

## Team Results for Clean Snowmobile Challenge 2012

### 2012 Clean Snowmobile Competition - Lab Emission Event Emission Data Sheet

Test Date : 2012/03/09 17:16:59  
 Team Name : North Dakota  
 Team Number : 11  
 Model : Polaris  
 Engine : IQ Turbo LX  
 Displacement[cc] : 898cc  
 100% Speed [rpm] : 3616  
 100% Torque [Nm] : 110.3  
 No of Strokes : 4  
 Fuel : Diesel H/C: 1.81 O/C: 0.01

ModeNum	:	1	2	3	4	5
Weighting	:	0.12	0.27	0.25	0.31	0.05
Power kW	:	40.9	17.9	9.7	5.3	0.0
HC_m g/hr	:	0.00	0.00	0.00	0.00	0.00
CO_m g/hr	:	0.57	0.21	0.03	0.01	0.00
NOx_m g/hr	:	109.66	85.64	56.39	47.11	16.88
Soot_m mg/hr	:	7278.32	2306.23	946.02	537.35	196.34
N2O_m mg/hr	:	0.02	0.02	0.02	0.01	0.01
CO2_m g/hr	:	36121.86	14370.29	8527.08	5584.65	1563.01
CH4_m g/hr	:	0.01	0.02	0.02	0.02	0.04
W_HC g/hr	:	0.00	0.00	0.00	0.00	0.00
W_CO g/hr	:	0.07	0.06	0.01	0.00	0.00
W_NOx g/hr	:	13.16	23.12	14.10	14.60	0.84
W_HCNOx g/hr	:	13.16	23.12	14.10	14.60	0.84
W_Soot mg/hr	:	873.40	622.68	236.51	166.58	9.82
W_N2O g/hr	:	0.00	0.01	0.00	0.00	0.00
W_CO2 g/hr	:	4334.62	3879.98	2131.77	1731.24	78.15
W_CH4 g/hr	:	0.00	0.01	0.01	0.01	0.00

Total Weighted Power [kW] 13.804

#### Weighted Emissions

	HC	CO	NOx	HC+NOx
Total Mass [g/hr]	0.00	0.14	65.83	65.83
Specific Mass [g/kW-hr]	0.00	0.01	4.77	4.77
BSFC [g/kW-hr]	273.5			

Total Soot [mg/hr] 1908.98 Specific Soot [mg/kW-hr] 138.29

#### Not Used for Competition

Total N2O [mg/hr]	0.02	Specific N2O [mg/kW-hr]	0.00
Total CO2 [g/hr]	12155.76	Specific CO2 [g/kW-hr]	880.59
Total CH4 [g/hr]	0.02	Specific CH4 [g/kW-hr]	0.00

#### EMISSION TESTS:

	Value	Limit	Result
Power	41.78	<96.94 kW	PASS
Soot	138.29	<100 mg/kW-hr	FAIL
CO	0.01	<275 g/kW-hr	PASS
HC + NOX	4.77	<90 g/kW-hr	PASS
E-Score	206.82	>100	PASS
Valid Data for All 5 Modes			PASS

LAB EMISSION TEST FAIL

## Team Results for Clean Snowmobile Challenge 2012

### Modal Raw Data : Engine / Environmental

ModeNum		1	2	3	4	5
Total Points	points	412	1187	1193	1196	1200
PtsInMode	points	467	1191	1193	1196	1200
Speed	rpm	3624.22	3072.10	2713.72	2351.28	1325.42
Torque	Nm	107.88	55.59	34.06	21.52	0.00
Power	kW	40.94	17.88	9.68	5.30	0.00
BSFC	g/kw-hr	277.38	252.65	276.97	331.32	**
Fuel	g/hr	11356.78	4518.04	2680.88	1755.79	491.40
T_int	degC	8.85	9.00	10.77	10.89	10.67
RelHumid	%	21.73	23.60	23.31	22.86	21.69
Baro	in Hg	29.29	29.30	29.30	29.29	29.29
Baro	mmHg	743.99	744.10	744.10	744.05	744.04
Pvap_kPa	kPa	0.23	0.25	0.27	0.27	0.25
Pvap_inHg	inHg	0.07	0.07	0.08	0.08	0.08
AbsHumidity	grains/lb	10.05	11.01	12.08	11.92	11.17
SatPres	kPa	98.96	98.95	98.93	98.93	98.94
Hum Factor		0.77	0.77	0.77	0.77	0.77
F_fac		0.96	0.96	0.97	0.97	0.97
K_fac		0.99	0.99	0.99	0.99	0.99
Humidity	g/kg	1.44	1.57	1.73	1.70	1.60
H2		0.00	0.00	0.00	0.00	0.00
WetDry Factor		0.90	0.92	0.94	0.96	0.98

## Team Results for Clean Snowmobile Challenge 2012

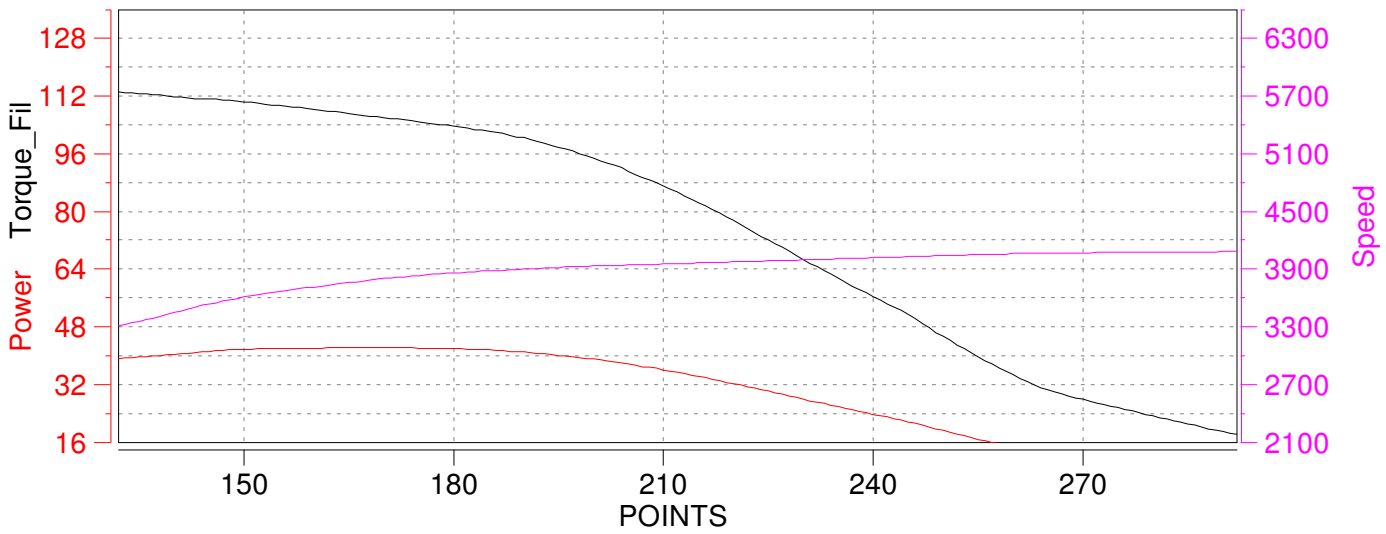
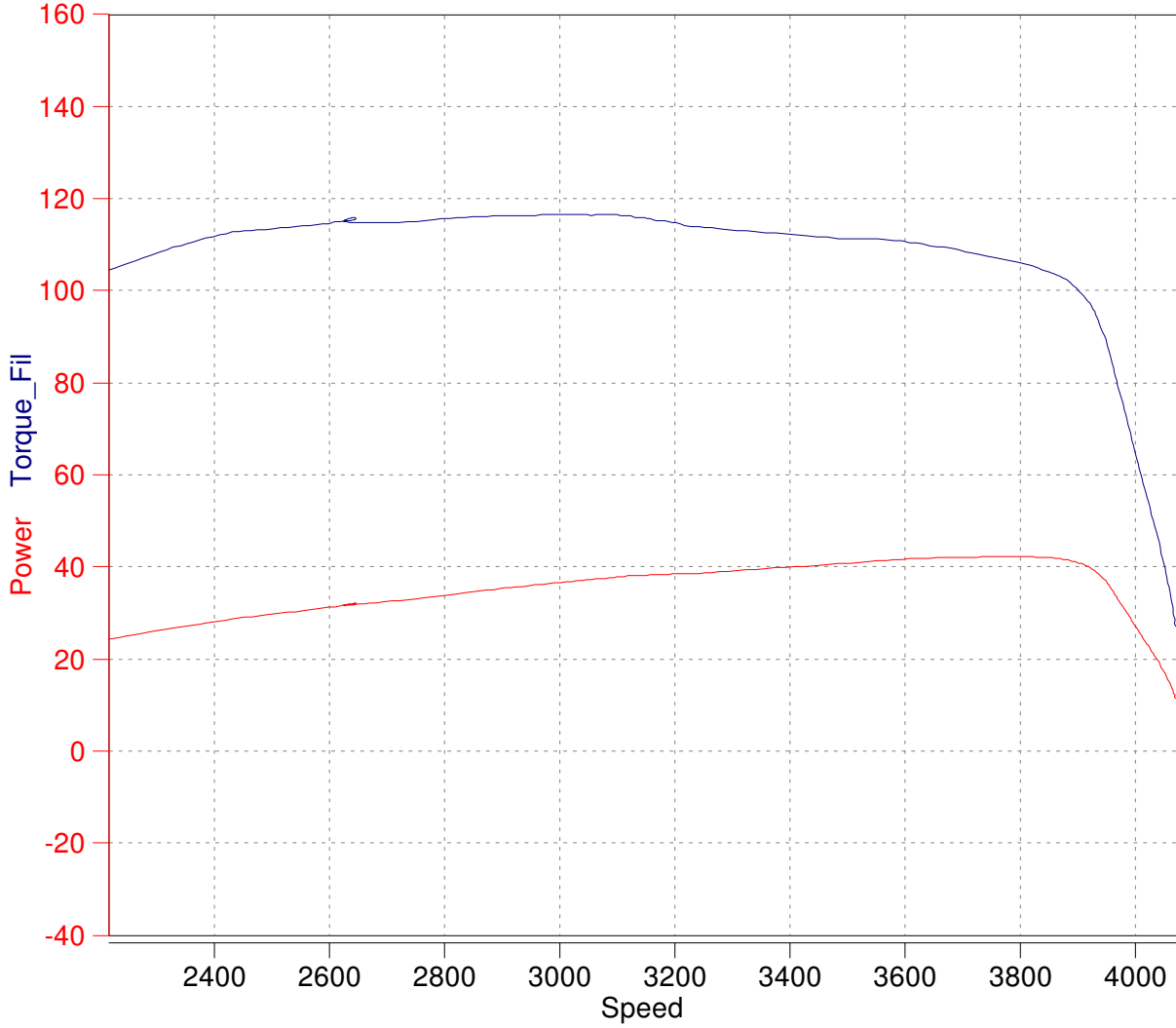
### Modal Emissions Concentrations

ModeNum		1	2	3	4	5
THC	ppmC1	0.00	0.00	0.00	0.00	0.00
CO	%	0.00	0.00	0.00	0.00	0.00
N2O	ppm	0.72	1.14	1.09	1.16	1.10
CH4	ppm	0.06	0.33	0.47	0.57	1.60
CO2	%	11.24	8.21	6.12	4.77	2.56
O2	%	3.36	8.02	11.21	13.33	16.83
CNOx	ppm	326.43	467.83	387.22	385.26	264.54
AHC	ppm	0.00	0.00	0.00	0.00	0.01
C2H2	ppm	0.26	0.07	0.11	0.09	0.19
C2H4	ppm	0.21	0.13	0.17	0.18	0.70
C3H6	ppm	0.03	0.03	0.04	0.03	0.07
C4H6	ppm	0.04	0.01	0.01	0.01	0.18
ETOH	ppm	1.24	0.79	0.74	0.59	0.42
H2O	%	9.98	7.62	5.70	4.48	2.40
HCHO	ppm	0.18	0.13	0.12	0.12	0.13
HCN	ppm	0.25	0.15	0.11	0.09	0.04
HNCO	ppm	4.38	7.65	5.63	4.89	2.54
MECHO	ppm	0.40	0.00	0.00	0.00	0.48
NC5	ppm	0.35	0.74	0.67	0.52	0.40
NH3	ppm	0.95	0.12	0.14	0.06	0.07
NO	ppm	403.60	228.56	157.09	294.93	299.39
NO2	ppm	22.48	379.92	344.65	204.55	44.46
Soot	mg/m3	41.69	24.30	12.56	8.49	5.92
AFR	:1	17.39	24.14	32.64	42.18	79.76

# Power Run

TeamNumber	11
TeamName	North Dakota
Model	Polaris
Engine	IQ Turbo LX

Displacement cc	898cc
RatedSpeed	3616
RatedTorque	110.3



Measurement Accuracy (SAE paper 961804)

H2_XLS %	ModalHC_Dry %	ModalFTIR_H2O %	N2 %	Ar %	AFR :1	Tr_Eff -
0.000	0.000	9.980	78.974	0.913	17.479	0.831
0.000	0.000	7.617	79.628	0.920	24.262	0.602
0.000	0.000	5.698	79.073	0.914	32.785	0.450
0.000	0.000	4.481	78.922	0.912	42.361	0.350
0.000	0.000	2.405	78.454	0.907	80.079	0.189

ModalWHC %	ModalC1 %	ModalC8 %	ModalSUM_HC %	ModalT_Emiss %	ModalError %
0.000	**	**	**	**	**
0.000	**	**	**	**	**
0.000	**	**	**	**	**
0.000	**	**	**	**	**
0.000	**	**	**	**	**