



# Team Results for Clean Snowmobile Challenge 2017 Team 10



## 2017 Clean Snowmobile Competition - Lab Emission Event Emission Data Sheet

Test Date : 2017/03/09 09:51:11  
Team Name : Rochester  
Team Number : 10  
Model : Polaris  
Engine : Polaris  
Displacement[cc] : 750.00  
100% Speed : 5349  
100% Torque : 42.8  
No of Strokes : 4  
Fuel : Gasoline H/C: 2.38 O/C: 0.24

ModeNum	:	1	2	3	4	5	RMC
Weighting	:	0.12	0.27	0.25	0.31	0.05	1.00
Power kW	:	25.5	10.3	6.0	3.5	0.0	7.7
HC_m g/hr	:	286.56	57.51	26.94	12.69	122.67	22.20
CO_m g/hr	:	5933.97	262.61	159.28	101.23	77.19	516.36
NOx_m g/hr	:	162.81	115.50	32.29	10.08	1.30	55.79
Soot_m mg/hr	:	256.21	7.45	11.81	2.24	0.02	24.11
N2O_m mg/hr	:	0.24	0.03	0.02	0.01	0.00	0.03
CO2_m g/hr	:	23299.94	13670.75	10416.10	8708.02	3860.41	12500.13
CH4_m g/hr	:	26.05	3.25	1.61	0.80	1.75	3.65
W_HC g/hr	:	34.39	15.53	6.74	3.93	6.13	22.20
W_CO g/hr	:	712.08	70.90	39.82	31.38	3.86	516.36
W_NOx g/hr	:	19.54	31.18	8.07	3.13	0.06	55.79
W_HCNOx g/hr	:	53.92	46.71	14.81	7.06	6.20	78.00
W_Soot mg/hr	:	30.75	2.01	2.95	0.70	0.00	24.11
W_N2O g/hr	:	0.03	0.01	0.00	0.00	0.00	0.03
W_CO2 g/hr	:	2795.99	3691.10	2604.03	2699.49	193.02	12500.13
W_CH4 g/hr	:	3.13	0.88	0.40	0.25	0.09	3.65

Total Weighted Power [kW] 8.420

### Weighted Emissions

	HC	CO	NOx	HC+NOx
Total Mass [g/hr]	66.72	858.04	61.99	128.70
Specific Mass [g/kW-hr]	7.92	101.90	7.36	15.29
BSFC [g/kW-hr]	582.0			

Total Soot [mg/hr] 36.41 Specific Soot [mg/kW-hr] 4.32

### Not Used for Competition

Total N2O [mg/hr]	0.04	Specific N2O [mg/kW-hr]	0.01
Total CO2 [g/hr]	11983.63	Specific CO2 [g/kW-hr]	1423.21
Total CH4 [g/hr]	4.74	Specific CH4 [g/kW-hr]	0.56
RMC BSFC [g/kW-hr]	571.70		

### EMISSION TESTS:

	Value	Limit	Result
Power	23.95	<96.94 kW	PASS
Soot	4.32	<50 mg/kW-hr	PASS
CO	101.90	<275 g/kW-hr	PASS
HC + NOX	15.29	<90 g/kW-hr	PASS
E-Score	174.33	>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	1200	1200	1200	12032
PtsInMode	points	1210	3050	2720	3470	1480	12032
Speed	rpm	5348.60	4547.39	4013.07	3478.91	2037.39	4005.63
Torque	Nm	45.60	21.68	14.23	9.50	0.00	18.27
Power	kW	25.54	10.32	5.98	3.46	0.00	7.66
BSFC	g/kw-hr	429.45	452.20	588.49	842.84	**	571.70
Fuel	g/hr	10968.36	4668.78	3519.40	2916.00	1426.38	4380.72
T_int	degC	14.81	13.85	13.55	14.74	14.04	14.41
RelHumid	%	17.17	15.71	14.84	16.34	15.06	16.06
Baro	in Hg	29.01	29.01	29.01	29.02	29.01	29.01
Baro	mmHg	736.91	736.98	736.89	737.02	736.94	736.96
Pvap_kPa	kPa	0.25	0.22	0.20	0.24	0.21	0.23
Pvap_inHg	inHg	0.08	0.07	0.06	0.07	0.06	0.07
AbsHumidity	grains/lb	11.34	9.82	9.11	10.74	9.51	10.36
SatPres	kPa	97.99	98.03	98.04	98.02	98.04	98.02
Hum Factor		0.77	0.77	0.76	0.77	0.76	0.77
F_fac		0.99	0.98	0.98	0.99	0.98	0.99
K_fac		1.01	1.01	1.01	1.01	1.01	1.01
Humidity	g/kg	1.62	1.40	1.30	1.53	1.36	1.48
H2		1.89	0.14	0.11	0.08	0.11	0.30
WetDry Factor		0.84	0.85	0.85	0.86	0.89	1.00



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## Modal Emissions Concentrations

ModeNum		1	2	3	4	5	RMC
THC	ppmC1	3619.77	1514.28	919.43	480.81	8466.08	596.73
CO	%	3.86	0.36	0.28	0.20	0.27	0.71
N2O	ppm	9.86	2.83	2.05	1.06	0.56	2.79
CH4	ppm	296.39	77.04	49.62	27.21	108.96	88.25
CO2	%	9.64	11.79	11.64	10.81	8.72	11.00
O2	%	0.17	1.39	1.69	3.15	6.10	2.48
CNOx	ppm	644.20	952.56	345.17	119.70	28.01	469.71
AHC	ppm	33.70	13.88	7.92	2.31	0.00	11.33
C2H2	ppm	94.41	57.41	42.64	19.19	36.00	47.47
C2H4	ppm	238.06	189.33	137.49	77.51	380.31	167.31
C3H6	ppm	57.31	29.16	18.36	8.48	79.04	28.10
C4H6	ppm	10.13	6.79	4.41	2.04	12.97	5.76
ETOH	ppm	338.14	56.50	23.27	16.85	1626.39	162.13
H2O	%	15.79	15.12	14.87	13.70	11.23	0.02
HCHO	ppm	42.06	88.65	60.91	37.39	205.97	71.83
HCN	ppm	5.82	13.44	7.56	1.58	0.34	6.83
HNCO	ppm	9.61	13.35	11.11	6.45	10.36	11.55
MECHO	ppm	80.97	54.03	29.44	18.21	208.50	53.06
NC5	ppm	112.54	10.54	4.34	2.19	378.24	41.03
NH3	ppm	3.65	0.48	0.20	0.21	0.00	0.77
NO	ppm	838.33	1237.51	442.21	150.78	28.51	606.66
NO2	ppm	0.18	6.38	9.78	6.19	8.16	6.10
Soot	mg/m3	1.99	0.11	0.23	0.05	0.00	0.37
AFR	:1	8.98	11.46	11.85	13.08	12.40	12.28



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Measurement Accuracy (SAE paper 961804)

ModeNum	H2_XLS %	ModalHC_Dry %	ModalFTIR_H2O %	N2 %	Ar %	AFR :1	Tr_Eff -
1	2.244	0.430	15.795	81.409	0.941	13.115	0.991
2	0.170	0.178	15.118	86.918	1.005	16.025	0.930
3	0.132	0.108	14.870	86.600	1.001	16.365	0.915
4	0.092	0.056	13.699	86.114	0.995	17.825	0.841
5	0.125	0.954	11.234	83.608	0.966	19.710	0.695

ModeNum	ModalWHC %	ModalC1 %	ModalC8 %	ModalSUM_HC %	ModalT_Emiss %	ModalError %
1	286.556	0.286	0.036	0.322	101.242	1.242
2	57.511	-0.841	-0.105	-0.946	103.236	3.236
3	26.945	-1.095	-0.137	-1.232	102.536	2.536
4	12.687	-1.976	-0.247	-2.223	101.402	1.402
5	122.669	-2.432	-0.304	-2.736	98.978	1.022

# Power Run

Team 10

TeamNumber	10
TeamName	Rochester
Model	Polaris
Engine	Polaris

Displacement cc	750.00
RatedSpeed	5349
RatedTorque	42.8

