01	0.00	0.02	0.05
CO2_m g/hr	:	48170.21	34393.80	26281.90	15838.98	3137.07	27366.95
CH4_m g/hr	:	30.81	14.27	0.57	3.89	9.07	12.94
W_HC g/hr	:	29.33	7.64	0.18	2.36	1.53	15.92
W_CO g/hr	:	1491.05	338.06	3.29	55.76	37.15	1546.50
W_NOx g/hr	:	8.03	1.57	6.83	0.45	0.00	14.04
W_HCNOx g/hr	:	37.36	9.20	7.01	2.81	1.53	29.96
W_Soot mg/hr	:	3.31	1.27	0.38	4.44	0.03	14.44
W_N2O g/hr	:	0.04	0.01	0.00	0.00	0.00	0.05
W_CO2 g/hr	:	5780.43	9286.33	6570.47	4910.08	156.85	27366.95
W_CH4 g/hr	:	3.70	3.85	0.14	1.21	0.45	12.94

Total Weighted Power [kW] 23.869

Weighted Emissions

	HC	CO	NOx	HC+NOx
Total Mass [g/hr]	41.05	1925.30	16.87	57.92
Specific Mass [g/kW-hr]	1.72	80.66	0.71	2.43
BSFC [g/kW-hr]	446.7			

Total Soot [mg/hr] 9.42 Specific Soot [mg/kW-hr] 0.39

Not Used for Competition

Total N2O [mg/hr]	0.06	Specific N2O [mg/kW-hr]	0.00
Total CO2 [g/hr]	26704.16	Specific CO2 [g/kW-hr]	1118.79
Total CH4 [g/hr]	9.35	Specific CH4 [g/kW-hr]	0.39
RMC BSFC [g/kW-hr]	456.11		

EMISSION TESTS:

	Value	Limit	Result
Power	71.64	<96.94 kW	PASS
Soot	0.39	<100 mg/kW-hr	PASS
CO	80.66	<275 g/kW-hr	PASS
HC + NOX	2.43	<90 g/kW-hr	PASS
E-Score	188.22	>100	PASS
Valid Data for All 5 Modes			PASS

LAB EMISSION TEST PASS



**Team Results for
Clean Snowmobile Challenge 2015
Team 8**



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	9066.23	7706.48	6799.25	5501.09	1658.06	6629.23
Torque	Nm	74.49	38.45	24.95	14.34	0.00	29.88
Power	kW	70.72	31.03	17.77	8.26	0.00	20.74
BSFC	g/kw-hr	306.86	372.34	469.29	619.35	**	456.11
Fuel	g/hr	21702.02	11554.10	8338.18	5117.88	1395.13	9460.99
T_int	degC	19.55	23.29	20.78	21.94	16.14	20.95
RelHumid	%	19.83	16.95	15.10	15.67	14.89	16.63
Baro	in Hg	29.17	29.16	29.16	29.17	29.16	29.16
Baro	mmHg	740.86	740.72	740.69	740.82	740.68	740.78
Pvap_kPa	kPa	0.38	0.40	0.31	0.35	0.24	0.35
Pvap_inHg	inHg	0.11	0.12	0.09	0.10	0.07	0.10
AbsHumidity	grains/lb	17.00	17.82	13.84	15.31	10.55	15.39
SatPres	kPa	98.39	98.35	98.44	98.42	98.51	98.41
Hum Factor		0.79	0.79	0.78	0.78	0.77	0.78
F_fac		0.99	1.00	1.00	1.00	0.98	1.00
K_fac		1.01	1.02	1.01	1.01	1.00	1.01
Humidity	g/kg	2.43	2.55	1.98	2.19	1.51	2.20
H2		1.63	0.25	0.00	0.08	1.54	0.37
WetDry Factor		0.87	0.86	0.87	0.87	0.88	1.00



**Team Results for
Clean Snowmobile Challenge 2015
Team 8**



Modal Emissions Concentrations

ModeNum		1	2	3	4	5	RMC
THC	ppmC1	1625.72	334.37	11.19	202.79	3251.21	227.99
CO	%	4.12	0.74	0.01	0.24	3.92	1.10
N2O	ppm	7.85	1.38	0.71	0.42	7.59	2.26
CH4	ppm	178.67	147.16	7.66	90.23	838.10	161.58
CO2	%	10.15	12.89	12.81	13.36	10.54	12.42
O2	%	0.00	0.00	1.16	0.00	0.00	0.29
CNOx	ppm	134.90	20.80	127.34	11.62	0.63	60.98
AHC	ppm	70.55	4.87	0.00	1.78	107.38	21.75
C2H2	ppm	8.00	3.50	2.16	1.70	5.05	4.18
C2H4	ppm	104.56	26.23	1.90	15.35	197.01	51.44
C3H6	ppm	47.98	4.91	0.62	3.64	67.84	16.24
C4H6	ppm	20.17	2.56	0.91	1.95	5.13	4.34
ETOH	ppm	8.82	1.32	1.57	1.15	1.93	2.31
H2O	%	13.45	13.59	12.81	13.31	12.42	0.00
HCHO	ppm	2.76	0.55	0.94	0.49	2.88	1.44
HCN	ppm	40.13	1.62	0.46	0.95	1.24	5.81
HNCO	ppm	6.95	1.86	1.54	1.23	0.03	1.85
MECHO	ppm	2.76	0.08	0.05	0.05	0.00	0.45
NC5	ppm	36.63	0.99	0.11	2.12	90.27	12.81
NH3	ppm	418.26	39.13	0.76	16.99	54.12	65.26
NO	ppm	171.15	25.26	160.55	13.68	0.08	76.73
NO2	ppm	0.57	1.14	3.38	1.22	0.93	1.35
Soot	mg/m3	0.11	0.03	0.01	0.22	0.03	0.12
AFR	:1	11.76	13.56	14.84	13.82	11.49	13.63



**Team Results for
Clean Snowmobile Challenge 2015
Team 8**



Measurement Accuracy (SAE paper 961804)

ModeNum	H2_XLS %	ModalHC_Dry %	ModalFTIR_H2O %	N2 %	Ar %	AFR :1	Tr_Eff -
1	1.888	0.188	13.447	77.537	0.896	12.587	1.000
2	0.284	0.039	13.588	82.361	0.952	14.266	1.000
3	0.004	0.001	12.807	83.453	0.965	15.537	0.941
4	0.089	0.023	13.305	82.602	0.955	14.512	1.000
5	1.754	0.371	12.421	76.221	0.881	12.564	1.000

ModeNum	ModalWHC %	ModalC1 %	ModalC8 %	ModalSUM_HC %	ModalT_Emiss %	ModalError %
1	244.450	0.188	0.023	0.211	97.039	2.961
2	28.279	0.039	0.005	0.044	99.415	0.585
3	0.728	-0.861	-0.108	-0.969	99.498	0.502
4	7.619	0.023	0.003	0.026	99.363	0.637
5	30.664	0.371	0.046	0.418	95.792	4.208

Power Run

Team 8

TeamNumber	8
TeamName	Duluth
Model	Yamaha
Engine	130FI

Displacement cc	1049.00
RatedSpeed	9067
RatedTorque	75.5

