



# Team Results for Clean Snowmobile Challenge 2015 Team 3 ECO



## 2015 Clean Snowmobile Competition - Lab Emission Event Emission Data Sheet

Test Date : 2015/03/04 13:00:15  
Team Name : Idaho  
Team Number : 3  
Model : Skidoo  
Engine : Rotax  
Displacement[cc] : 797.00  
100% Speed : 5822  
100% Torque : 71.4  
No of Strokes : 2  
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	:	43.0	18.8	10.8	5.4	0.0	12.6
HC_m g/hr	:	1005.19	41.22	52.84	16.60	6.12	25.80
CO_m g/hr	:	13415.99	130.11	17.51	44.14	3.41	599.53
NOx_m g/hr	:	15.01	83.33	13.29	2.44	0.44	26.04
Soot_m mg/hr	:	12280.96	520.57	17.52	15.49	70.57	**
N2O_m mg/hr	:	0.47	0.03	0.01	0.00	0.00	0.03
CO2_m g/hr	:	36663.39	17745.53	11175.85	8305.42	1629.13	16263.12
CH4_m g/hr	:	307.17	5.97	1.63	5.75	0.49	16.96
W_HC g/hr	:	120.62	11.13	13.21	5.14	0.31	25.80
W_CO g/hr	:	1609.92	35.13	4.38	13.68	0.17	599.53
W_NOx g/hr	:	1.80	22.50	3.32	0.76	0.02	26.04
W_HCNOx g/hr	:	122.42	33.63	16.53	5.90	0.33	51.84
W_Soot mg/hr	:	1473.72	140.55	4.38	4.80	3.53	**
W_N2O g/hr	:	0.06	0.01	0.00	0.00	0.00	0.03
W_CO2 g/hr	:	4399.61	4791.29	2793.96	2574.68	81.46	16263.12
W_CH4 g/hr	:	36.86	1.61	0.41	1.78	0.02	16.96

Total Weighted Power [kW] 14.598

### Weighted Emissions

	HC	CO	NOx	HC+NOx
Total Mass [g/hr]	150.41	1663.28	28.40	178.82
Specific Mass [g/kW-hr]	10.30	113.94	1.95	12.25
BSFC [g/kW-hr]	373.5			

Total Soot [mg/hr] 1626.98 Specific Soot [mg/kW-hr] 111.45

### Not Used for Competition

Total N2O [mg/hr]	0.07	Specific N2O [mg/kW-hr]	0.00
Total CO2 [g/hr]	14641.00	Specific CO2 [g/kW-hr]	1002.94
Total CH4 [g/hr]	40.69	Specific CH4 [g/kW-hr]	2.79
RMC BSFC [g/kW-hr]	433.97		

### EMISSION TESTS:

	Value	Limit	Result
Power	43.53	<96.94 kW	PASS
Soot	111.45	<100 mg/kW-hr	FAIL
CO	113.94	<275 g/kW-hr	PASS
HC + NOX	12.25	<90 g/kW-hr	PASS
E-Score	173.35	>100	PASS
Valid Data for All 5 Modes			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	12031
PtsInMode	points	1210	3050	2720	3470	1480	12031
Speed	rpm	5820.44	4948.89	4366.06	3783.11	1193.60	4321.83
Torque	Nm	70.51	36.31	23.52	13.61	0.00	27.90
Power	kW	42.98	18.82	10.75	5.39	0.00	12.63
BSFC	g/kw-hr	449.26	304.53	335.15	495.55	**	433.97
Fuel	g/hr	19308.68	5731.04	3604.11	2671.25	524.23	5479.52
T_int	degC	-9.05	28.92	-11.51	-1.87	8.71	-1.29
RelHumid	%	21.34	23.44	18.94	24.12	17.60	21.76
Baro	in Hg	28.83	28.85	28.84	28.85	28.84	28.84
Baro	mmHg	732.39	732.68	732.61	732.67	732.50	732.59
Pvap_kPa	kPa	0.07	0.75	0.05	0.13	0.18	0.12
Pvap_inHg	inHg	0.02	0.22	0.02	0.04	0.05	0.04
AbsHumidity	grains/lb	3.22	33.64	2.42	5.84	8.19	5.47
SatPres	kPa	97.57	96.93	97.62	97.55	97.48	97.55
Hum Factor		1.00	1.00	1.00	1.00	1.00	1.00
F_fac		0.93	1.03	0.93	0.95	0.98	0.95
K_fac		0.97	1.04	0.97	0.98	1.00	0.98
Humidity	g/kg	0.46	4.81	0.35	0.83	1.17	0.78
H2		2.18	0.04	0.01	0.04	0.01	0.21
WetDry Factor		0.86	0.90	0.90	0.87	0.93	1.00



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## Modal Emissions Concentrations

ModeNum		1	2	3	4	5	RMC
THC	ppmC1	7721.64	751.33	1536.16	822.05	805.35	547.17
CO	%	5.13	0.12	0.03	0.11	0.02	0.63
N2O	ppm	11.54	1.46	0.98	0.31	0.73	1.98
CH4	ppm	2057.34	94.83	41.23	248.36	56.03	313.53
CO2	%	8.93	10.25	10.30	13.04	6.79	10.93
O2	%	0.31	4.86	4.91	0.54	10.31	3.48
CNOx	ppm	34.96	460.59	117.11	36.68	17.38	167.43
AHC	ppm	176.78	12.47	14.09	12.95	6.60	33.70
C2H2	ppm	947.98	4.17	1.31	7.37	1.00	95.31
C2H4	ppm	576.18	109.51	44.78	62.99	14.02	131.18
C3H6	ppm	14.53	24.42	36.70	23.40	12.13	26.50
C4H6	ppm	7.05	2.22	0.23	3.59	0.26	3.06
ETOH	ppm	0.00	0.23	6.86	0.47	3.46	1.55
H2O	%	13.71	10.37	10.29	13.48	6.90	0.00
HCHO	ppm	28.69	56.07	48.43	28.66	19.66	37.85
HCN	ppm	9.82	1.71	0.60	0.67	0.24	1.91
HNCO	ppm	13.81	6.98	2.77	3.06	1.74	4.73
MECHO	ppm	0.00	12.26	21.62	4.76	9.92	9.30
NC5	ppm	14.24	8.73	135.41	13.59	81.13	36.88
NH3	ppm	14.49	0.66	0.19	0.57	0.11	2.31
NO	ppm	32.98	378.21	84.21	35.55	2.26	138.32
NO2	ppm	1.98	82.19	32.89	1.13	15.12	29.09
Soot	mg/m3	59.93	5.44	0.29	0.44	5.35	#####
AFR	:1	10.15	18.01	17.72	14.06	27.43	16.30



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Measurement Accuracy (SAE paper 961804)

ModeNum	H2_XLS %	ModalHC_Dry %	ModalFTIR_H2O %	N2 %	Ar %	AFR :1	Tr_Eff -
1	2.521	0.895	13.712	76.418	0.883	11.745	0.984
2	0.043	0.084	10.375	82.353	0.952	19.086	0.757
3	0.009	0.171	10.294	82.298	0.951	19.055	0.754
4	0.041	0.095	13.484	83.715	0.968	14.906	0.973
5	0.008	0.087	6.897	81.205	0.939	29.236	0.492

ModeNum	ModalWHC %	ModalC1 %	ModalC8 %	ModalSUM_HC %	ModalT_Emiss %	ModalError %
1	1005.194	0.616	0.077	0.693	97.178	2.822
2	41.220	-2.753	-0.344	-3.097	97.293	2.707
3	52.845	-2.704	-0.338	-3.042	97.213	2.787
4	16.596	-0.325	-0.041	-0.365	100.185	0.185
5	6.123	-3.673	-0.459	-4.133	96.413	3.587

# Power Run

## Team 3 ECO

TeamNumber	3
TeamName	Idaho
Model	Skidoo
Engine	Rotax

Displacement cc	797.00
RatedSpeed	5822
RatedTorque	71.4

