



Team Results for Clean Snowmobile Challenge 2018 Team 16



2018 Clean Snowmobile Competition - Lab Emission Event Emission Data Sheet

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Test Date       : 2018/03/06 17:55:22
Team Name      : Ferris
Team Number    : 16
Model         : Polaris
Engine        :
Displacement[cc] : 795.00
100% Speed    : 6082
100% Torque   : 57.6
No of Strokes : 2
Fuel          : GASOLINE           H/C: 2.04       O/C: 0.07
  
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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 :	23.1	15.9	9.1	4.5	0.0	10.9
HC_m	g/hr :	9347.94	483.19	262.48	362.15	219.28	316.33
CO_m	g/hr :	20789.79	167.80	378.78	2395.11	1871.45	2729.81
NOx_m	g/hr :	17.89	17.62	2.12	0.18	0.01	8.25
Soot_m	mg/hr:	3473.73	107.39	16.20	15.99	4.83	345.75
N2O_m	mg/hr:	0.59	0.01	0.01	0.07	0.06	0.08
CO2_m	g/hr :	13527.78	15822.19	11871.81	6808.18	2237.97	15786.80
CH4_m	g/hr :	691.21	6.15	7.94	32.42	26.25	57.89
W_HC	g/hr :	1121.75	130.46	65.62	112.27	10.96	316.33
W_CO	g/hr :	2494.78	45.30	94.69	742.48	93.57	2729.81
W_NOx	g/hr :	2.15	4.76	0.53	0.05	0.00	8.25
W_HCNOx	g/hr :	1123.90	135.22	66.15	112.32	10.96	324.58
W_Soot	mg/hr:	416.85	29.00	4.05	4.96	0.24	345.75
W_N2O	g/hr :	0.07	0.00	0.00	0.02	0.00	0.08
W_CO2	g/hr :	1623.33	4271.99	2967.95	2110.53	111.90	15786.80
W_CH4	g/hr :	82.95	1.66	1.99	10.05	1.31	57.89

Total Weighted Power [kW] 10.745

Weighted Emissions

	HC	CO	NOx	HC+NOx
Total Mass [g/hr]	1441.07	3470.83	7.49	1448.56
Specific Mass [g/kW-hr]	134.12	323.03	0.70	134.82
BSFC [g/kW-hr]	593.3			

Total Soot [mg/hr] 455.09 Specific Soot [mg/kW-hr] 42.36

Not Used for Competition

Total N2O [mg/hr]	0.10	Specific N2O [mg/kW-hr]	0.01
Total CO2 [g/hr]	11085.71	Specific CO2 [g/kW-hr]	1031.75
Total CH4 [g/hr]	97.95	Specific CH4 [g/kW-hr]	9.12
RMC BSFC [g/kW-hr]	615.41		

EMISSION TESTS:

	Value	Limit	Result
Power	36.66	<96.94 kW	PASS
Soot	42.36	<50 mg/kW-hr	PASS
CO	323.03	<275 g/kW-hr	FAIL
HC + NOX	134.82	<90 g/kW-hr	FAIL
E-Score	39.36	>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	1520	1200	1200	1200	11432
PtsInMode	points	1210	3370	3470	1800	1480	11432
Speed	rpm	6264.09	5169.42	4561.48	3956.34	1743.50	4657.05
Torque	Nm	35.27	29.36	19.02	10.94	0.00	22.44
Power	kW	23.14	15.89	9.09	4.53	0.00	10.94
BSFC	g/kw-hr	1042.17	353.91	467.49	825.20	**	615.41
Fuel	g/hr	24113.10	5624.85	4247.41	3741.19	1874.51	6733.39
T_int	degC	22.00	21.75	22.35	20.58	23.20	21.75
RelHumid	%	19.71	19.41	20.22	20.20	18.72	19.92
Baro	in Hg	28.82	28.83	28.83	28.82	28.82	28.83
Baro	mmHg	732.13	732.17	732.21	732.14	732.15	732.17
Pvap_kPa	kPa	0.44	0.42	0.46	0.41	0.44	0.43
Pvap_inHg	inHg	0.13	0.13	0.13	0.12	0.13	0.13
AbsHumidity	grains/lb	19.56	19.00	20.45	18.55	19.82	19.50
SatPres	kPa	97.17	97.19	97.16	97.20	97.17	97.18
Hum Factor		1.00	1.00	1.00	1.00	1.00	1.00
F_fac		1.01	1.01	1.01	1.01	1.01	1.01
K_fac		1.03	1.03	1.03	1.02	1.03	1.03
Humidity	g/kg	2.79	2.71	2.92	2.65	2.83	2.79
H2		6.34	0.07	0.22	2.16	4.56	1.11
WetDry Factor		0.87	0.87	0.86	0.86	0.87	1.00



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Modal Emissions Concentrations

ModeNum		1	2	3	4	5	RMC
THC	ppmC1	88287.38	11524.05	8642.92	14607.89	19449.24	6476.15
CO	%	9.86	0.20	0.63	4.85	8.34	2.81
N2O	ppm	17.93	0.54	1.00	9.51	17.24	5.47
CH4	ppm	5739.62	128.92	229.88	1149.88	2047.34	1042.05
CO2	%	4.08	12.06	12.49	8.78	6.34	10.33
O2	%	0.31	1.33	0.06	0.00	0.05	0.54
CNOx	ppm	51.67	128.50	21.35	2.16	0.32	51.64
AHC	ppm	587.37	2.87	52.12	87.04	150.48	104.81
C2H2	ppm	1650.96	1.77	3.56	27.55	67.98	157.32
C2H4	ppm	4248.27	357.56	215.74	645.23	852.77	790.63
C3H6	ppm	71.90	105.46	116.85	158.28	113.55	132.01
C4H6	ppm	25.85	4.75	14.84	29.97	25.33	19.32
ETOH	ppm	0.00	38.24	33.46	19.67	8.50	29.80
H2O	%	13.44	13.14	13.99	14.33	13.26	0.00
HCHO	ppm	126.26	129.28	16.70	18.18	16.58	65.41
HCN	ppm	5.28	0.61	2.01	3.87	1.17	2.36
HNCO	ppm	31.82	3.50	1.52	0.07	1.31	4.44
MECHO	ppm	0.00	56.34	24.97	32.82	19.68	35.52
NC5	ppm	0.00	344.40	160.28	58.65	13.93	171.65
NH3	ppm	67.40	0.01	7.32	19.88	10.25	13.47
NO	ppm	49.67	123.04	22.23	2.77	0.27	50.68
NO2	ppm	2.00	5.48	0.00	0.02	0.16	1.47
Soot	mg/m3	25.35	1.49	0.31	0.42	0.30	4.36
AFR	:1	2.76	11.11	10.96	8.41	6.84	10.86



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Measurement Accuracy (SAE paper 961804)

ModeNum	H2_XLS %	ModalHC_Dry %	ModalFTIR_H2O %	N2 %	Ar %	AFR :1	Tr_Eff -
1	7.328	10.199	13.435	65.052	0.752	5.826	0.983
2	0.080	1.327	13.138	82.262	0.951	14.419	0.932
3	0.256	1.005	13.989	81.675	0.944	13.648	0.997
4	2.525	1.705	14.328	75.313	0.871	11.183	1.000
5	5.258	2.242	13.257	69.957	0.809	9.440	0.997

ModeNum	ModalWHC %	ModalC1 %	ModalC8 %	ModalSUM_HC %	ModalT_Emiss %	ModalError %
1	9347.942	9.751	1.219	10.969	100.569	0.569
2	483.191	0.278	0.035	0.313	99.273	0.727
3	262.484	0.956	0.119	1.075	99.277	0.723
4	362.149	1.703	0.213	1.915	96.537	3.463
5	219.276	2.192	0.274	2.466	95.472	4.528

Carbon Balance Verification

		1	2	3	4	5	6
Power	kW	23.137	15.894	9.086	4.534	0.000	10.941
BSFC	g/kw-hr	1042.2	353.9	467.5	825.2	**	615.4
Fuel_MassFlow	g/hr	24113	5625	4247	3741	1875	6733
HC_m	g/hr	9347.9	483.2	262.5	362.1	219.3	316.3
CO_m	g/hr	20790	168	379	2395	1871	2730
CO2_m	g/hr	13528	15822	11872	6808	2238	15787
TW_Power	kW	10.745					
TW_BSFC	g/kw-hr	593.30					
Fuel_MassFlow	g/hr	24113	5625	4247	3741	1875	6733
FuelCalc	g/hr	27760	6162	4634	4106	2064	7328
FuelCalcDev	%	-15.125	-9.548	-9.102	-9.748	-10.121	-8.828

\$HCR_ENG	2.04
\$OCR_ENG	0.07
MassFracCFuel H/C ratio	0.79086

Power Run

Team 16

TeamNumber	16
TeamName	Ferris
Model	Polaris
Engine	

Displacement cc	795.00
RatedSpeed	6082
RatedTorque	57.6

