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**Done Right the First Time
 Every Time!**

Invoice #:	3157
Work Order:	WO-00001780
Service Date:	01/09/2015
Technician(s):	William Haddow Ian Frick
Equipment #:	6628121

WORK SUMMARY

SITE	CONTACT
Post Office - Los Angeles 7001 S. Central Ave. Los Angeles, CA, 90052	Edwardo Martinez (909) 731-9979

NATURE OF CALL

Engine Diagnostic

RECOMMENDATIONS

(DIAGNOSTIC) Engine faults include CYLINDER #4 PERFORMANCE, ENGINE EGR MALFUNCTION. Also found a high stumble at high speeds. Further evaluation revealed (2) Unit Pumps under-performing with suspected issues with the Nozzles and/or lines. Also discovered an EGR leak. Also discovered a possible valve "slap" issue. Recommend installing NEW Unit Pumps, NEW Nozzles, NEW Fuel Lines, Repairing EGR Leak and inspecting Cooler, Performing full TUNE-UP including Valve Adjustment and Inspection. (REPAIRS) Removed and Installed the following: FUEL NOZZLES, UNIT PUMPS, FUEL LINES. Found #3 and #4 Nozzles clogged. Found Cylinder #6 predetonation. Found Cyl #3 needing Nozzle Bored. Discovered USPS installed a NEW Turbocharger. Used PTT to check and calibrate the VGT on new turbo, OK. Installed NEW Unit Pump CALIBRATION FILES into ECM using PTT. Cleaned and Degreased the critical parts of engine.
 Washed all soot off of truck, and replaced damaged exhaust clamps on DPF system. Test drove truck confirm engine operating OK. Discovered Transmissions FAULTS present. Found that the Transmission Fluid LOW. Added Trans Fluid as needed. Test drove truck again, and found Trans Faults coming back as soon as truck is driven, will make USPS aware of the faults.

VEHICLE

Equipment #	VIN	Equipment Year/Make/Model	Application	Muffler Configuration
6628121	1M1AK05Y67N012843	2006 Mack CXN613	Shipping (local: USPS, U-haul, UPS, etc)	

ENGINE

Serial Number	Year	Make/Model/Family Name	Horsepower	Mileage	Hours
29384YP1	2006	Mack A Series - 6MKXH11.9H70	350	264152	17246

Engine Summary

01/05/2015 Performed engine diagnostic using Volvo PTT. Found various engine and transmissions faults. Most notably EGR, and

Cylinder #4 performance. Performed diagnostic tests of engine: 1) Engine Cylinder CUT OUT (OK, slight non notice on 2 and 3) 2) Cylinder RUN UP, would not complete due to timeout. (Possible issue with Unit pumps) 3) Unit Pump CALIBRATIONS, spot checked 2, OK (however, the calcs loaded inconsistent, need to ensure NEW Unit Pumps are entered correctly) 01/12/2014 Perform opacity test, both COLD and at NORMAL TEMP. Found both to fail (cold for high results, and warm due to abnormally high deviation). 01/24/2015 Used compressed air and brake clean to clean all surfaces, to avoid dirt debris dropping into engine. Removed Intake Boots and Hoses, removed Unit Pump Heat Shield, removed valve covers; in order to remove the following components: 1) Unit Pumps (6) 2) Fuel Line (Unit to Nozzle) (6) 3) Nozzles (6) Attempted to adjust valves, will have to complete tomorrow (too hot - need to complete cold). 01/26/2015 1) Adjusted valves as needed, no valves out of adjustment more than 0.005" (adjusted to spec). 2) Installed NEW components A) Unit Pumps (6) B) Fuel Nozzles (6) C) Fuel Lines (6) 3) Calibrated all unit pumps with PTT Tested all Fuel Nozzles and Pumps for performance and leaks, OK. Also re-installed all hoses, intake boots, etc. Primed the FUELING SYSTEM and started engine. See Conclusions for final calcs.

Engine Images

VDEC

Serial Number	VDEC System Installed	Date Of Installation
B.0025942	HUG Filtersystems Mobiclean R	01/01/2013

After-Treatment Summary

Performed Data Download of HUG System by use of CPK TERMINAL. Found the HUG DPF System functioning normally. However, the DPF core is soot loading very prematurely (most likely due to engine issue). Removed the DPF core for cleaning. Cleaned the core, and reinstalled. Found some exhaust clamps leaking, replaced as needed.

VDEC Images

Exhaust Temperatures rarely breaking 300 Deg C

The screenshot shows a software window titled 'DYN_Analysis V6.0.15.ML' with a menu bar and a main data display area. The data is organized into three main sections: Limit 2, Pressure Range, and Temperature Range. Each section contains a table of parameters and their values.

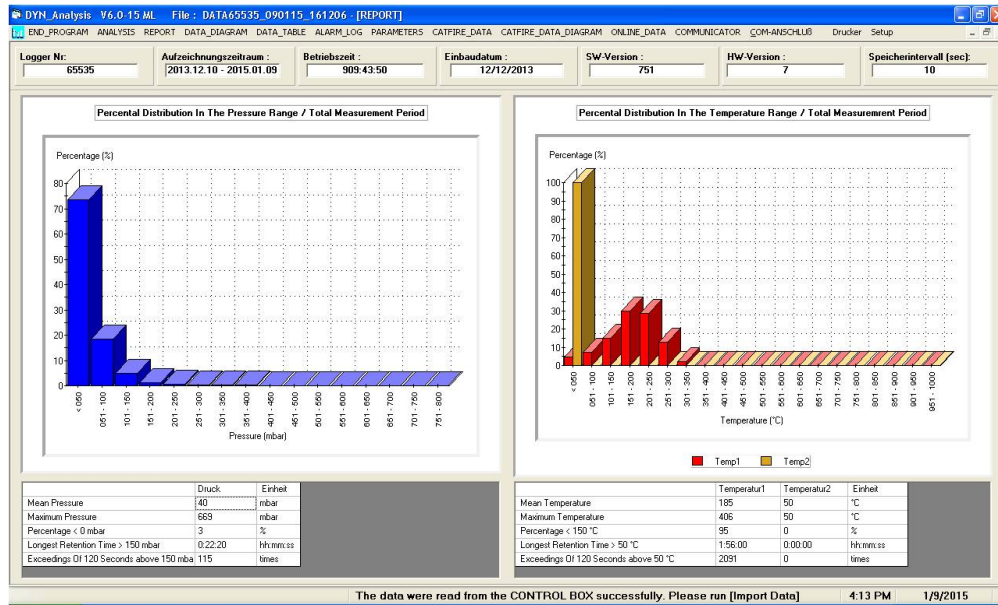
Limit 2		
Total Time Below Limit	0:00:00	hh:mm:ss
Longest Period Below Limit	0:00:00	hh:mm:ss
Percentage Below Limit	0	%
Limit 2	150	mbar
Total Time Above Limit	27:24:40	hh:mm:ss
Longest Period Above Limit	0:22:20	hh:mm:ss
Percentage Above Limit	3	%
Minimum Retention Time	1:20	s
Limit Exceedings	115	

Pressure Range		
< 050	73.44	%
051 - 100	18.59	%
101 - 150	4.95	%
151 - 200	1.37	%
201 - 250	0.59	%
251 - 300	0.36	%
301 - 350	0.24	%
351 - 400	0.17	%
401 - 450	0.09	%
451 - 500	0.07	%
501 - 550	0.05	%
551 - 600	0.04	%
601 - 650	0.02	%
651 - 700	0.02	%
701 - 750	0.00	%
751 - 800	0.00	%

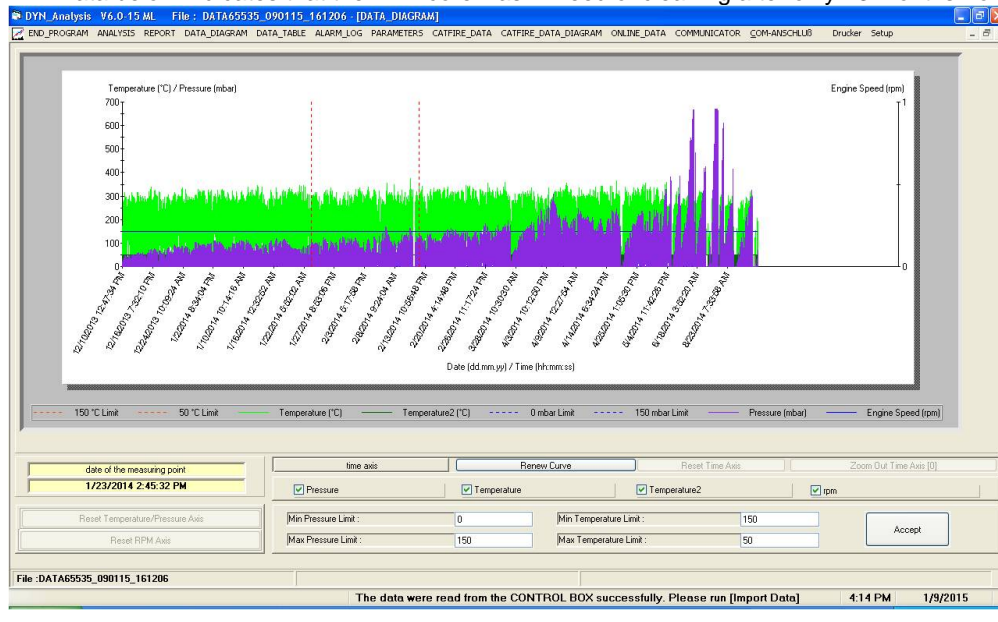
Temperature Range		
< 050	4.89	100.00 %
051 - 100	7.08	0.00 %
101 - 150	15.05	0.00 %
151 - 200	29.79	0.00 %
201 - 250	28.33	0.00 %
251 - 300	12.56	0.00 %
301 - 350	2.22	0.00 %
351 - 400	0.08	0.00 %
401 - 450	0.00	0.00 %
451 - 500	0.00	0.00 %
501 - 550	0.00	0.00 %
551 - 600	0.00	0.00 %
601 - 650	0.00	0.00 %
651 - 700	0.00	0.00 %
701 - 750	0.00	0.00 %
751 - 800	0.00	0.00 %
801 - 850	0.00	0.00 %
851 - 900	0.00	0.00 %
901 - 950	0.00	0.00 %
951 - 1000	0.00	0.00 %

The data were read from the CONTROL BOX successfully. Please run [Import Data] 4:13 PM 1/9/2015

Data Plot of Temp and Pressure (Lifetime data - since Dec 2013)



ALL Data below indicates that the DPF core was in need of cleaning after only ~3 months from date of install in Dec 2013



CORE/PRE-FILTER

Serial Number	Filter Type	Pre-Weight (grams)	Post-Weight (grams)
6628121	Core	43620	43230

Core/Pre-Filter Images

COMPLIANCE

Compliance Summary

PARTS USED

Parts Installed	Quantity	Description/Reason
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OTHER IMAGES

Opacity results prior to engine work (Cold and Hot) (Both FAILED)

CalTest™ 1000 SmokeMeter
EMISSIONS SERVICES UNLTD
 809-550-9299

VEHICLE SNAP-ACCELERATION TEST REPORT
 SAE J1507 procedure and standards
 12 JAN 15 15:57

VEHICLE EXHAUST DIAMETER: 5.0 in
 VEHICLE RATED HP IS IN RANGE: > 800
 "STD" EXH. DIAG. FOR RATED HP: 5.0 in

PRECONDITIONING - FINAL 3 PURGES

PURGE	ACTUAL OPACITY
1	27.2%
2	7.1%
3	14.5%

PEAK TEST READINGS AND RESULTS

TEST	ACTUAL OPACITY
1	11.5%
2	15.7%
3	10.5%

AVERAGE RANGE 12.7% 5.1%

NUMBER OF PURGES 0 MIN 0 VES 3 VES
 NUMBER OF TESTS 0 0 0
 RANGE OF TESTS AVERD 5% 5.1% NO
 PEAK AVERAGE 30% 12.7% VES
 POST-TEST ZERO SHIFT 2% 100% NO

FINAL TEST RESULTS: FAIL

VEHICLE ID: **6628121**
 Last mile calibration check: 03/30/14
 Near Final Update: 10/03
 SAE Test Mode: 0076

TESTING: **EMISSIONS SERVICES UNLIMITED**
 2035 Piacentia Ave. B-2
 Costa Mesa, CA 92627
 888-550-9293

CalTest™ 1000 SmokeMeter
EMISSIONS SERVICES UNLTD
 809-550-9299

VEHICLE SNAP-ACCELERATION TEST REPORT
 SAE J1507 procedure and standards
 12 JAN 15 15:125

VEHICLE EXHAUST DIAMETER: 5.0 in
 VEHICLE RATED HP IS IN RANGE: > 800
 "STD" EXH. DIAG. FOR RATED HP: 5.0 in

PRECONDITIONING - FINAL 3 PURGES

PURGE	ACTUAL OPACITY
1	5.0%
2	4.5%
3	3.5%

PEAK TEST READINGS AND RESULTS

TEST	ACTUAL OPACITY
1	5.0%
2	7.5%
3	5.0%

AVERAGE RANGE 6.4% 2.1%

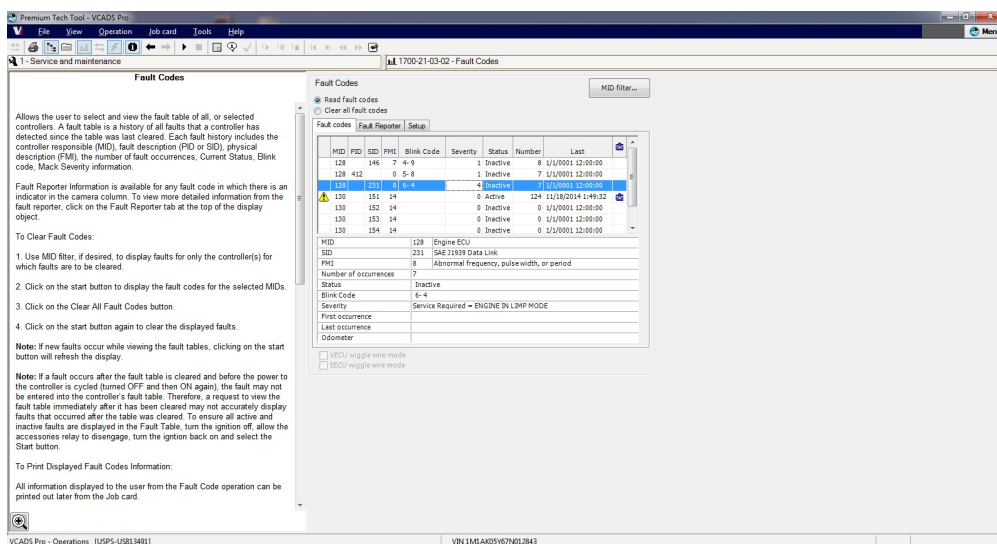
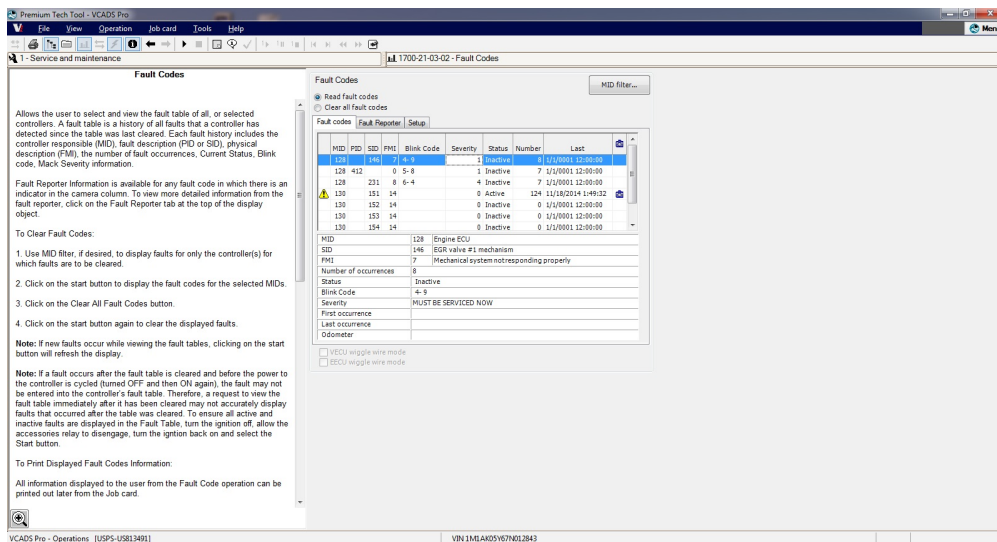
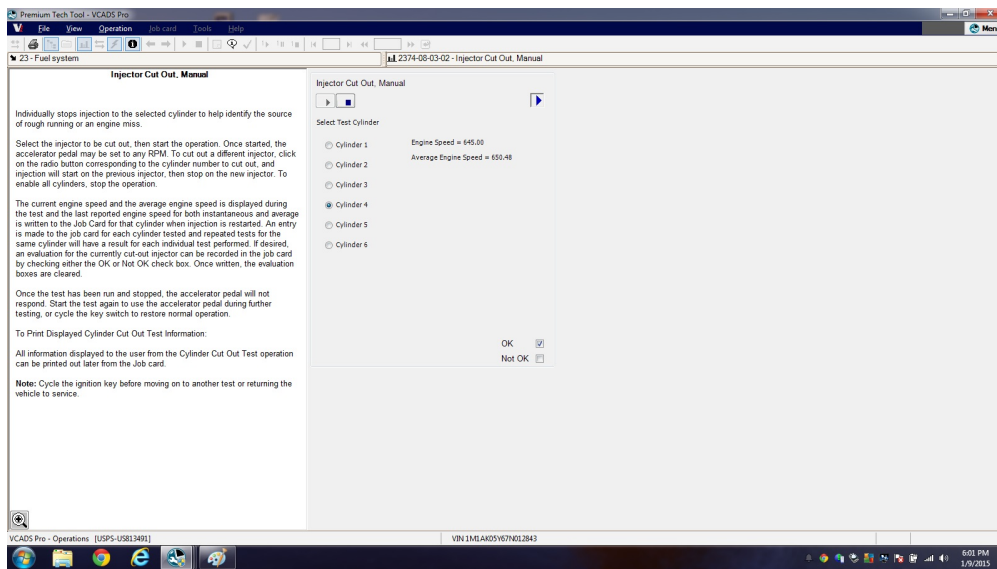
NUMBER OF PURGES 0 MIN 0 VC 3 VC
 NUMBER OF TESTS 0 0 0
 RANGE OF TESTS AVERD 0% 2.1% VS
 PEAK AVERAGE 0% 5.4% VC
 POST-TEST ZERO SHIFT 2% 100% NO

FINAL TEST RESULTS: FAIL

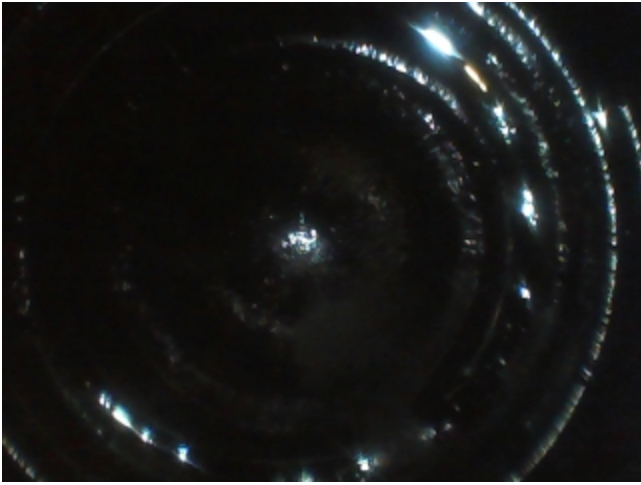
VEHICLE ID: **6628121**
 Last mile calibration check: 03/30/14
 Near Final Update: 10/03
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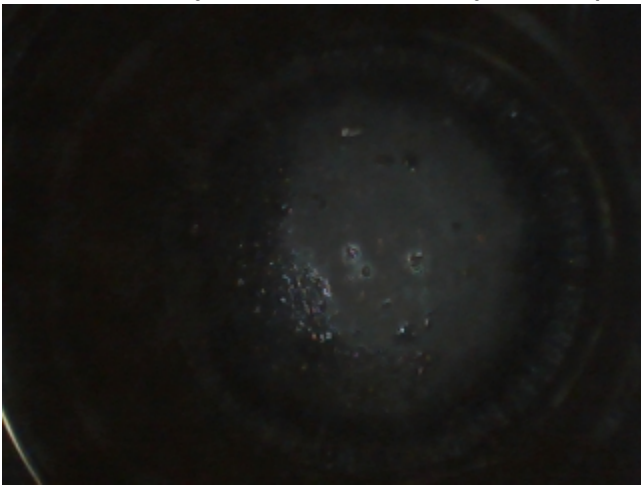
Performed various engine diagnostics, found misfires on #3 and #4



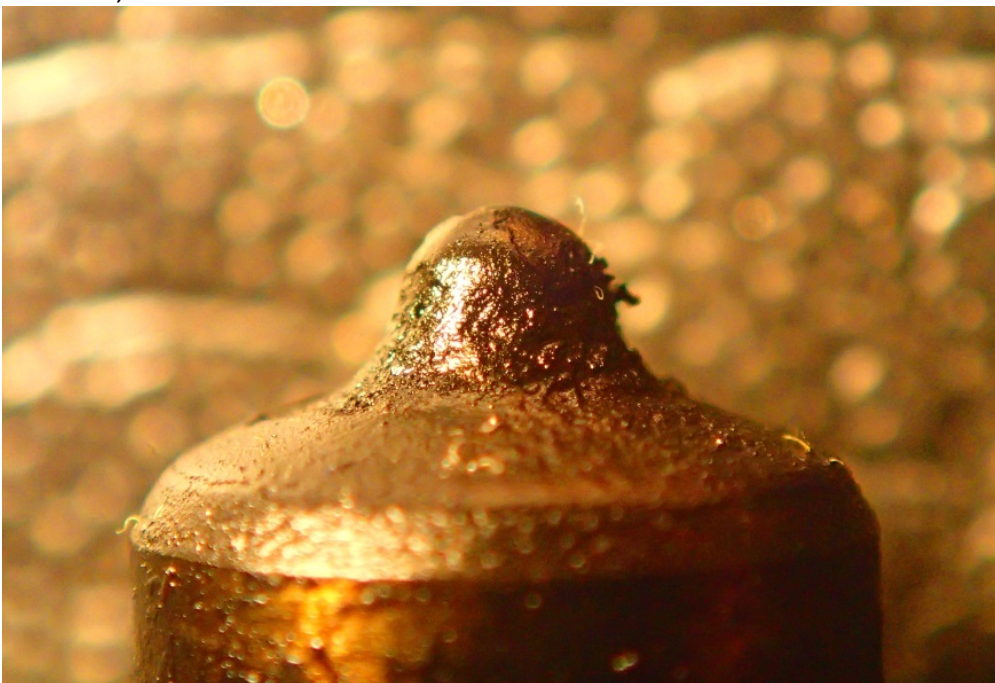
When removed NOZZLES, discovered one cylinder heavily carboned over, and had to be bored out

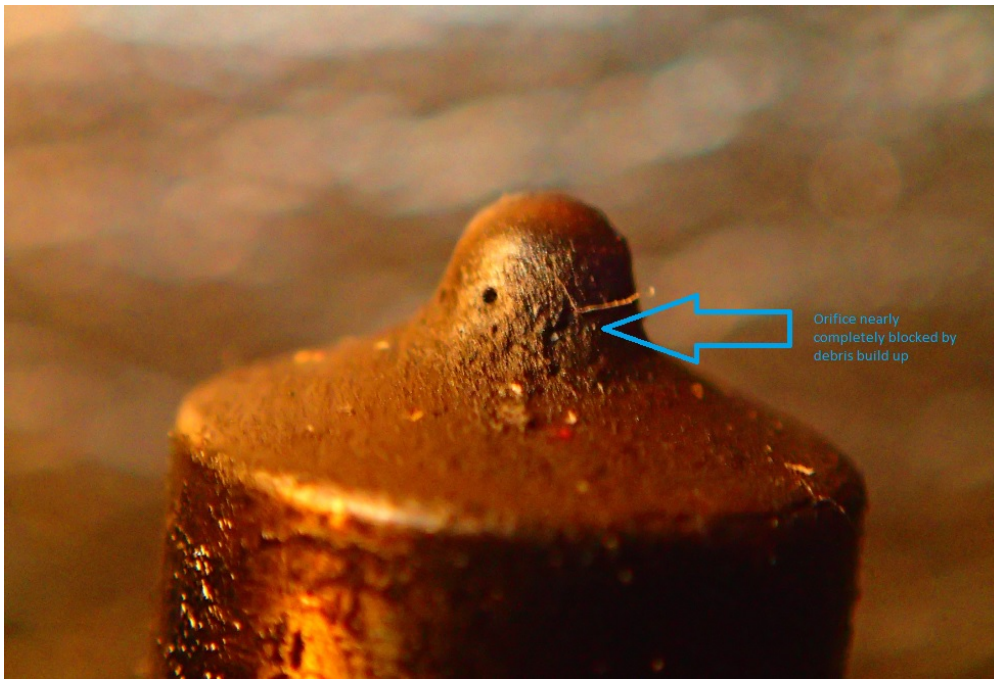


Discovered Cylinder #6 had heavy ash deposits and signs of predetonation

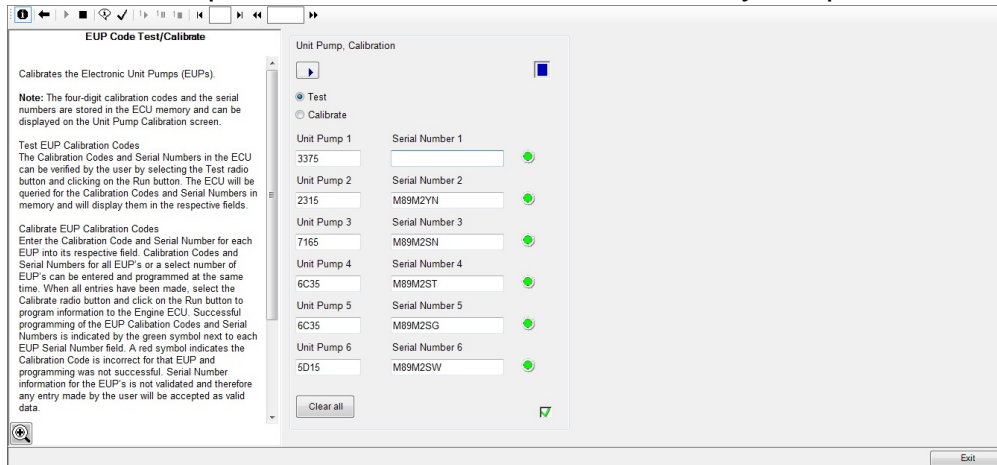


Removed Fuel Nozzles and discovered heavy blockage on #3 and #4 (install ALL NEW Fuel Nozzles)





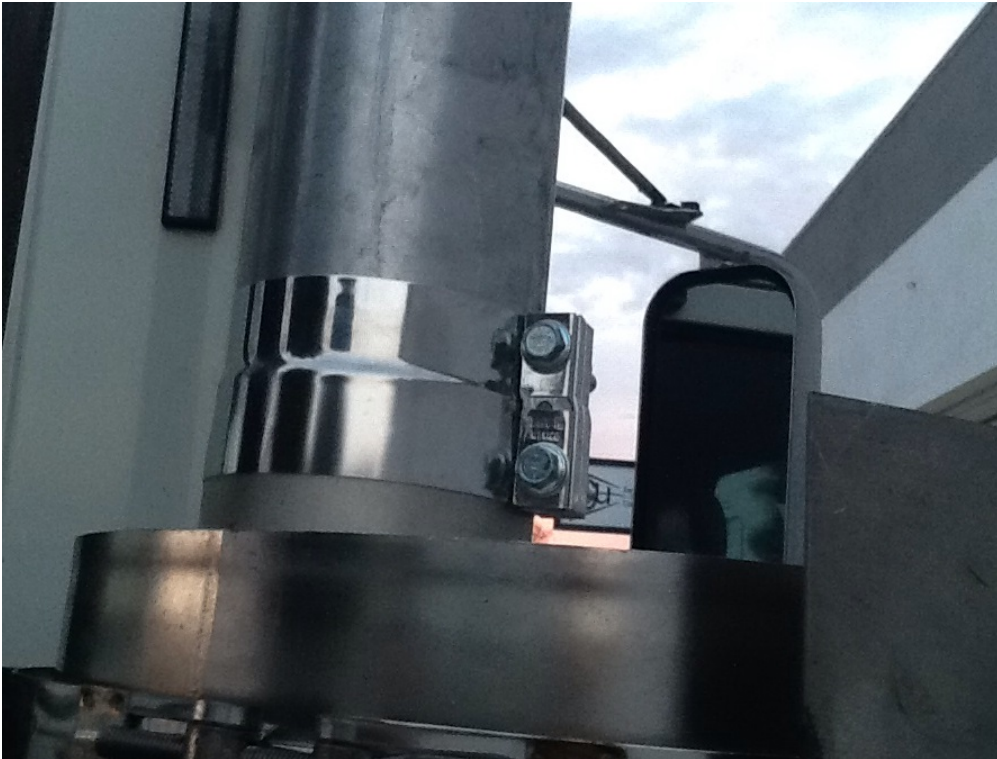
After all NEW parts installed, calibrated all necessary components



Found heavy exhaust leaks at Accuseal Clamps (removed)



Installed SEAL CLAMPS in place of all leaking AccuSeal (TM) Clamps (and cleaned all soot off truck)



After all work completed, Post Opacity Test completed, yeilding a mere 3.2% Average!

Call Test 1000 Stuckemeter

EMISSIONS OPERATIONS LIMITED
393-552-9933

VEHICLE SWAP-ACCELERATION TEST REPORT

SAE J1537 procedure and standards

28 JAN 15 17:00

VEHICLE EXHAUST DIAMETER: 5.0 in

VEHICLE WEIGHT UP IN RANGE: > 1000

"GROSS" WGT. DIAV. FOR DATED WGT: 5.0 in

PRECONDITIONING - FIVE (5) PURGES

2.0% 4.5%

5 7.5%

6 4.0%

PEAK TEST READINGS AND RESULTS

ACTUAL AVERAGE

4.1%

2.1%

5.3%

AVERAGE 0.2%

RANGE 1.0%

NUMBER OF PURGES 0 MIN 6 YES
NUMBER OF TESTS 0 YES
NUMBER OF TESTS AVOID 0 YES
RANGE OF TESTS AVOID 5% 1.0% YES
PEAK AVERAGE 2% 0.2% YES
POST-TEST ZERO OUTPUT 0% 1.4% YES

FINAL TEST RESULTS: PASS

VEHICLE ID:

License# 04156767-00007 05/25/14

Test Serial Number: 19910

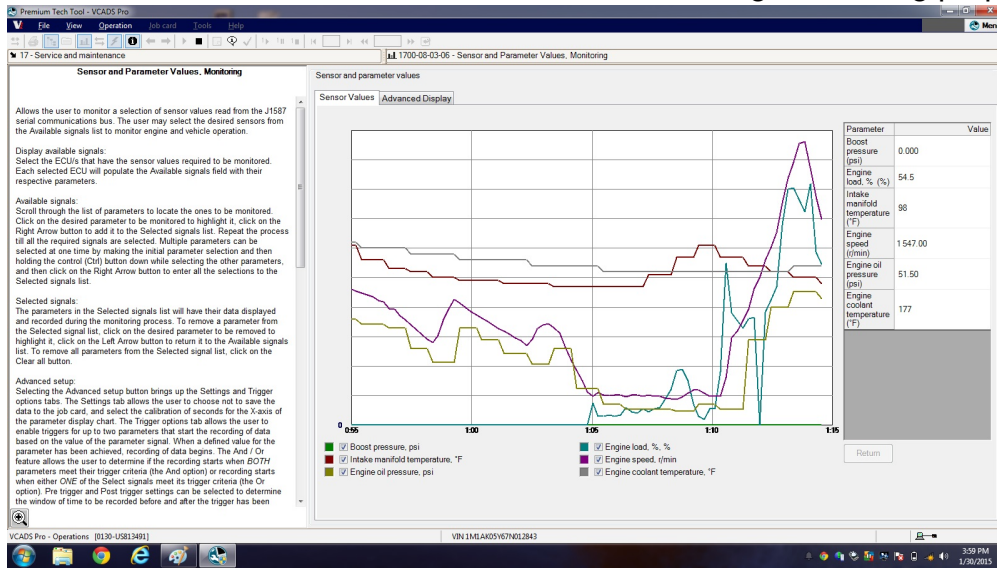
Station# 10306

Site Ref. Date: 1/20/15

EV:

REMARKS:

Performed ROAD TEST to confirm all sensor and engine working properly



Post DPF Cleaning, Exhaust Pressure (original was nearly 60mBAR at fast idle, now only ~20mBAR)

