



Team Results for Clean Snowmobile Challenge 2011

2011 Clean Snowmobile Competition - Lab Emission Event Emission Data Sheet

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Test Date      :
Team Name     : Univ of Wisconsin - Madison
Team Number   : 1
Model        : UW-M
Engine       : UW-M
Displacement[cc] : 750cc
100% Speed   : 6211
100% Torque  : 81.0
No of Strokes : 4
Fuel         : Gasoline           H/C: 1.92       O/C: 0.10
  
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ModeNum	:	1	2	3	4	5
Weighting	:	0.12	0.27	0.25	0.31	0.05
Power kW	:	38.0	22.1	12.6	6.5	0.0
HC_m g/hr	:	2.54	0.92	0.53	0.30	0.33
CO_m g/hr	:	480.42	220.71	151.34	106.97	12.40
NOx_m g/hr	:	11.08	1.50	0.43	0.13	0.11
Soot_m mg/hr	:	0.00	0.00	0.00	0.00	0.00
N2O_m mg/hr	:	0.01	0.00	0.00	0.00	0.00
CO2_m g/hr	:	66192.25	40276.19	27814.82	19038.48	6641.93
CH4_m g/hr	:	2.06	1.24	0.93	0.60	0.43
W_HC g/hr	:	0.30	0.25	0.13	0.09	0.02
W_CO g/hr	:	57.65	59.59	37.83	33.16	0.62
W_NOx g/hr	:	1.33	0.41	0.11	0.04	0.01
W_HCNOx g/hr	:	1.63	0.65	0.24	0.13	0.02
W_Soot mg/hr	:	0.00	0.00	0.00	0.00	0.00
W_N2O g/hr	:	0.00	0.00	0.00	0.00	0.00
W_CO2 g/hr	:	7943.07	10874.57	6953.71	5901.93	332.10
W_CH4 g/hr	:	0.25	0.33	0.23	0.19	0.02

Total Weighted Power [kW] 15.689

Weighted Emissions

	HC	CO	NOx	HC+NOx
Total Mass [g/hr]	0.79	188.86	1.89	2.68
Specific Mass [g/kW-hr]	0.05	12.04	0.12	0.17
BSFC [g/kW-hr]	691.3			

Total Soot [mg/hr] 0.00 Specific Soot [mg/kW-hr] 0.00

Not Used for Competition

Total N2O [mg/hr]	0.00	Specific N2O [mg/kW-hr]	0.00
Total CO2 [g/hr]	32005.37	Specific CO2 [g/kW-hr]	2039.96
Total CH4 [g/hr]	1.02	Specific CH4 [g/kW-hr]	0.07

EMISSION TESTS:

	Value	Limit	Result
Power	52.68	<96.94 kW	PASS
Soot	0.00	<100 mg/kW-hr	PASS
CO	12.04	<275 g/kW-hr	PASS
HC + NOX	0.17	<90 g/kW-hr	PASS
E-Score	206.88	>100	PASS
Valid Data for All 5 Modes			PASS

LAB EMISSION TEST PASS



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Modal Raw Data : Engine / Environmental

ModeNum		1	2	3	4	5
Total Points	points	687	1206	1201	1206	1201
PtsInMode	points	687	1206	1201	1206	1201
Speed	rpm	6201.80	5276.33	4652.57	4066.39	2037.90
Torque	Nm	58.44	40.06	25.81	15.26	0.00
Power	kW	37.95	22.13	12.58	6.50	0.00
BSFC	g/kw-hr	559.15	581.72	707.06	936.53	**
Fuel	g/hr	21220.52	12875.82	8891.42	6087.56	2111.57
T_int	degC	18.50	20.28	20.35	19.45	18.61
RelHumid	%	26.01	23.25	21.12	20.07	19.68
Baro	in Hg	28.86	28.85	28.84	28.83	28.82
Baro	mmHg	733.02	732.87	732.55	732.26	732.15
Pvap kPa	kPa	0.48	0.47	0.43	0.39	0.36
Pvap inHg	inHg	0.14	0.14	0.13	0.11	0.11
AbsHumidity	grains/lb	21.30	20.99	19.14	17.31	16.21
SatPres	kPa	97.25	97.24	97.24	97.24	97.25
Hum Factor		0.80	0.80	0.79	0.79	0.78
F_fac		1.00	1.01	1.01	1.01	1.00
K_fac		1.02	1.02	1.02	1.02	1.02
Humidity	g/kg	3.04	3.00	2.73	2.47	2.32
H2		0.05	0.04	0.04	0.04	0.01
WetDry Factor		0.86	0.87	0.87	0.87	0.87



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Modal Emissions Concentrations

ModeNum		1	2	3	4	5
THC	ppmC1	16.04	9.66	8.03	6.69	20.89
CO	%	0.15	0.12	0.11	0.12	0.04
N2O	ppm	0.25	0.10	0.03	0.03	0.06
CH4	ppm	11.37	11.33	12.36	11.72	24.05
CO2	%	13.27	13.42	13.43	13.43	13.50
O2	%	0.00	0.00	0.00	0.00	0.00
CNOx	ppm	21.26	4.79	1.98	0.86	2.07
AHC	ppm	0.02	0.00	0.00	0.00	0.00
C2H2	ppm	0.47	0.53	0.60	0.44	0.63
C2H4	ppm	0.34	0.26	0.21	0.12	0.20
C3H6	ppm	0.25	0.23	0.33	0.12	0.43
C4H6	ppm	3.84	3.28	4.19	5.90	3.35
ETOH	ppm	4.50	5.12	7.00	8.16	6.24
H2O	%	14.40	13.49	13.43	13.39	13.35
HCHO	ppm	0.39	0.27	0.20	0.18	0.12
HCN	ppm	0.68	0.53	0.28	0.31	0.39
HNCO	ppm	4.33	4.09	4.90	7.84	3.05
MECHO	ppm	0.00	0.00	0.00	0.00	0.00
NC5	ppm	0.80	0.52	0.43	0.41	0.33
NH3	ppm	79.88	81.76	137.73	202.42	95.99
NO	ppm	26.71	6.13	2.44	1.02	2.65
NO2	ppm	0.04261	0.02928	0.10841	0.10447	0.06561
Soot	mg/m3	0.000	0.000	0.000	0.000	0.000
AFR	:1	12.74	12.76	12.76	12.76	12.79



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Clean Snowmobile Challenge 2011**

Measurement Accuracy (SAE paper 961804)

H2_XLS %	ModalHC_Dry %	ModalFTIR_H2O %	N2 %	Ar %	AFR :1	Tr_Eff -
0.057	0.002	14.403	84.793	0.980	14.569	1.000
0.043	0.001	13.494	83.042	0.960	14.586	1.000
0.043	0.001	13.428	82.929	0.959	14.587	1.000
0.044	0.001	13.389	82.844	0.958	14.585	1.000
0.015	0.002	13.346	82.857	0.958	14.620	1.000

ModalWHC %	ModalC1 %	ModalC8 %	ModalSUM_HC %	ModalT_Emiss %	ModalError %
2.536	0.002	0.000	0.002	101.515	1.515
0.919	0.001	0.000	0.001	99.689	0.311
0.527	0.001	0.000	0.001	99.577	0.423
0.300	0.001	0.000	0.001	99.491	0.509
0.326	0.002	0.000	0.003	99.455	0.545

Power Run

TeamNumber	1
TeamName	Univ of Wisconsin - Madison
Model	UW-M
Engine	UW-M

Displacement cc	750cc
RatedSpeed	6211
RatedTorque	81.0

