[redacted] Engine Testing Laboratories, LLC
Texas Heavy Duty Transient TestResults
M11BASEMP01

Test Information

Test ID	M11BASEMP01
Date	Fri, Nov 13, 2009
Time	11:26 AM
Fuel Specification	DIESEL
Test Comments:	

Engine Information

Engine Manufacturer	Cummins
Engine Model	ISM 400-1800
Engine Serial Number	60412072

Integrated Concentrations Corrected for Background

HC Conc	6.932035	ppm
NOx Conc	41.169644	ppm
NO Conc	39.495251	ppm
CO2 Conc	0.587284	percent
CO Conc	18.472939	ppm

Dilution/Engine Air Data

Barometric Pressure	29.707554	inHg
Relative Humidity	34.995043	percent
Engine Inlet Air Temp	78.670204	deg F
Absoute Humidity	51.146990	gr/lb

Mass Emissions

HC Mass	5.625599	grams
NOx Mass	104.739476	grams
NO Mass	100.484551	grams
CO2 Mass	15157.030495	grams
CO Mass	30.360649	grams
NMHC Mass	5.593568	grams

Brake Specific Emissions

HC	0.206278	g/bhp-hr
NOx	3.840557	g/bhp-hr
NO	3.684538	g/bhp-hr
CO2	555.773616	g/bhp-hr
CO	1.113256	g/bhp-hr
NMHC	0.205103	g/bhp-hr

Sample Flow Data

Total Volume (Vmix)	49962.294857	scf
Dilution Flow	43402.535854	scf
Exhaust Flow	6559.759003	scf
Dilution (Total/Exhaust)	7.616483	ratio

Correction Factors

NOx Humidity CF	0.942289	Kh
Dry to Wet CF	0.989212	Kw
Dilution Factor	7.616483	df

Test Cycle Data

Hot-Cold Test	2.000000	1=Cold, 2=Hot
Test Time	1213.000000	sec
Total Work	27.271950	bhp-hr
Reference Work	27.916728	bhp-hr

Fuel Data

Fuel Usage	4598.000000	grams
BSFC	0.371695	lb/bhp-hr

Particulate	0.0856 .207	g/bhp-hr

Data processed on Friday, November 13, 2009 12:26 PM

[redacted] Engine Testing Laboratories, LLC
Texas Heavy Duty Transient TestResults
M11DEVICEMP01

Test Information

Test ID	M11DEVICEMP01
Date	Mon, Nov 16, 2009
Time	9:54 AM
Fuel Specification	DIESEL
Test Comments:	

Engine Information

Engine Manufacturer	Cummins
Engine Model	ISM 400-1800
Engine Serial Number	60412072

Integrated Concentrations Corrected for Background

HC Conc	6.776895	ppm
NOx Conc	46.923966	ppm
NO Conc	44.735192	ppm
CO2 Conc	0.585029	percent
CO Conc	16.668251	ppm

Dilution/Engine Air Data

Barometric Pressure	30.040677	inHg
Relative Humidity	8.375856	percent
Engine Inlet Air Temp	77.490023	deg F
Absoute Humidity	11.540744	gr/lb

Mass Emissions

HC Mass	5.500651	grams
NOx Mass	108.905243	grams
NO Mass	103.827473	grams
CO2 Mass	15102.496346	grams
CO Mass	27.397982	grams
NMHC Mass	5.427882	grams

Brake Specific Emissions

HC	0.201473	g/bhp-hr
NOx	3.988893	g/bhp-hr
NO	3.802908	g/bhp-hr
CO2	553.161949	g/bhp-hr
CO	1.003511	g/bhp-hr
NMHC	0.198808	g/bhp-hr

Sample Flow Data

Total Volume (Vmix)	49965.957717	scf
Dilution Flow	43444.236166	scf
Exhaust Flow	6521.721551	scf
Dilution (Total/Exhaust)	7.661468	ratio

Correction Factors

NOx Humidity CF	0.859065	Kh
Dry to Wet CF	0.998181	Kw
Dilution Factor	7.661468	df

Test Cycle Data

Hot-Cold Test	2.000000	1=Cold, 2=Hot
Test Time	1213.000000	sec
Total Work	27.302124	bhp-hr
Reference Work	27.920156	bhp-hr

Fuel Data

Fuel Usage	4575.500000	grams
BSFC	0.369468	lb/bhp-hr

Particulate	0.0730	g/bhp-hr
	.207	

Data processed on Monday, November 16, 2009 10:51 AM

[redacted] Engine Testing Laboratories, LLC
Texas Heavy Duty Transient TestResults
M11DEVICEMP02

Test Information		Engine Information	
Test ID	M11DEVICEMP02	Engine Manufacturer	Cummins
Date	Mon, Nov 16, 2009	Engine Model	ISM 400-1800
Time	11:04 AM	Engine Serial Number	60412072
Fuel Specification	DIESEL		
Test Comments:			

Integrated Concentrations Corrected for Background			Dilution/Engine Air Data		
HC Conc	6.565310	ppm	Barometric Pressure	30.012542	inHg
NOx Conc	46.794846	ppm	Relative Humidity	8.000362	percent
NO Conc	44.354680	ppm	Engine Inlet Air Temp	79.060877	deg F
CO2 Conc	0.570124	percent	Absoute Humidity	11.618391	gr/lb
CO Conc	16.678484	ppm			

Mass Emissions			Brake Specific Emissions		
HC Mass	5.329276	grams	HC	0.195095 5.4 90	g/bhp-hr
NOx Mass	108.608078	grams	NOx	3.975935	g/bhp-hr
NO Mass	102.947149	grams	NO	3.768699	g/bhp-hr
CO2 Mass	14720.886884	grams	CO2	538.903628 -3.0	g/bhp-hr
CO Mass	27.425104	grams	CO	1.003981 -9.8	g/bhp-hr
NMHC Mass	5.232127	grams	NMHC	0.191538 -6.6	g/bhp-hr

Sample Flow Data			Correction Factors		
Total Volume (Vmix)	49968.562532	scf	NOx Humidity CF	0.859214	Kh
Dilution Flow	43426.890901	scf	Dry to Wet CF	0.998163	Kw
Exhaust Flow	6541.671632	scf	Dilution Factor	7.638501	df
Dilution (Total/Exhaust)	7.638501	ratio			

Test Cycle Data			Fuel Data		
Hot-Cold Test	2.000000	1=Cold, 2=Hot	Fuel Usage	4577.000000	grams
Test Time	1213.000000	sec	BSFC	0.369396	lb/bhp-hr
Total Work	27.316363	bhp-hr			
Reference Work	27.928862	bhp-hr			

Particulate ~~0.0660~~ / .207 g/bhp-hr 0.0679

PM = 21 % Reduction vs B/L

NO_x = 3.5% Increase

Data processed on Monday, November 16, 2009 12:01 PM