



Team Results for Clean Snowmobile Challenge 2018 Team 11



2018 Clean Snowmobile Competition - Lab Emission Event Emission Data Sheet

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Test Date       : 2018/03/08 09:23:23
Team Name      : UW Platteville
Team Number    : 11
Model         : Ford
Engine        : EcoBoost
Displacement[cc] : 10000.00
100% Speed    : 5495
100% Torque   : 123.4
No of Strokes : 4
Fuel          : GAS
                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 :	65.8	29.4	16.7	8.6	0.0	23.6
HC_m	g/hr :	61.58	87.91	63.31	38.33	19.34	32.07
CO_m	g/hr :	763.37	261.27	161.72	51.24	10.60	273.65
NOx_m	g/hr :	766.21	296.38	101.80	31.54	0.77	199.23
Soot_m	mg/hr:	36.95	22.77	17.51	7.91	0.43	22.20
N2O_m	mg/hr:	0.12	0.09	0.04	0.01	0.00	0.06
CO2_m	g/hr :	60836.17	27249.36	16935.21	10812.86	2011.86	24970.87
CH4_m	g/hr :	6.54	4.41	3.00	1.92	0.50	4.44
W_HC	g/hr :	7.39	23.74	15.83	11.88	0.97	32.07
W_CO	g/hr :	91.60	70.54	40.43	15.88	0.53	273.65
W_NOx	g/hr :	91.95	80.02	25.45	9.78	0.04	199.23
W_HCNOx	g/hr :	99.33	103.76	41.28	21.66	1.01	231.30
W_Soot	mg/hr:	4.43	6.15	4.38	2.45	0.02	22.20
W_N2O	g/hr :	0.01	0.02	0.01	0.00	0.00	0.06
W_CO2	g/hr :	7300.34	7357.33	4233.80	3351.99	100.59	24970.87
W_CH4	g/hr :	0.78	1.19	0.75	0.60	0.03	4.44

Total Weighted Power [kW] 22.680

Weighted Emissions

	HC	CO	NOx	HC+NOx
Total Mass [g/hr]	59.80	218.99	207.23	267.03
Specific Mass [g/kW-hr]	2.64	9.66	9.14	11.77
BSFC [g/kW-hr]	328.0			

Total Soot [mg/hr] 17.43 Specific Soot [mg/kW-hr] 0.77

Not Used for Competition

Total N2O [mg/hr]	0.05	Specific N2O [mg/kW-hr]	0.00
Total CO2 [g/hr]	22344.05	Specific CO2 [g/kW-hr]	985.19
Total CH4 [g/hr]	3.35	Specific CH4 [g/kW-hr]	0.15
RMC BSFC [g/kW-hr]	345.30		

EMISSION TESTS:

	Value	Limit	Result
Power	71.03	<96.94 kW	PASS
Soot	0.77	<50 mg/kW-hr	PASS
CO	9.66	<275 g/kW-hr	PASS
HC + NOX	11.77	<90 g/kW-hr	PASS
E-Score	199.74	>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	1520	1200	1200	1200	11432
PtsInMode	points	1210	3370	3470	1800	1480	11432
Speed	rpm	5491.12	4513.65	4120.67	3573.35	1365.52	4163.05
Torque	Nm	114.37	62.16	38.79	23.03	0.00	54.15
Power	kW	65.76	29.38	16.74	8.62	0.00	23.61
BSFC	g/kw-hr	302.46	303.91	332.06	408.49	**	345.30
Fuel	g/hr	19890.59	8929.09	5557.69	3520.27	667.73	8151.17
T_int	degC	28.98	25.86	31.47	27.07	26.80	28.41
RelHumid	%	23.72	30.48	26.17	24.19	27.98	26.74
Baro	in Hg	28.83	28.83	28.83	28.83	28.83	28.83
Baro	mmHg	732.28	732.38	732.39	732.31	732.29	732.34
Pvap_kPa	kPa	0.76	0.83	0.95	0.70	0.80	0.83
Pvap_inHg	inHg	0.22	0.25	0.28	0.21	0.24	0.25
AbsHumidity	grains/lb	34.17	37.33	42.90	31.51	36.00	37.41
SatPres	kPa	96.87	96.81	96.69	96.93	96.83	96.80
Hum Factor		0.84	0.85	0.87	0.83	0.85	0.85
F_fac		1.03	1.03	1.04	1.03	1.03	1.03
K_fac		1.04	1.03	1.04	1.04	1.04	1.04
Humidity	g/kg	4.88	5.33	6.13	4.50	5.14	5.34
H2		0.08	0.06	0.06	0.03	0.03	0.07
WetDry Factor		0.86	0.86	0.86	0.86	0.87	1.00



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Modal Emissions Concentrations

ModeNum		1	2	3	4	5	RMC
THC	ppmC1	389.06	1261.76	1457.15	1407.45	3706.99	500.58
CO	%	0.24	0.19	0.19	0.09	0.10	0.21
N2O	ppm	2.33	3.93	2.88	0.82	0.49	2.86
CH4	ppm	36.32	55.69	60.78	62.15	84.48	60.88
CO2	%	12.29	12.50	12.46	12.69	12.33	12.46
O2	%	0.97	0.68	0.72	0.49	1.05	0.81
CNOx	ppm	1480.31	1300.69	716.44	354.18	45.09	950.83
AHC	ppm	1.91	7.48	7.74	6.35	44.18	11.19
C2H2	ppm	1.98	1.11	1.15	1.13	1.02	1.40
C2H4	ppm	22.52	64.60	73.51	76.03	104.57	68.05
C3H6	ppm	2.94	13.10	13.93	13.20	28.97	13.81
C4H6	ppm	1.22	2.31	2.59	3.41	7.55	2.87
ETOH	ppm	1.23	2.53	2.12	1.43	1.65	2.04
H2O	%	13.55	13.75	13.69	13.85	13.41	0.00
HCHO	ppm	1.28	3.30	3.23	1.11	2.54	2.74
HCN	ppm	0.35	0.15	0.12	0.20	0.21	0.25
HNCO	ppm	0.90	0.73	0.71	0.83	0.15	0.80
MECHO	ppm	0.00	0.01	0.00	0.00	0.26	1.39
NC5	ppm	1.99	19.35	26.63	23.14	96.03	25.93
NH3	ppm	6.07	5.95	12.50	19.60	22.50	13.61
NO	ppm	1764.37	1531.30	824.87	427.01	54.04	1119.14
NO2	ppm	0.22	0.07	0.02	0.05	0.01	0.07
Soot	mg/m3	0.14	0.19	0.23	0.17	0.05	0.20
AFR	:1	13.94	13.46	13.41	13.30	12.96	13.78



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Measurement Accuracy (SAE paper 961804)

ModeNum	H2_XLS %	ModalHC_Dry %	ModalFTIR_H2O %	N2 %	Ar %	AFR :1	Tr_Eff -
1	0.097	0.045	13.546	83.144	0.961	15.465	0.951
2	0.075	0.146	13.753	83.157	0.961	15.144	0.966
3	0.074	0.169	13.694	82.863	0.958	15.129	0.963
4	0.037	0.163	13.846	82.975	0.959	14.988	0.975
5	0.040	0.428	13.411	82.630	0.955	15.131	0.947

ModeNum	ModalWHC %	ModalC1 %	ModalC8 %	ModalSUM_HC %	ModalT_Emiss %	ModalError %
1	61.577	-0.671	-0.084	-0.755	99.266	0.734
2	87.914	-0.365	-0.046	-0.410	99.458	0.542
3	63.309	-0.374	-0.047	-0.421	99.058	0.942
4	38.326	-0.211	-0.026	-0.237	99.195	0.805
5	19.338	-0.357	-0.045	-0.402	98.792	1.208

Carbon Balance Verification

		1	2	3	4	5	6
Power	kW	65.764	29.380	16.737	8.618	0.000	23.606
BSFC	g/kw-hr	302.46	303.91	332.06	408.49	**	345.30
Fuel_MassFlow	g/hr	19891	8929	5558	3520	668	8151
HC_m	g/hr	61.577	87.914	63.309	38.326	19.338	32.071
CO_m	g/hr	763.37	261.27	161.72	51.24	10.60	273.65
CO2_m	g/hr	60836	27249	16935	10813	2012	24971
TW_Power	kW	22.680					
TW_BSFC	g/kw-hr	328.00					
Fuel_MassFlow	g/hr	19891	8929	5558	3520	668	8151
FuelCalc	g/hr	21485	9656	6012	3808	724	8806
FuelCalcDev	%	-8.0168	-8.1416	-8.1702	-8.1609	-8.4950	-8.0323

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

Power Run

Team 11

TeamNumber	11
TeamName	UW Platteville
Model	Ford
Engine	EcoBoost

Displacement cc	10000.00
RatedSpeed	5495
RatedTorque	123.4

