



## Team Results for Clean Snowmobile Challenge 2019 Team 9



### 2019 Clean Snowmobile Competition - Lab Emission Event Emission Data Sheet

```

Test Date       : 2019/03/06 12:59:50
Team Name      : IUPUI
Team Number    : 9
Model         : Polaris
Engine        : Polaris
Displacement[cc] : 800.00
100% Speed    : 8182
100% Torque   : 92.9
No of Strokes : 2
Fuel          : Gas
                H/C: 1.95      O/C: 0.00
  
```

ModeNum	:	1	2	3	4	5
Weighting	:	0.12	0.27	0.25	0.31	0.05
Power kW	:	34.7	0.0	0.0	0.0	0.0
HC_m g/hr	:	1368.12	**	**	**	**
CO_m g/hr	:	32212.18	**	**	**	**
NOx_m g/hr	:	0.88	**	**	**	**
Soot_m mg/hr	:	421.15	**	**	**	**
N2O_m mg/hr	:	1.06	**	**	**	**
CO2_m g/hr	:	35973.52	**	**	**	**
CH4_m g/hr	:	310.93	**	**	**	**
W_HC g/hr	:	164.17	**	**	**	**
W_CO g/hr	:	3865.46	**	**	**	**
W_NOx g/hr	:	0.11	**	**	**	**
W_HCNOx g/hr	:	164.28	**	**	**	**
W_Soot mg/hr	:	50.54	**	**	**	**
W_N2O g/hr	:	0.13	**	**	**	**
W_CO2 g/hr	:	4316.82	**	**	**	**
W_CH4 g/hr	:	37.31	**	**	**	**

Total Weighted Power [kW] 4.164

#### Weighted Emissions

	HC	CO	NOx	HC+NOx
Total Mass [g/hr]	164.17	3865.46	0.11	164.28
Specific Mass [g/kW-hr]	39.43	928.29	0.03	39.45
BSFC [g/kW-hr]	****			

Total Soot [mg/hr] 50.54      Specific Soot [mg/kW-hr] 12.14

#### Not Used for Competition

Total N2O [mg/hr]	0.13	Specific N2O [mg/kW-hr]	0.03
Total CO2 [g/hr]	4316.82	Specific CO2 [g/kW-hr]	1036.68
Total CH4 [g/hr]	37.31	Specific CH4 [g/kW-hr]	8.96
RMC BSFC [g/kW-hr]	0		

#### EMISSION TESTS:

	Value	Limit	Result
Power	79.57	<96.94 kW	PASS
Soot	12.14	<50 mg/kW-hr	PASS
CO	928.29	<275 g/kW-hr	FAIL
HC + NOX	39.45	<90 g/kW-hr	FAIL
E-Score	0.00	>175	FAIL
Valid Data for All 5 Modes			FAIL
RMC			FAIL (-50 Points)
LAB EMISSION TEST			FAIL



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**Modal Raw Data : Engine / Environmental**

ModeNum		1	2	3	4	5
Total Points	points	530	1	1	1	1
PtsInMode	points	1140	1	1	1	1
Speed	rpm	8018.74	0.00	0.00	0.00	0.00
Torque	Nm	41.32	0.00	0.00	0.00	0.00
Power	kW	34.70	0.00	0.00	0.00	0.00
BSFC	g/kw-hr	831.80	**	**	**	**
Fuel	g/hr	28863.96	#####	#####	#####	#####
T_int	degC	23.36	0.00	0.00	0.00	0.00
RelHumid	%	16.74	0.00	0.00	0.00	0.00
Baro	in Hg	28.91	0.00	0.00	0.00	0.00
Baro	mmHg	734.42	0.00	0.00	0.00	0.00
Pvap_kPa	kPa	0.40	0.00	0.00	0.00	0.00
Pvap_inHg	inHg	0.12	0.00	0.00	0.00	0.00
AbsHumidity	grains/lb	17.81	**	**	**	**
SatPres	kPa	97.51	0.00	0.00	0.00	0.00
Hum Factor		1.00	1.00	1.00	1.00	1.00
F_fac		1.01	**	**	**	**
K_fac		1.03	**	**	**	**
Humidity	g/kg	2.54	**	**	**	**
H2		5.06	**	**	**	**
WetDry Factor		0.90	1.00	1.00	1.00	1.00



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**Modal Emissions Concentrations**

ModeNum		1	2	3	4	5
THC	ppmC1	8092.03	0.00	0.00	0.00	0.00
CO	%	9.51	0.00	0.00	0.00	0.00
N2O	ppm	19.87	0.00	0.00	0.00	0.00
CH4	ppm	1606.39	0.00	0.00	0.00	0.00
CO2	%	6.76	0.00	0.00	0.00	0.00
O2	%	0.08	0.00	0.00	0.00	0.00
CNOx	ppm	1.58	0.00	0.00	0.00	0.00
AHC	ppm	68.87	0.00	0.00	0.00	0.00
C2H2	ppm	10.10	0.00	0.00	0.00	0.00
C2H4	ppm	84.82	0.00	0.00	0.00	0.00
C3H6	ppm	16.22	0.00	0.00	0.00	0.00
C4H6	ppm	4.69	0.00	0.00	0.00	0.00
ETOH	ppm	0.00	0.00	0.00	0.00	0.00
H2O	%	10.18	0.00	0.00	0.00	0.00
HCHO	ppm	0.32	0.00	0.00	0.00	0.00
HCN	ppm	2.20	0.00	0.00	0.00	0.00
HNCO	ppm	2.51	0.00	0.00	0.00	0.00
MECHO	ppm	1.47	0.00	0.00	0.00	0.00
NC5	ppm	6.16	0.00	0.00	0.00	0.00
NH3	ppm	25.40	0.00	0.00	0.00	0.00
NO	ppm	0.80	0.00	0.00	0.00	0.00
NO2	ppm	0.84	0.00	0.00	0.00	0.00
Soot	mg/m3	1.60	0.00	0.00	0.00	0.00
AFR	:1	9.19	**	**	**	**



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**Measurement Accuracy (SAE paper 961804)**

ModeNum	H2_XLS %	ModalHC_Dry %	ModalFTIR_H2O %	N2 %	Ar %	AFR :1	Tr_Eff -
1	5.633	0.901	10.181	66.933	0.774	9.967	0.996
2	**	0.000	0.000	0.000	0.000	**	**
3	**	0.000	0.000	0.000	0.000	**	**
4	**	0.000	0.000	0.000	0.000	**	**
5	**	0.000	0.000	0.000	0.000	**	**

ModeNum	ModalWHC %	ModalC1 %	ModalC8 %	ModalSUM_HC %	ModalT_Emiss %	ModalError %
1	1368.121	0.822	0.103	0.925	92.459	7.541
2	**	**	**	**	**	**
3	**	**	**	**	**	**
4	**	**	**	**	**	**
5	**	**	**	**	**	**

**Carbon Balance Verification**

		1	2	3	4	5
Power	kW	34.701	0.000	0.000	0.000	0.000
BSFC	g/kw-hr	831.80	**	**	**	**
Fuel_MassFlow	g/hr	28864	9999999	9999999	9999999	9999999
HC_m	g/hr	1368.1	**	**	**	**
CO_m	g/hr	32212	**	**	**	**
CO2_m	g/hr	35974	**	**	**	**
TW_Power	kW	4.1641				
TW_BSFC	g/kw-hr	**				
Fuel_MassFlow	g/hr	28864	9999999	9999999	9999999	9999999
FuelCalc	g/hr	29087	**	**	**	**
FuelCalcDev	%	-0.77267	**	**	**	**

\$HCR_ENG	1.949
\$OCR_ENG	0
MassFracCFuel H/C ratio	0.85943

# Power Run

## Team 9

TeamNumber	9
TeamName	IUPUI
Model	Polaris
Engine	Polaris

Displacement cc	800.00
RatedSpeed	8182
RatedTorque	92.9

