Investigation Summary Report DRAFT

H&S Performance

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EXECUTIVE SUMMARY

From January through July 2013, a compliance inspection team comprised of staff from EPA and EPA's contractor, Eastern Research Group, Inc. (ERG) investigated H&S Performance's (H&S) compliance with tampering prohibitions of the Clean Air Act (CAA) Section 203 (a)(3). This report summarizes EPA's investigation of the H&S tuning device, demonstrating that the device is not compliant with CAA tampering prohibitions, and includes emissions testing results of an EPA-purchased H&S tuner on a Dodge 3500 Ram test vehicle with a 6.7 liter turbo diesel engine. The engineering analysis of the design and function confirms that the H&S tuner alters the engine's intended operational design critical to control of emissions. Furthermore, test results confirm a measureable increase in emissions.

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I. INTRODUCTION

A compliance inspection team comprising staff from EPA and EPA's contractor, ERG, investigated H&S for potential tampering of on-highway engines. H&S is an aftermarket manufacturer of on-highway light heavy-duty engine computer tuning devices. H&S advertises these devices to increase performance and fuel economy when installed on several different popular on-highway light heavy-duty engines. The following personnel participated in this investigation:

EPA Representatives:	Anne Wick, MSEB, EPA Headquarters
EPA Contractors:	Brent Ruminski, ERG Michael Sabisch, ERG Alan Stanard, ERG Goppi Manne, ERG Andrew Loll, ERG
Cummins Representatives:	[redacted]

The inspection team focused on requirements of the Clean Air Act (CAA) Section 203 (a)(3) that prohibit tampering of emission control devices. EPA's Memorandum 1A states that the use of an aftermarket replacement part or add-on part will not constitute tampering if the dealer has a "reasonable basis" to believe that the act or device does not adversely affect emissions performance.[1] It also provides specific procedures or options by which the dealer would have a "reasonable basis" for evaluating whether an act or device would affect emissions performance. A common reasonable basis is that the device performs the identical function of the original part it replaces (e.g., a Fram oil filter instead of a stock oil filter). Memorandum 1A also explains that as an alternative, the manufacturer may conduct emissions testing in accordance with 40 CFR Part 85 demonstrating compliance with emission standards for the useful life of the vehicle or engine. [2]

To date, H&S has not submitted any documentation to EPA of completed emissions testing demonstrating that the engine computer tuning devices of concern do not adversely affect emissions performance. This report summarizes EPA and ERG's investigation of the H&S tuning device. Throughout the report, photographs from the investigation provided in Appendix A and are referred to as Photograph [#].

II. H&S PRODUCTS OF CONCERN AND SCOPE

H&S offers many types of automotive performance products, including the aforementioned engine computer tuners, cold air intakes, and tuning software for personal computers called Maxx Calibration Control (MCC).[3] This investigation is primarily focused on the engine computer tuners. H&S's website lists three different engine computer tuner models that are capable of installing calibrations for engine operation with the removal of the diesel particulate filter (DPF) and the exhaust gas recirculation (EGR) as well as tuning engines with the DPF and EGR in place:

- Mini Maxx;

[1] Memorandum 1A is available online at: http://www.epa.gov/compliance/resources/policies/civil/caa/mobile/admem1a.pdf.
[2] Subsequently revised and incorporated under 40 CFR Part 86.
[3] The MCC software allows users to view, create, or modify calibrations on their H&S performance tuners and is free to download from H&S's website. However, in order to enable the software to communicate with a tuner, the user must purchase an unlock code specifically for the MCC software.

- XRT Pro; and
- Black Maxx.

In early 2013, EPA communicated their concern to H&S regarding all tuners capable of installing DPF- and EGR-removed calibrations. As of April 2013, H&S had changed their website by dividing each tuner model into a "street" version and a "racing" version and indicating that the racing version was discontinued. Around this time, H&S only offered tuners that had the DPF- and EGR-removed calibrations available with an unlock code. The street versions no longer listed DPF and EGR removal as one of the featured capabilities. On 11 July 2011, H&S reported to EPA that they ceased production of tuners with such capabilities including unlock codes.

ERG later determined that both versions still contain the DPF- and EGR-removed calibrations. However, the racing tuners come ready to install these calibrations directly out of the box whereas the street tuners require an unlock code in order to install them. Otherwise, the street tuner is only capable of installing calibrations that enhance performance without the removal of the DPF and EGR.[4] For this investigation, EPA was primarily concerned with investigating the following:

- Racing tuner availability: Whether H&S has continued to make unlock codes available to dealers or customers.
- Racing tuner (emissions equipment-removed calibrations *included*): Determining what engine parameters are altered by these type of calibrations and if this type of calibration adversely affects emissions performance; and
- Street tuners (emissions equipment-present calibrations *not included without unlock code*): Determining what engine parameters are altered by these types of calibrations and if these types of calibrations adversely affect emissions performance.

III. INVESTIGATIVE PHONE CALLS TO H&S DEALERS

H&S has hundreds of authorized dealers for their products across the country.[5] On the 24-25 April 2013, ERG contacted 15 different H&S dealers around the country to determine if they were still able to provide H&S tuners capable of defeating EGR and DPF. ERG contacted the dealers as a potential customer looking to removing the EGRs and DPFs from their truck.

Table 1 groups the dealers' responses into different response categories. In summary, only five of the dealers were able to sell an H&S tuner equipped with the DPF- and EGR-removal capabilities. However, four of these dealers acknowledged that they could only have a few remaining in-stock and they are no longer able to get the units from H&S with unlock codes. Only one dealer, Confederate Diesel, suggested that they are still able to receive unlock codes from H&S.[6] Appendix B includes the contact reports for the 15 dealers.

Table 1. Summary of Investigative Phone Calls to H&S Dealers

Response Categories	Number of Facilities that Fit In This Response Category
Stated that H&S is still providing a tuner capable of installing DPF and EGR removed calibrations	5[a]

[4] Section VI.B provides more detail on the installation options ERG observed with the street version of the Mini Maxx Tuner.
[5] A list of authorized H&S dealers is available online at: http://www hsperformance.com/1/dealers-main-section?sid=1:Dealer-Locator.
[6] Confederate Diesel's website is available online at: http://www.confederatediesel.com/h-and-s-mini-maxx-offroad-custom-tuning html.

Table 1. Summary of Investigative Phone Calls to H&S Dealers

Response Categories	Number of Facilities that Fit In This Response Category
Stated they are continuing to receive unlock codes from H&S	1
Stated they can no longer receive unlock codes from H&S because they are discontinued but still have tuners in stock	4
Stated they are unable to provide an H&S tuner capable of installing DPF and EGR removed calibrations	10
Offered other brands of tuners capable of installing DPF- and EGR-removed calibrations	3
Offered to perform custom tuning that accomplishes DPF and EGR deletes	1
Offered no services for DPF- and EGR- removed calibrations or deletes	6

a – Two of these facilities offered to install the H&S tuner and perform the DPF and EGR hardware removal at their shop.

IV. PURCHASE AND ANALYSIS OF H&S TUNERS

ERG purchased two separate H&S performance tuners as part of this investigation. The following summarizes the purchasing process and observations.

A. Mini Maxx Tuner

On 16 April 2013, ERG purchased an H&S tuner online through Truckwurx, LLC (Truckwurx), an H&S dealer located in Las Vegas, Nevada.[7] At the same time, ERG also purchased the unlock code for the MCC software from Truckwurx. EPA was primarily interested in the MCC software to have a tool to evaluate the alterations H&S tuners make to a stock engine computer.

To purchase the Mini Maxx tuner with EGR and DPF defeat capabilities, ERG first added the racing version of the Mini Maxx tuner and the MCC software unlock code to the shopping cart on Truckwurx's website. ERG completed the checkout process and Truckwurx quickly responded via two separate emails containing the unlock codes for both the tuner's race mode and the MCC software. Appendix C provides the emails received from Truckwurx that contain the unlock codes.

Photograph [1] shows the Mini Maxx tuner out of the box as received by ERG on 17 April 2013. Photographs [2] and [3] show the product description and the serial number as 0070041354. The date 21 March 2013 was also printed next to the serial number suggesting that unit was produced prior to the production end date of H&S race tuners on 11 July 2013.

The Mini Maxx is advertised to be compatible with the following list of engine makes, models, and model years:

- 2006 – 2007: Cummins 5.9 Liter
- 2007.5 – 2009: Cummins 6.7 Liter
- 2010 – 20012: Cummins 6.7 Liter
- 2003 – 2007: Ford Powerstroke 6.0 Liter

[7] More information on Truckwurx is available online at: http://truckwurx.com/.

- 2008 – 2010: Ford Powerstroke 6.4 Liter
- 2011 – 2013: Ford Powerstroke 6.7 Liter
- 2007.5 – 2010: Duramax 6.6 Liter
- 2011 – 2013: Duramax 6.6 Liter

B. XRT Pro Tuner

On 18 July 2013, ERG purchased a second H&S tuner. This time, ERG purchased the XRT Pro tuner from Monster Performance Exhaust.[8] Photograph [4] shows the XRT Pro tuner out of the box as received by ERG on 23 July 2013. Photograph [5] shows the serial number on the sticker as 0060039934. The date 21 March 2013 was also printed next to the serial number suggesting that unit was produced prior to the production end date of 11 July 2013 claimed by H&S. Photographs [6] and [7] show the warranty card received with the XRT Pro and also include the part number and serial number. The warranty card also indicates that the XRT Pro is capable of installing software modifications necessary to support "off-road/race modifications". The XRT Pro box indicated that the unit is compatible with the same engine model makes, models, and model years as the Mini Maxx.

V. EVALUATION OF THE MINI MAXX TUNER CALIBRATIONS

On 11 July 2013, H&S provided EPA several MCC files including: a stock calibration file and a DPF/ERG calibration file for a 2010 6.7 liter Cummins engine. ERG reviewed the engine data maps using the MCC software that ERG purchased in order to evaluate the alterations the Mini Maxx performs to a stock vehicle. Appendix D provides a memorandum describing the comparison of the engine data maps in the Cummins stock calibration to the H&S calibrations. ERG determined that the following engine parameters are altered by the H&S calibrations:

- Main injection duration maps – Increased up to 43 percent for the performance on-the-fly power setting;
- Maximum fuel rate curves – Increased by up to 2.5 percent for the performance on-the-fly power setting; and
- Fuel injection timing – Advanced by up to 10.93 degrees depending on the engine speed.

ERG confirmed that the following engine parameters were not altered:

- Injection pressure maps; and
- Torque-to-fuel conversion maps.

VI. TESTING OF H&S MINI MAXX

Cummins agreed to provide EPA with a test vehicle and conduct emissions testing on it to measure and document changes in emissions and engine operation when using the H&S Mini Maxx purchased by ERG. Cummins performed testing with EPA and ERG personnel at Cummins' facility located in Columbus, Indiana 24-26 June 2013. The following subsections summarize the results and observations.

A. Test Vehicle

Cummins provided a 2012 MY Dodge Ram 3500 with a Cummins 6.7 liter light heavy-duty engine. Table 2 provides a detailed description of the test vehicle. The test vehicle was OBD II compliant and was certified to meet 2012 MY emissions standards. The vehicle was loaded with bags of sand to simulate 50 percent payload for all testing. Photographs [8] through [12] show the test vehicle at the time of the

[8] Monster's website is available at: http://monsterperformanceexhaust.com.

testing. Photograph [13] shows the H&S Mini Maxx mounted onto the test vehicle windshield after being installed (see Section VI.B for installation information).

Table 2. Cummins Test Vehicle Description

Parameter	Value
Make	Dodge
Model	3500
Model Year	2012
Engine Size	6.7 L
VIN	3C63D3GL2CG181452
Odometer (beginning of testing)	9,532 miles[a]
EPA engine family:	CCEXD06.78WV
Emissions Equipment	Heated oxygen sensor (HO2S), turbo charger (TC), NOx absorption catalyst (NAC), direction diesel injection (DDI), charge air cooler (CAC), Period trap oxidizer (PTOX), oxidation catalyst (OC), exhaust gas recirculation (EGR)
Certified standard (g/mi)[b]	
NOx	0.4
PM	0.02
CO	8.1
HC (non-methane)	0.23

a – This is the odometer reading observed at the beginning of testing on 24 June 2013. However, Cummins indicated that the engine and emissions equipment may have closer to 40,000 total miles.
b – Emissions standards from EPA's website at: http://www.epa.gov/otaq/crttst htm.

B. Mini Maxx Installation Options

When first plugged into the vehicle, the Mini Maxx requires input of basic information such as the vehicle make, model, and model year. The following describes the general steps for installing an H&S calibration after the initial setup. These installation steps occur under the "downloads" menu option and then under the "install downloads" sub menu:

1. The user is prompted to adjust the level of injection timing advancement. See Photographs [14] and [15].[9]
2. The user is prompted to adjust the speed limiter of the vehicle.9
3. The user is prompted to enter whether the emissions equipment (DPF and EGR) are removed or present on the vehicle. See Photograph [16]. Note: This prompt only appears if the unlock code has been entered into a different menu separate from the installation menu. See Photograph [17] for a screen shot after the unlock code is entered.
4. The Mini Maxx builds the desired calibration and installs it onto the engine computer. This step lasts approximately 10 minutes.
5. After the installation completes, the vehicle is ready to drive. The user is able to change the on-the-fly power levels between stock, tow, street, and performance. For example, Photograph [18] shows the Mini Maxx set to the performance on-the-fly power level.

[9] These options occur prior to the calibration installation. Therefore, these options cannot be changed on-the-fly after the installation is complete.

Figure 1 shows the installation options in flow chart-format. Dotted lines represent options that are only available if the "high sulfur" unlock code has been entered into the "emissions selection" menu. The red text indicates the options that EPA selected to complete the desired matrix of testing scenarios. Section VI.D provides more information on the matrix of testing. ERG will refer to the two different H&S calibrations as the H&S emissions present calibration and the H&S emissions removed calibration for the remainder of this report. Section VI.C provides more information on the testing matrix.

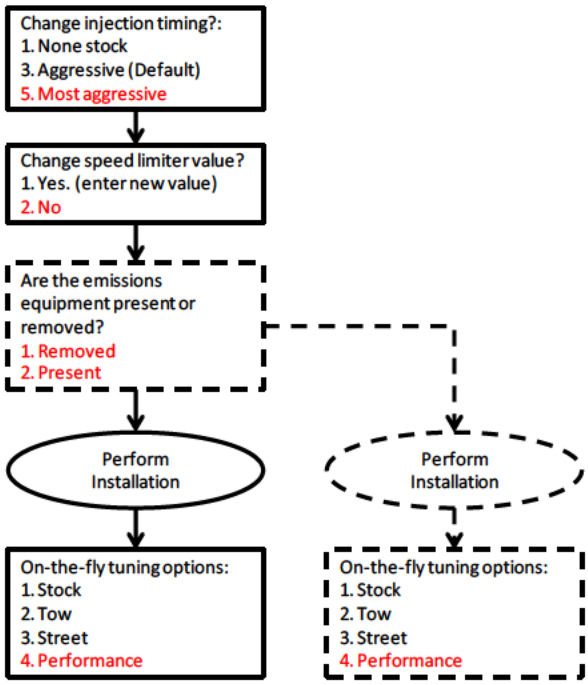


Figure 1. Mini Maxx Installation Flow Chart

For the initial installation, ERG was not given the option to enter whether the emissions equipment was present or removed. In a menu option called "emissions selection", ERG entered the unlock code received by H&S (see Section IV for more information on unlock code retrieval). Only after entering this code, the installation process included a prompt for the user to indicate if the engine emissions equipment are present or removed. Photograph [17] shows a screen shot of the Mini Maxx after entering the unlock code. It is important to note that even without the unlock code entered; the user was still prompted to change injection timing.

ERG confirmed the following additional items during the installation process:

- The emissions equipment-removed calibration is designed to disable both the EGR and DPF at the same time. This assumes that, at a minimum, the vehicle operator has unplugged the EGR valve and installed a straight pipe to remove the DPF. H&S does not recommend installing this calibration with the DPF present in order to only disable the EGR because the DPF filter may clog.

- The Mini Maxx is capable of being installed onto any vehicle listed Section VI.A. However, as explained in Section IV, customers are required to provide the VIN for the intended vehicle during the purchasing process. Out of the box, the Mini Maxx must first be fully installed onto the vehicle with the reported VIN and then completely uninstalled from that vehicle in order for the unit to be installed on any other vehicles.

- If the Mini Maxx is unplugged from a vehicle during operation, the most recent Mini Maxx calibration remains installed. However, the on-the-fly power level automatically resets to the mildest setting. Section VI.E.2 summarizes recorded OBD data which confirms this.

C. Test Cycle Selection

After consulting with Cummins, EPA decided to test the Dodge 3500 on three different test cycles for each of the two H&S calibrations described in Section VI.B. The following describes the three test cycles and Table 3 provides a more detailed technical description of the aforementioned test cycles.

- LA-4 – The LA-4 is also known as the US FTP-75 (Federal Test Procedure) cycle or the Urban Dynamometer Driving Schedule (UDDS). This test is designed to mirror city driving conditions simulated frequent starts and stops. EPA conducted each LA-4 test cycle two times consecutively and only used emissions results from the second test to ensure that the vehicle's engine and fluid temperatures were always the same.
- Highway Fuel Economy Test (HWFE) – The HWFE is a test cycle that is designed to mirror normal highway driving. EPA conducted each HWFE test cycle one time within a few minutes after the LA-4 test.
- US06 – The US06 is also known as the Supplemental Federal Test Procedure (SFTP) which was to address the shortcomings with the FTP-75 test cycle. It captures aggressive, high speed and/or high acceleration driving behavior, rapid speed fluctuations, and driving behavior following startup. EPA conducted each US06 test cycle two times consecutively (i.e., two phases) with no time gap in between runs and only used the emissions results from the second phase.

Table 3. Emissions Testing Description

Test Scenario	LA-4	HWFE	US06
Short description	Normal city driving	Normal highway driving	Hard city driving
Number of consecutive tests for each data point	2	1	2
Miles per test cycle (miles)	7.45 (14.9 total)	10.26	8.01 (16.02 total)
Average speed (miles per hour)	19.6	48.3	48.4

D. Testing Matrix

Table 4 shows the matrix of test cycles and H&S calibrations along with the date of completion.[10] For both calibrations, the fuel injection timing was increased to the highest level of advancement. In addition, all H&S calibration testing was performed with the on-the-fly power level set to performance.

For the H&S emissions equipment-removed calibration, ERG with the assistance of Cummins, disabled both the EGR and DPF. This included unplugging the EGR throttle valve control harness as directed by the H&S installation instructions (see Photograph [19]). The rest of the EGR system remained fully installed. For the DPF, Cummins removed the bolt-in exhaust pipe section that included the oxidation catalyst and DPF and replaced it with the same stock exhaust pipe section but with no catalyst substrates. This method was used to represent a straight pipe installation. Due to logistics, Cummins left one catalyst inside the exhaust system upstream of the bolt-in exhaust pipe. Photograph [20] shows the stock exhaust pipe that was removed and replaced for the testing.

Table 4. Chassis Dynamometer Test Cycle Matrix for H&S Mini Maxx Emissions Testing

Test Cycle	Baseline	H&S: Emissions Present[a]	H&S: Emissions Removed[a]
LA-4	Prior to 6/24/2013	6/25/2013	6/26/2013
HWFE	Prior to 6/24/2013	6/25/2013	6/26/2013
US06	6/24/2013	6/25/2013	6/26/2013

a – Both H&S calibrations were run on the performance on-the-fly power level.

E. Results

The following subsections summarize the results and observations from the emissions testing. This includes analysis of live engine data, observations of general engine information reported through the OBD, and emissions test results.

1. Live Engine Data

During the testing, Cummins logged live engine operating data by connecting a laptop computer directly to the engine computer and provided EPA the data after testing was completed. ERG analyzed engine parameters that can affect emissions performance if altered from the designed operating range including EGR throttle position (% open), fuel injection timing in degrees prior to top dead center, and air-to-fuel ratio (AFR).

The raw data from Cummins included a value for each engine parameter over time at the rate of 600 hertz, or 600 data points per second. For all data analyses, ERG did not analyze data before the vehicle speed increased from zero at the beginning of testing and after the vehicle speed reached zero at the end of the testing. This is because the data logger often started logging data immediately after engine start up and when the actual test cycle commenced (i.e., the vehicle was put into drive). ERG calculated the median, average, and range of the reported instantaneous EGR throttle position and the fuel injection timing. The raw data did include instantaneous air and fuel flow rates necessary to calculate instantaneous AFR. However, ERG did not analyze instantaneous AFRs due to potential time lag differences between air and fuel rates.[11]

[10] All information provided in this section is available on EPA's website at: http://www.epa.gov/nvfel/testing/dynamometer htm.
[11] A very small time lag (less than a second) can cause an inaccurate instantaneous AFR.

Instead to estimate AFR, ERG integrated the instantaneous fuel mass rate and instantaneous intake air mass flow to calculate the cumulative air and fuel flow for the entire test cycle and then subsequently calculated the cumulative average AFR. Furthermore, the raw data reported fuel flow rate in units of mass per stroke which required conversion to mass per unit time using other data reported. Equation 1, Equation 2, and Equation 3 convert the reported mass per stroke to mass per unit time, integrate the instantaneous mass flow rates, and calculate the cumulative fuel used for each test cycle. Note: Bold values in the equations were reported directly in the raw engine data.

Equation 1

$$Cumulative\ Fuel\ (kg) = \sum \boldsymbol{RPM_{inst}} \left(\frac{revoltions}{minute}\right) \times \boldsymbol{Fuel_{inst}} \left(\frac{kg}{stroke}\right) \times \left(\frac{2\pi}{revolution}\right) \times \left(\frac{180\ degrees}{\pi}\right) \times \left(\frac{1\ stroke}{720\ degrees/cylinder}\right) \times 6\ (cylindrs) \times \Delta \boldsymbol{Time}$$

Equation 2

$$Cumulative\ Air\ (kg) = \sum \boldsymbol{Air_{inst}} \left(\frac{\text{kg}}{\text{minute}}\right) \times \Delta \boldsymbol{Time}$$

Equation 3

$$Cumulative\ AFR\ (kg{:}\,kg) = \frac{Cumulative\ Air\ (kg)}{Cumulative\ Fuel\ (kg)}$$

Table 5 provides the range, median, and average values that ERG calculated for the live engine data logged by Cummins. The following summarizes the observations for each engine parameter:

<u>EGR</u>

- The H&S emissions equipment-removed calibration forced the EGR throttle position to be a constant zero verifying that this H&S calibration disables the EGR.
- The H&S emissions equipment-present calibration increased the EGR throttle position and, consequently, the total EGR flow for the LA-4 and HWFE test cycles. The H&S emissions equipment-present calibration slightly decreased the EGR throttle position and, consequently, decreased the EGR flow for the US06 test cycle. Cummins was unable to provide repeatability data for EGR throttle position.

<u>Fuel Injection Timing</u>

- The H&S emissions equipment-removed calibration altered the average fuel injection timing by advancing it by two to five degrees on average.
- The H&S emissions equipment-present calibration altered the average fuel injection timing by advancing it by two to five degrees on average.

<u>AFR</u>

- The H&S emissions equipment-removed calibration increased the cumulative average AFR for all test cycles.
- The H&S emissions equipment-present calibration did not alter the cumulative average AFR for any test cycle.

Table 5. Cummins Testing Live Data Observations

Test Cycle	Parameter	Value Type	Baseline	H&S: Emissions Equipment Present[a]	H&S: Emissions Equipment Removed[a]
LA-4	EGR Throttle Position (% open)	Range	0 – 97.63	0 – 97.63	--
		Median	95.41	95.41	0
		Average	71.02	75.85	0
	Fuel Injection Timing (degrees before top dead center)[b]	Range	-159 – 2.69	-157.63 – 4.5	0 – 4.28
		Median	0.84	3.97	3.97
		Average	-0.41	2.24	2.91
	AFR (kg/kg)	Cumulative Average	21.65	21.88	52.46
HWFE	EGR Throttle Position (% open)	Range	0 – 97.63	0 – 97.63	--
		Median	22.19	26.63	0
		Average	42.88	46.08	0
	Fuel Injection Timing (degrees before top dead center)[b]	Range	-3.66 – 1	0 – 3.97	0 – 3.97
		Median	-1.34	3.97	3.97
		Average	-1.26	3.63	3.66
	AFR (kg/kg)	Cumulative Average	21.33	21.07	41.41
US06	EGR Throttle Position (% open)	Range	0 – 99.84[c]	0 – 97.63[c]	--
		Median	22.19	19.97	0
		Average	46.36	45.69	0
	Fuel Injection Timing (degrees before top dead center)[b]	Range	-21 – 13.31	0 – 19.47	0 – 12.72
		Median	0	3.97	3.97
		Average	0.14	3.36	3.33
	AFR (kg/kg)	Cumulative Average	23.63	23.08	38.29

a – Both H&S calibrations were run on the performance on-the-fly power level.
b – Fuel injection timing is represented in degrees before top dead center. A value of zero represents top dead center. A negative value represents a delayed timing after top dead center. A positive value represents an advanced timing prior to top dead center.
c – The raw data included a several EGR throttle positions as -2.22. ERG included these negative values in the median and average calculations but not for the range.

2. OBD Scan Tool Data Observations

After completion of the three emissions tests for each testing scenario, ERG immediately removed the H&S tuner and connected an OBD II scan tool to the OBD II data link connector (DLC) on the test vehicle and obtained vehicle data. Table 6 shows the data obtained through the OBD DLC after each set of tests. It is important to note that when the Mini Maxx is unplugged, the most recent calibration remains installed on the engine computer but the on-the-fly power level resets to the lowest setting called "stock" not to be confused with the manufacture calibration. Therefore, the unit can be unplugged but injection timing and emission control modifications will remain installed on the ECM.

ERG observed the calibration identifications (Cal ID) after each H&S test and the value always matched the certified Cal ID.[12] However, the calibration verification numbers (CVNs) reported by the OBD were different for all three testing scenarios, confirming that the engine computer data maps were altered by the H&S Mini Maxx for both H&S calibrations.[13] Cummins confirmed that the CVN value of 80C5BCE1 is the certified CVN for the 12351331AG Cal ID, which is the certified OEM calibration Cal ID.[14] This CVN value was observed after the computer was returned to stock.

During all installations, the Mini Maxx interface reports "clearing DTCs", indicating that the tuner deliberately disables the function of the OBD. During all testing scenarios, the MIL was off while the H&S Mini Maxx was plugged in. After the H&S emissions equipment- removed calibration was uninstalled, the MIL immediately turned on, confirming that the tuner "disabled" OBD MIL illumination, even with a physically removed exhaust system. However, Cummins suggested that the Mini Maxx did not appear to be manually turning off MILs during the emission equipment-present calibration scenario.

Table 6. OBD Scan Tool Observations

Test Scenario	Calibration Returned to Stock[a]	H&S: Emissions Equipment Present[b]	H&S: Emissions Equipment Removed[b]
MIL Status	On	Off	Off
DTC Count	5[c]	1	Unknown[d]
Calibration ID 1	12351331AG	12351331AG	12351331AG
Calibration ID 2	10375249970173D2	10375249970173D2	10375249970173D2
Calibration Verification Number 1	80C5BCE1	32FEBCE1	CCEBBCE1
Calibration Verification Number 2	000073D2	000073D2	000073D2

a - This OBD data was observed after the vehicle ECM was returned to its stock calibration while the empty bolt-in emissions piping (i.e., straight pipe) was still installed. As a result, the MIL indicator was illuminated.
b – Both H&S calibrations were run on the performance on-the-fly power level.
c—Five DTCs were triggered when the Mini Maxx calibrations were completely uninstalled from the vehicle and the exhaust system with the missing catalyst substrate was still installed.
d—The DTC screen on the scan tool was not photographed during this scenario.

3. Emissions Results

Table 7 shows test results for NO_x, PM, NMHC, and fuel economy. For NOx and NMHC, Cummins provided both system out (SO) values, which represents tailpipe emissions, and engine out (EO) values, which represents emissions prior to after-treatment. Cummins was able to estimate the EO emissions by inserting a probe immediately downstream of the turbo charger, prior to after-treatment.

The results in Table 7 are presented as they were reported by Cummins. However, it is important to note that the test results in Table 7 do not include the Engine Adjustment Factor (EAF) for NO_x which is necessary to account for emissions during DPF regeneration. Engine manufacturers must add the EAF to the final test results during engine family certification if regeneration does not occur during the testing.[15]

[12] The Cal ID represents the software version.
[13] The CVN is the result of a 'check-sum' calculation performed by the OBD system using the engine data maps as inputs. If the data values have not been changed or corrupted, the CVN will always provide the same sum for a given Cal ID. If the ECM has been modified or corrupted any of the calibration values, the CVN calculation will generate an incorrect 'sum'.
[14] Appendix E provides email documentation from Cummins verifying [redacted] is the certified CVN.
[15] More information on engine adjustment factors is available online at: http://www.epa.gov/otaq/highway-diesel/workshop/420f04022.pdf.

Cummins manually performed DPF regeneration each day prior to testing to ensure that it did not occur during the test cycles. The EAF is 0.0609 grams per mile for NO_x for this engine family.

Due to logistics, replicate test results were not available to quantify test repeatability. However, based on Cummin's historical data of emissions testing on this engine family, they estimate approximately 0.03 grams/mile NOx variability in back-to-back tests with the same vehicle model, engine model, calibration, and aftertreatment system on the FTP75 test cycle.[16] This is equivalent to approximately 13 percent variability at the measured SO NO_x level on the LA-4 test cycle. However, it is important to note that EPA's testing did not include a full FTP75 test cycle, which is the basis for Cummins's repeatability estimate of 0.03 grams NO_x per mile.[17] Because of the similarity of the LA-4 and FTP75 test cycles, it is reasonable to assume that the repeatability for the two cycles are on the same order of magnitude (i.e., the maximum variability would be 0.10 grams NO_x per mile, or 43 percent of the LA-4 NO_x baseline assuming the LA-4 repeatability is on the same order of magnitude as the FTP75). The 63 percent increase over baseline measured for SO NO_x emissions with the H&S emissions-equipment present calibration is greater than the 13 percent variability Cummins reported based on historical test data. Also, the increase of the measured defeat calibration SO NOx emissions over baseline is greater than the 43 percent order-of-magnitude variability between the LA-4 and FTP75 test cycles estimated by ERG as a worst case scenario. Cummins did not provide similar historical variability data for the HWFET and US06 test cycles and, therefore, ERG cannot make similar conclusions for those test cycles. Furthermore, Cummins did not provide variability estimates for any other measured parameters (e.g., PM).

[16] Appendix E provides the documentation of Cummins reporting this data.

[17] The LA-4 test cycle represents the first two phases of the FTP75 test cycle. The FTP75 test cycle includes a third phase, which is a repeat of Phase 1 of the LA-4 but with the engine hot.

Table 7. H&S Mini Maxx Emission Testing Results for Cummins 6.7 L (2012 MY) Vehicle

Test Scenario	Test Cycle	EO NOx		SO NOx		SO NMHC		PM		Fuel Economy	
		Result (g/mi)	% Diff[a]	Result (g/mi)	% Diff[a]	Result (g/mi)	% Diff[a]	Result (g/mi)	% Diff[a]	Result (mpg)	% Diff[a]
Baseline	LA-4	0.7212	--	0.2305	--	0.0267	--	0.0039	--	12.89	--
H&S: Emissions Equip-Present[b]		0.8217	13.9	0.3758	63.1	0.0371	38.8	0.0019	-52.2	13.29	3.1
H&S: Emissions Equip-Removed[b]		7.4986	939.8	7.4986	3153.6	0.0948	255.1	0.0622	1485.0	14.08	9.2
Baseline	HWFE	0.6951	--	0.6494	--	0.0031	--	0.0020	--	19.50	--
H&S: Emissions Equip-Present[b]		0.7198	3.6	0.6589	1.5	0.0029	-4.3	0.0016	-17.9	20.12	3.2
H&S: Emissions Equip-Removed[b]		5.9350	753.9	5.9350	813.9	0.0349	1034.5	0.0239	1100.2	20.69	6.1
Baseline	US06	2.6304	--	2.4679	--	0.0047	--	0.0072	--	12.44	--
H&S: Emissions Equip-Present[b]		2.8616	8.8	2.6533	7.5	0.0042	-11.0	0.0067	-6.7	12.92	3.9
H&S: Emissions Equip-Removed[b]		9.1141	247.5	9.1141	269.3	0.0431	820.7	0.4478	6106.4	13.54	8.9

EO – Engine Out
SO – System Out (tailpipe)
a – Percent difference of the result compared to baseline (or stock OEM).
b – Both H&S calibrations were run on the performance on-the-fly power level.

APPENDIX A
PHOTOGRAPH LOG

APPENDIX B
INVESTIGATIVE CALL LOGS TO H&S DEALERS

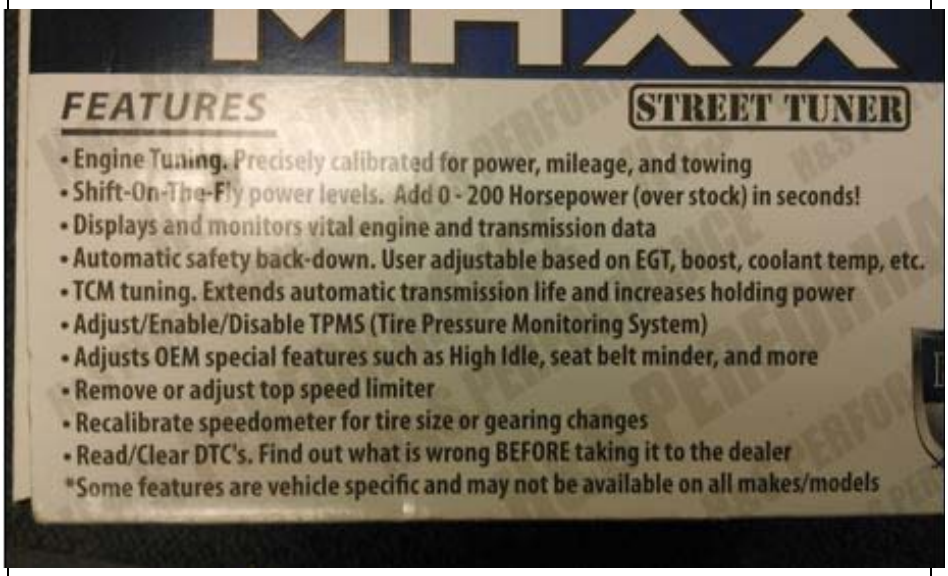
APPENDIX C
MINI MAXX UNLOCK CODE RETRIEVAL

APPENDIX D
ERG'S EVALUATION OF THE MINI MAXX CALIBRATION TABLES

APPENDIX E
EMAIL RECEIVED FROM CUMMINS

H&S Performance CAA Investigation Photo Log

DATE TAKEN: 17 April 2013	
TAKEN BY: A. Stanard	**SITE LOCATION:** ERG Office
PHOTO #: 1	
COMMENTS: H&S Mini Maxx tuner box as received from Truckwurx.	

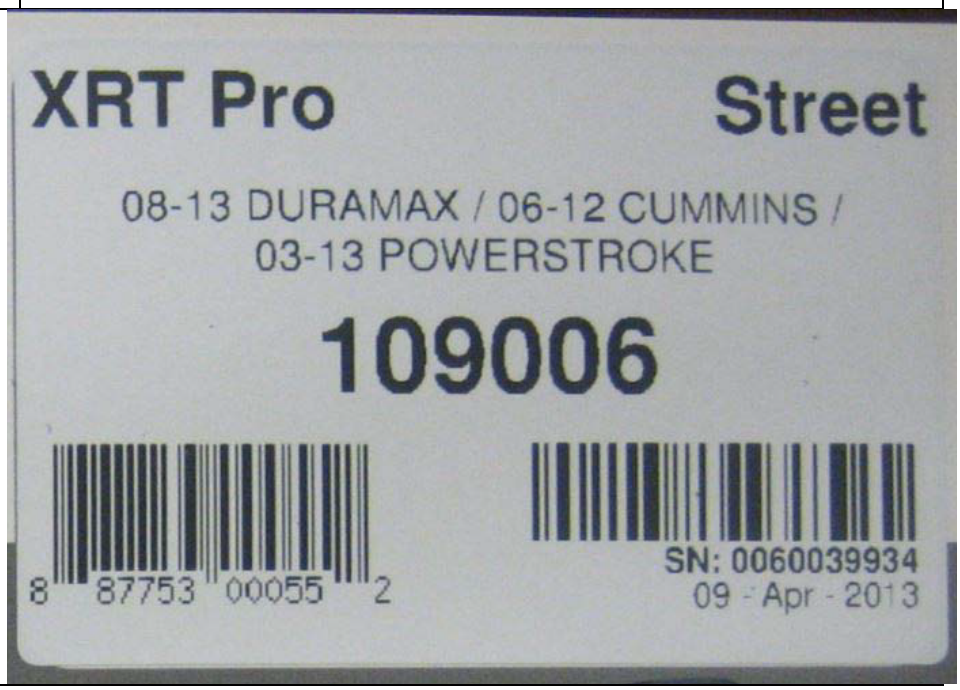
DATE TAKEN: 26 July 2013	
TAKEN BY: B. Ruminski	**SITE LOCATION:** ERG Office
PHOTO #: 2	
COMMENTS: Features displayed on the side of the H&S Mini Maxx box.	

H&S Performance CAA Investigation Photo Log

DATE TAKEN: 26 July 2013	
TAKEN BY: B. Ruminski	**SITE LOCATION:** ERG Office
PHOTO #: 3	
COMMENTS: Label observed on the H&S Mini Maxx box exterior showing the unit serial number.	

DATE TAKEN: 31 July 2013	
TAKEN BY: A. Stanard	**SITE LOCATION:** ERG Office
PHOTO #: 4	
COMMENTS: H&S XRT Pro tuner box.	

H&S Performance CAA Investigation Photo Log

DATE TAKEN: 31 July 2013	
TAKEN BY: A. Stanard	**SITE LOCATION:** ERG Office
PHOTO #: 5	
COMMENTS: Label observed on the H&S XRT Pro box exterior showing the unit serial number.	

DATE TAKEN: 31 July 2013	
TAKEN BY: A. Stanard	**SITE LOCATION:** ERG Office
PHOTO #: 6	
COMMENTS: Top half of the warranty card found inside the H&S XRT Pro box containing the part number and serial number for the unit.	

OFF-ROAD / RACE UPGRADE INSTRUCTIONS

Part Number	Serial Number	Upgrade NUMBER
6009	0060039934	35089

POWER UP THE DOWNLOADER BY PLUGGING IT INTO THE TRUCKS OBD2 PORT
SELECT ANY VEHICLE APPLICATION
THE DOWNLOADER WILL OPEN UP THE MAIN MENU
THEN GO TO: USER OPTIONS>EMISSIONS SELECTION
(THEN ENTER THE UPGRADE NUMBER)
ONCE THE DOWNLOADER IS UPGRADED IT WILL ALWAYS BE UPGRADED
IT CAN BE LOCKED & UNLOCKED TO ANY APPLICABLE VECHICLES
THIS UPGRADE INCLUDES ALL THE CURRENT UNLOCK CODES
DODGE 2006 2012 - FORD 2003 2013 - GM 2008 2013

NEVER TELL H&S THE OFF-ROAD / RACE UPGRADE IS INSTALLED
DOING SO MAY VOID THE WARRANTY
NEVER CONTACT H&S WITH ANY OFF-ROAD / RACE UPGRADE
RELATED QUESTIONS OR ISSUES – CONTACT YOUR DEALER
FOR ADDITIONAL H&S DOWNLOADS IT IS RECOMMENDED
TO CONTACT YOUR DEALER

H&S Performance CAA Investigation Photo Log

DATE TAKEN: 31 July 2013	
TAKEN BY: A. Stanard	**SITE LOCATION:** ERG Office
PHOTO #: 7	
COMMENTS: Bottom half of the warranty card found inside the H&S XRT Pro box.	**IMPORTANT WARRANTY INFORMATION** NEVER TELL H&S THE OFF-ROAD / RACE UPGRADE IS INSTALLED DOING SO MAY VOID THE WARRANTY BEFORE INSTALLING THE DOWNLOADER OFF-ROAD / RACE UPGRADE REGISTER THE DOWNLOADER AT: WWW.HSPERFORMANCE.COM/REGISTER **PRODUCT REGISTRATION INSTRUCTIONS** ENTER ALL OF THE OWNER INFORMATION PRODUCT INFORMATION SECTION ENTER TUNER MODEL XRT PRO STREET ENTER TUNER SERIAL NUMBER ON THE WARRANTY CARD ENTER WHERE WAS THE TUNER PURCHASED YOUR DEALER NAME ENTER YOUR PURCHASE PRICE $$$$$$ ENTER ALL REQUESTED DATE INFORMATION AND SUBMIT **ALWAYS INSTALL THE TUNER BEFORE MAKING ANY OFF-ROAD / RACE MODIFICATIONS** ONCE THE TUNER AND TRUCK ARE FUNCTIONING CORRECTLY YOU CAN PROCEED WITH YOUR OFF-ROAD / RACE MODIFICATIONS

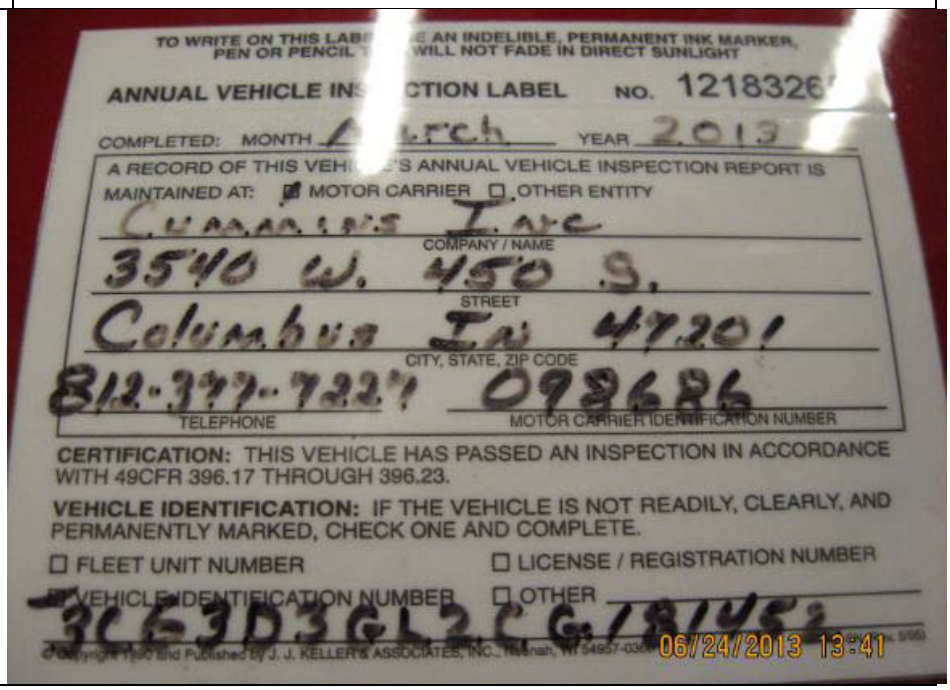
DATE TAKEN: 25 June 2013	
TAKEN BY: B. Ruminski	**SITE LOCATION:** Cummins testing facility
PHOTO #: 8	
COMMENTS: Overview of the test vehicle from the rear.	

H&S Performance CAA Investigation Photo Log

DATE TAKEN: 25 June 2013	
TAKEN BY: B. Ruminski	**SITE LOCATION:** Cummins testing facility
PHOTO #: 9	
COMMENTS: Close up of the vehicle chassis model (i.e., Dodge 3500).	

DATE TAKEN: 24 June 2013	
TAKEN BY: B. Ruminski	**SITE LOCATION:** Cummins testing facility
PHOTO #: 10	
COMMENTS: View of the test vehicle bed loaded with sand to equal 50 percent of the payload.	

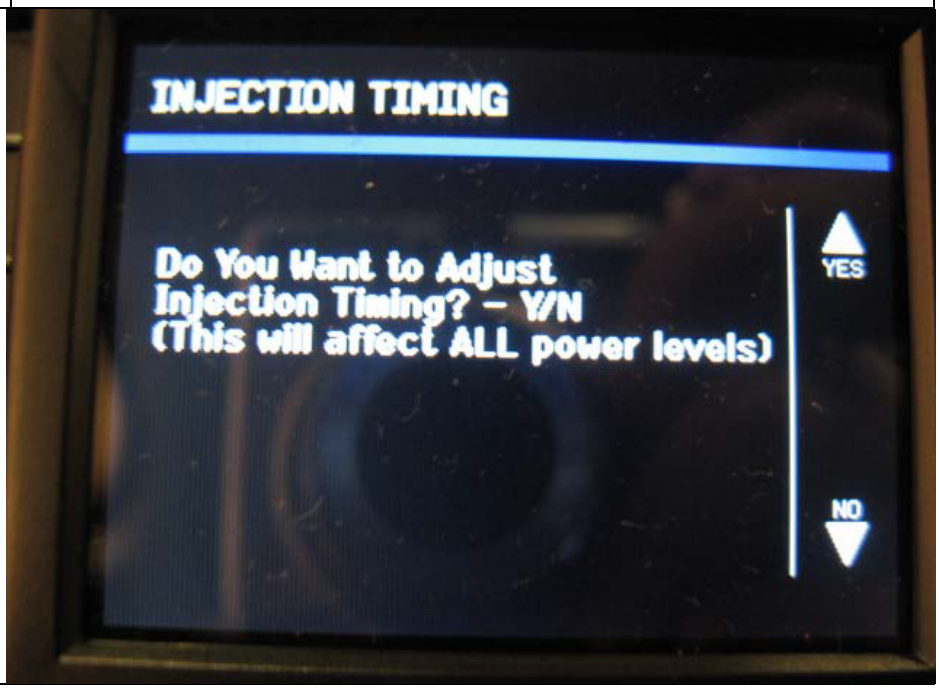
H&S Performance CAA Investigation Photo Log

DATE TAKEN: 24 June 2013	
TAKEN BY: B. Ruminski	**SITE LOCATION:** Cummins testing facility
PHOTO #: 11	
COMMENTS: Label on test vehicle showing VIN.	

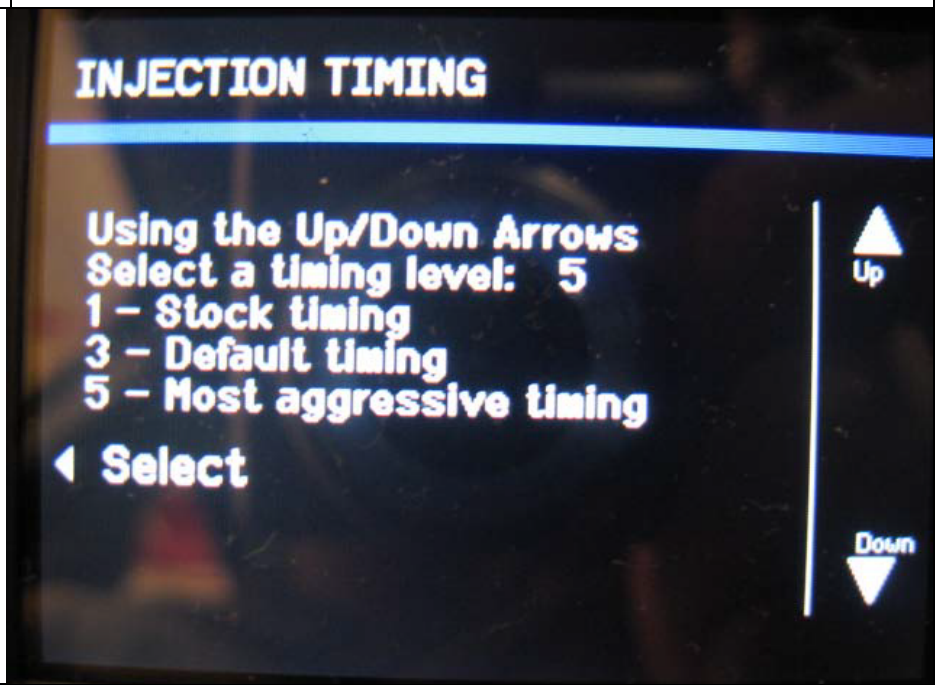
DATE TAKEN: 24 June 2013	
TAKEN BY: B. Ruminski	**SITE LOCATION:** Cummins testing facility
PHOTO #: 12	
COMMENTS: Odometer reading	

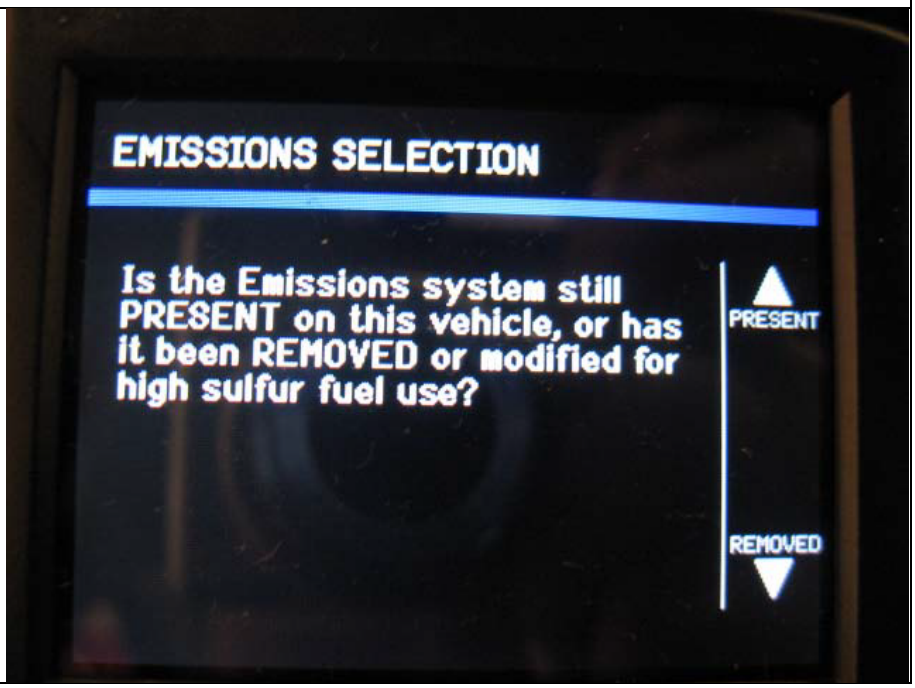
H&S Performance CAA Investigation Photo Log

DATE TAKEN: 24 June 2013	
TAKEN BY: B. Ruminski	**SITE LOCATION:** Cummins testing facility
PHOTO #: 13	
COMMENTS: H&S Mini Maxx tuner mounted to the windshield of the test vehicle after being installed.	

DATE TAKEN: 26 June 2013	
TAKEN BY: B. Ruminski	**SITE LOCATION:** Cummins testing facility
PHOTO #: 14	
COMMENTS: Screen shot of the H&S Mini Maxx tuner during the installation process. This step prompts the user to enter whether or not fuel injection timing is to be altered in the calibration, which affects all on-the-fly power levels after installation.	

H&S Performance CAA Investigation Photo Log

DATE TAKEN: 26 June 2013	
TAKEN BY: B. Ruminski	**SITE LOCATION:** Cummins testing facility
PHOTO #: 15	
COMMENTS: Screen shot of the H&S Mini Maxx tuner during the installation process. This step prompts the user to enter the level of alteration in fuel injection timing, which affects all on-the-fly power levels after installation.	

DATE TAKEN: 26 June 2013	
TAKEN BY: B. Ruminski	**SITE LOCATION:** Cummins testing facility
PHOTO #: 16	
COMMENTS: Screen shot of the H&S Mini Maxx tuner during the installation process. This step prompts the user to enter whether the emissions systems (i.e., diesel particulate filter (DPF) and exhaust gas recirculation (EGR)) are still installed on the vehicle or if they have been removed. Note that this step only occurs after the user has entered the "high sulfur" unlock code in a different menu option.	

H&S Performance CAA Investigation Photo Log

DATE TAKEN: 26 June 2013	
TAKEN BY: B. Ruminski	**SITE LOCATION:** Cummins testing facility
PHOTO #: 17	
COMMENTS: Screen shot of the H&S Mini Maxx immediately after the "high sulfur" unlock code was entered. After entering this code, the user is now given the option to enter the whether or not the emissions systems (i.e., DPF and EGR) are present during the installation process.	

DATE TAKEN: 26 June 2013	
TAKEN BY: B. Ruminski	**SITE LOCATION:** Cummins testing facility
PHOTO #: 18	
COMMENTS: Screen shot of the H&S Mini Maxx during normal vehicle operation. The bottom right hand corner of the screen shows the current on-the-fly power level that can be changed by pressing the button on the bottom right corner of the unit.	

H&S Performance CAA Investigation Photo Log

DATE TAKEN: 26 June 2013	
TAKEN BY: B. Ruminski	**SITE LOCATION:** Cummins testing facility
PHOTO #: 19	
COMMENTS: EGR valve electrical connection disconnected prior to conducting emissions tests for the H&S emissions removed calibration.	

DATE TAKEN: 26 June 2013	
TAKEN BY: B. Ruminski	**SITE LOCATION:** Cummins testing facility
PHOTO #: 20	
COMMENTS: Bolt-on stock exhaust section that contains the diesel oxidation catalyst (DOC) and the DPF. The same bolt-on exhaust section was installed onto the vehicle for the H&S emissions removed calibration testing but with no catalyst substrates inside the bulges (i.e., straight pipe).	

CONTACT REPORT

DATE: 24 April 2013

CONTACT FACILITY: Adrenaline Off Road

FACILITY POC(S): Jeff

ERG STAFF: Brent Ruminski

Brent Ruminski identified Adrenaline Off Road as an authorized H&S Performance Dealer from H&S's Dealer Locator Website (http://www.hsperformance.com/1/united-states?sid=54:United-States). Brent called Adrenaline Off Road on 26 April 2013 and discussed options to purchase an H&S tuner and defeat exhaust gas recirculation (EGR) and diesel particulate filter (DPF) emission control devices on a 2008 Cummins. The following bullets detail the discussion with the point of contact:

- Brent explained that he was looking to do some upgrades to his truck and was curious about his options for removing the EGR and DPF. Brent explained that he noticed H&S's website says some of these units have been discontinued. Jeff said that no one, including himself, is able to purchase the H&S tuners with EGR and DPF defeat capabilities out of the box.

- Delton went on to say that you can still purchase the H&S tuners on eBay that are capable of defeating the EGR and EPF. He said that if I decide to go with one of those units, that he will be happy to install the hardware for the physical EGR and DPF deletes (e.g., straight pipe for the exhaust to remove the DPF).

- Delton also explained that it is still possible to get the unlock codes from H&S necessary to activate the EGR and DPF deletes on the current tuners they sell. However, you have to provide documentation to H&S showing that the truck is certified with EPA for off road use only.

- For all work that Adrenaline Off Road does, they require the customer to sign an agreement that the Adrenaline Off Road is not liable for any accident the vehicle is involved in on highways. So if Brent wanted Adrenaline to physically remove the EGR and DPF from his truck he would need to sign the agreement. The agreement states that the customer understands the vehicle is to be used for off road purposes only.

- Brent asked for some more information on how these tuners work. He specifically asked what happens if you unplug the tuner from the truck after you have defeated the EGR and DPF. Jeff said that the latest tune that the tuner installed onto the truck will remain on the truck. So after someone uses one of these units, they can remove it from the truck and still defeat the EGR and DPF.

CONTACT REPORT

DATE: 24 April 2013

CONTACT FACILITY: Auto Wurks Diesel

FACILITY POC(S): Chris

ERG STAFF: Brent Ruminski

Brent Ruminski identified Auto Wurks Diesel [1] as an authorized H&S Performance Dealer from H&S's Dealer Locator Website (http://www.hsperformance.com/1/united-states?sid=54:United-States). Brent called Auto Wurks on 24 April 2013 and discussed options to purchase a tuner and defeat exhaust gas recirculation (EGR) and diesel particulate filter (DPF) emission control devices on a 6.7L Cummins. The following bullets detail the discussion with the point of contact:

- Brent asked Chris about options for deleting the EGR and DPF on a 6.7 Liter Cummins. He explained that he only has one tuner left that can do this called a Smarty. Chris stated that he could offer the Smarty tuner for approximately $700. However, an additional $100 would be added if the desired system is to be able to defeat the EGR and DPF system. These prices do not include the cost to physically remove the EGR and DPF from the truck.

- Brent asked Chris about other popular tuning models such as H&S and Chris explained that H&S no longer provides him the necessary unlock key to use the H&S tuners for defeating EGR and DPF since November 2012. Chris went on to explain that a person by the name of Rudy is to blame for this. In the past, Rudy sold H&S tuners on a website called www.DPFdelete.com which triggered events that caused H&S to publically discontinue tuners capable of defeating EGR and EPF. Chris said that Rudy supposedly bought hundreds if not thousands of the H&S tuners prior to November 2012 all equipped with the unlock keys necessary to defeat the EGR and DPF. Chris thinks that this was in anticipation of H&S discontinuing their tuners. Rudy now sells these units on eBay at a high market price of $1,800's now that H&S has discontinued these models.[2]

- Chris went on to say that he can still get the H&S tuners but without the necessary codes to defeat the EGR and DPF. However, Chris is currently working on "solving" the codes so that he can continue to sell these units. He thinks he might be able to do this.

- Brent asked Chris if it is required to completely uninstall the EGR system in order to utilize the tuner to deactivate the EGR system. He explained that it does not matter if the EGR system is uninstalled or not as long as it is unplugged but he highly recommends installing the entire system for best results.

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[1] Company website available online at: http://www.autowurksdiesel.com/aboutus.html

[2] Rudy's H&S products are available on EBay at: http://stores.ebay.com/Rudys-Performance-Parts?_trksid=p2047675.l2563. The Mini Max H&S tuner is available for $1,400 but it does not specify if the unit includes the unlock keys necessary to defeat the EGR and DPF.

CONTACT REPORT

DATE: 24 April 2013

CONTACT FACILITY: Central Florida Diesel Performance

FACILITY POC(S): Unknown

ERG STAFF: Brent Ruminski

Brent Ruminski identified Central Florida Diesel Performance as an authorized H&S Performance Dealer from H&S's Dealer Locator Website (http://www.hsperformance.com/1/united-states?sid=54:United-States). Brent called Central Florida Diesel Performance on 24 April 2013 and discussed options to purchase an H&S tuner and defeat exhaust gas recirculation (EGR) and diesel particulate filter (DPF) emission control devices. The following bullets detail the discussion with the point of contact:

- The facility contact said that Central Florida Diesel Performance only performs in-house installations and they generally do not ship products to customers in other states for self installations.[1] This is in part because there are too many things that can go wrong when installing them that can result in damage to the engine.

- Brent asked the contact if he recommends any specific brands or companies but the contact did not want to discuss specifics. He said that they may use some products from companies but ultimately they perform custom tunes on the computers themselves. The contact went on to explain he recommends not calling shops over the phone to inquire about these types of devices. However, he recommended calling Riess Diesel[2], which is located in Pennsylvania and indicated they will have products and/or services that can help with this specific topic.

- Brent asked if the contact recommends leaving the EGR equipment installed on the truck or removing it when using a tuner for EGR defeat purposes. Brent explained he was worried about passing the annual state emission tests. The contact recommended to talk to a shop located in the state the truck is registered in to get a profession recommendation on that topic.

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[1] The contact acknowledged that he saw Pennsylvania on the caller-id.
[2] ERG was unable to find a website for Riess Diesel located in Pennsylvania.

CONTACT REPORT

DATE: 24 April 2013

CONTACT FACILITY: Confederate Diesel

FACILITY POC(S): Justin

ERG STAFF: Brent Ruminski

Brent Ruminski identified Confederate Diesel as an authorized H&S Performance Dealer from H&S's Dealer Locator Website (http://www.hsperformance.com/1/united-states?sid=54:United-States). Brent called Confederate Diesel on 24 April 2013 and discussed options to purchase an H&S tuner and defeat exhaust gas recirculation (EGR) and diesel particulate filter (DPF) emission control devices on a 2008 6.7L Cummins. The following bullets detail the discussion with the point of contact:

- Brent asked Justin about the H&S tuners they offer and explained how H&S's website says they have discontinued the racing version of this unit and only offer the street version. Justin clarified that H&S no longer offers the racing version of the software, which is the version necessary to defeat the EGR and DPF systems, to individual customers. Instead, H&S sells the racing version to Confederate Diesel who then is able to sell them to individual customers. In summary, Justin is able to sell and install the H&S Mini Maxx for $1,050 which includes removing the EGR and DPF deletes.

- Brent explained that he was confused by H&S's website and was curious how the EGR and DPF can get deleted with the street tuner and mentioned something about unlock keys. Justin said he would not explain the details until after I purchased the unit with the EGR and DPF delete and only in person.

- Brent asked Justin about the disclaimer they have on their website for the H&S Mini Maxx:[1]

This tuner is for offroad use only and will only be sold to customers that have a signed agreement with the EPA that there truck if for offroad use only.(we will take the word of any of our trusted customers on this, no physical proof needed)

  Justin responded by explaining that customers do not actually need to sign any agreement or show documentation to show that is certified with the EPA for off-road use only. He would sell me the unit in good faith.

- Brent asked Justin if it is required to completely uninstall the EGR system in order to utilize the tuner to deactivate the EGR system. He explained that it does not matter if the EGR system is uninstalled or not as long as it is unplugged. If the system is not removed, you simply unplug some sensors for the EGR. Brent asked Justin if he recommends leaving the EGR equipment installed on the truck or leaving it in place. Brent explained he was worried about passing the annual state emission tests and was curious as to what most customers

[1] Available online at: http://www.confederatediesel.com/h-and-s-mini-Maxxx-offroad-custom-tuning.html.

decide to do. He said that because it is a model year 2008, the truck does not actually need the EGR to pass. If it was a 2011 or newer model year, then he would recommending leaving the EGR system installed so that the EGR could be more readily reactivated in order to pass emission tests.

CONTACT REPORT

DATE: 24 April 2013

CONTACT FACILITY: East Coast Diesel

FACILITY POC(S): Delton

ERG STAFF: Brent Ruminski

Brent Ruminski identified East Coast Diesel as an authorized H&S Performance Dealer from H&S's Dealer Locator Website (http://www.hsperformance.com/1/united-states?sid=54:United-States). Brent called East Coast Diesel on 26 April 2013 and discussed options to purchase an H&S tuner and defeat exhaust gas recirculation (EGR) and diesel particulate filter (DPF) emission control devices on a 6.7L Cummins. The following bullets detail the discussion with the point of contact:

- Brent explained that he was looking to do some upgrades to his truck and was curious about his options for removing the EGR and DPF. Brent explained that he saw H&S units on East Coast Diesel's website and was curious if they still have them in stock because he also noticed H&S's website says some of these units have been discontinued. Delton responded by saying "you're about a month late." East Coast Diesel has sold out of all of these units and is no longer to get them with EGR and DPF delete capability.

- Delton went on to say that there is no real difference in the street version and the racing version except that the EGR and DPF delete options in the street version are locked requiring an unlock code from H&S. Second, the EGR and DPF deletes in the street version are not called EGR and DPF deletes, they are referred to as "high sulfur tune".

- Brent asked how to obtain the unlock codes for the street version. Delton said the only way is to talk to obtain documentation from EPA that the vehicle is now certified for off-road use only. Then, you have send this documentation to H&S and then they would provide the unlock codes.

- Delton went on to say that you can still obtain the racing version on eBay, but at a relatively high price. He said that if I decide to go with one of those units, that East Coast Diesel will be happy to do the install the tuner for Brent and along with the hardware for the physical EGR and DPF deletes (i.e., straight pipe for the exhaust to remove the DPF).

CONTACT REPORT

DATE: 25 April 2013

CONTACT FACILITY: CenTex Diesel Performance

FACILITY POC(S): Cody

ERG STAFF: Gopi Manne

Gopi Manne identified CenTex Diesel Performance as an authorized H&S Performance Dealer from H&S's Dealer Locator Website (http://www.hsperformance.com/1/united-states?sid=54:United-States). Gopi Manne called CenTex Diesel Performance on 25 April 2013 and discussed options to purchase an H&S tuner and defeat exhaust gas recirculation (EGR) and diesel particulate filter (DPF) emission control devices on diesel trucks. The following bullets detail the discussion with the CenTex Diesel Performance point of contact:

- Called asking for help in deciding a tuner for a 2010 Dodge Ram 3500 diesel truck, specifically asked for H&S tuners to delete DPF/EGR.

- He mentioned that doing a DPF/EGR delete will make the vehicle illegal to drive on the street. He also said that he could obtain the parts but I need to sign a waiver indicating that I am aware that it is not street-legal.

- He indicated that H&S tuners capable to delete DPF/EGR are discontinued, but he could get them for $1500, including unlock codes and all required tunes for DPF/EGR delete. He mentioned that they do not have them in-stock and can get them from other companies. He also indicated a Smarty tuner that is also discontinued and is able to do DPF/EGR delete for $700.

Summary: Dealer contact indicated that H&S has discontinued the XRT and Mini Maxx tuners (that are capable of DPF/EGR delete). They do not have any units in-stock but can order them from companies/dealers that they know have these tuners available for $1500 (Mini Maxx).

CONTACT REPORT

DATE: 24 April 2013

CONTACT FACILITY: Diesel Auto Shop

FACILITY POC(S): Dallas

ERG STAFF: Gopi Manne

Gopi Manne identified Diesel Auto Shop as an authorized H&S Performance Dealer from H&S's Dealer Locator Website (http://www.hsperformance.com/1/united-states?sid=54:United-States). Gopi Manne called Diesel Auto Shop on 24 April 2013 and discussed options to purchase an H&S tuner and defeat exhaust gas recirculation (EGR) and diesel particulate filter (DPF) emission control devices on diesel trucks. The following bullets detail the discussion with the Diesel Auto Shop point of contact:

- Called asking for help in picking the right tuner for a 2010 Dodge Ram 3500 diesel truck to get rid of DPF/EGR. Dallas said that he has H&S Mini Maxx and XRT tuners that are capable of EGR/DPF delete functionality. He said there is no need to download additional software/unlock codes.

- He said the H&S tuners (Mini Maxx/XRT) are expensive as they are discontinued due to EPA regulations. He also mentioned Smarty tuners (junior and senior models) that are capable of performing EGR/DPF delete. He said no additional downloads are necessary and that they come with the EGR/DPF delete tunes installed on them. He explained that the Smarty tuners are manufactured with no software and they (dealer) can load the software to delete DPF/EGR. He said technically the manufacturer cannot load the DPF/EGR delete tunes on them but that they are available on the internet and can be loaded on to the Smarty tuners.

Summary: Dealer contact has indicated that H&S XRT and Mini Maxx tuners have been discontinued by the manufacturers and the dealer has some of the discontinued units on-shelf and offered them for sale (H&S Mini Max: $1250; H&S XRT: $999; Smarty Junior: $535; Smarty Senior: $685).

CONTACT REPORT

DATE: 25 April 2013

CONTACT FACILITY: Elite Truck & Auto Repair, Inc.

FACILITY POC(S): Wayne

ERG STAFF: Gopi Manne

Gopi Manne identified Elite Truck & Auto Repair, Inc as an authorized H&S Performance Dealer from H&S's Dealer Locator Website (http://www.hsperformance.com/1/united-states?sid=54:United-States). Gopi Manne called Elite Truck & Auto Repair Inc on 25 April 2013 and discussed options to purchase an H&S tuner and defeat exhaust gas recirculation (EGR) and diesel particulate filter (DPF) emission control devices on diesel trucks. The following bullets detail the discussion with the Elite Truck & Auto Repair, Inc. point of contact:

- Called asking for a tuner for a 2010 Dodge Ram 3500 diesel truck to perform a DPF/EGR delete.
- Wayne indicated that tuners capable of DPF/EGR delete are no longer produced due to EPA restrictions and they are discontinued, including H&S. He also said that they do not have any such tuners in-stock.

Summary: Dealer contact indicated that H&S has discontinued the XRT and Mini Maxx tuners (that are capable of DPF/EGR delete). They do not have any units in-stock.

CONTACT REPORT

DATE: 24 April 2013

CONTACT FACILITY: First Class Diesel & Performance

FACILITY POC(S): James

ERG STAFF: Gopi Manne

Gopi Manne identified First Class Diesel & Performance as an authorized H&S Performance Dealer from H&S's Dealer Locator Website (http://www.hsperformance.com/1/united-states?sid=54:United-States). Gopi Manne called First Class Diesel & Performance on 24 April 2013 and discussed options to purchase an H&S tuner and defeat exhaust gas recirculation (EGR) and diesel particulate filter (DPF) emission control devices on diesel trucks. The following bullets detail the discussion with the First Class Diesel & Performance point of contact:

- Called asking for help picking out a tuner for a diesel truck (2010 Dodge Ram 3500) to delete DPF/EGR (parts only, no labor).

- James mentioned that it is hard to get the tuners as EPA put a stop-sale on them. He said he knew someone who has the H&S XRT Pro tuners that are capable of DPF/EGR/CAT delete, but that it is very expensive as they are not readily available anymore. He said that these tuners already have the required files and codes stored in them and no additional download is required. When inquired if they are used, he said they are brand new and that person had them stockpiled to sell later. He said they have none in stock.

- He also mentioned that I could buy an H&S street tuner of their website and then later on purchase files, online, that are capable of DPF/EGR delete functionality. He also mentioned that I could buy the discontinued H&S tuners on e-bay or other online sites.

Summary: Dealer contact indicated that H&S has discontinued the XRT and Mini Maxx tuners (that are capable of DPF/EGR delete). They do not have any units in-stock.

CONTACT REPORT

DATE: 25 April 2013

CONTACT FACILITY: Revolution Speed

FACILITY POC(S): Justin

ERG STAFF: Gopi Manne

Gopi Manne identified Revolution Speed as an authorized H&S Performance Dealer from H&S's Dealer Locator Website (http://www.hsperformance.com/1/united-states?sid=54:United-States). Gopi Manne called Revolution Speed on 25 April 2013 and discussed options to purchase an H&S tuner and defeat exhaust gas recirculation (EGR) and diesel particulate filter (DPF) emission control devices on diesel trucks. The following bullets detail the discussion with the Revolution Speed point of contact:

- Called asking for a tuner to perform DPF/EGR delete on a 2010 Dodge Ram 3500. Justin mentioned that such tuners are not legal and are outlawed by EPA.

- He indicated that they do not have any such tuners in stock but can find out from their dealer network if these tuners (DPF/EGR delete capable) are available. He also mentioned that they are expensive.

Summary: Dealer contact indicated that H&S has discontinued the XRT and Mini Maxx tuners (that are capable of DPF/EGR delete). They do not have any units in-stock.

CONTACT REPORT

DATE: 25 April 2013

CONTACT FACILITY: Spade Performance & Accessories

FACILITY POC(S): Jason

ERG STAFF: Gopi Manne

Gopi Manne identified Spade Performance & Accessories as an authorized H&S Performance Dealer from H&S's Dealer Locator Website (http://www.hsperformance.com/1/united-states?sid=54:United-States). Gopi Manne called Spade performance & Accessories on 25 April 2013 and discussed options to purchase an H&S tuner and defeat exhaust gas recirculation (EGR) and diesel particulate filter (DPF) emission control devices on diesel trucks. The following bullets detail the discussion with the Spade Performance & Accessories point of contact:

- Called asking for a tuner for 2010 Dodge Ram 3500 to perform DPF/EGR delete. Jason mentioned that these tuners are discontinued. He mentioned H&S does not make tuners that are capable of DPF/EGR delete.

- Jason indicated that they do not have any such tuners in-stock.

Summary: Dealer contact indicated that H&S has discontinued the XRT and Mini Maxx tuners (that are capable of DPF/EGR delete). They do not have any units in-stock.

CONTACT REPORT

DATE: 24 April 2013

CONTACT FACILITY: Strictly Diesel

FACILITY POC(S): Gary

ERG STAFF: Gopi Manne

Gopi Manne identified Strictly Diesel as an authorized H&S Performance Dealer from H&S's Dealer Locator Website (http://www.hsperformance.com/1/united-states?sid=54:United-States). Gopi Manne called Strictly Diesel on 24 April 2013 and discussed options to purchase an H&S tuner and defeat exhaust gas recirculation (EGR) and diesel particulate filter (DPF) emission control devices on diesel trucks. The following bullets detail the discussion with the Strictly Diesel point of contact:

- Called asking for support in picking out a diesel truck tuner for a 2010 Dodge Ram 3500 to improve gas mileage. How can I get rid of the DPF/EGR? Gary responded saying that such tuners are no longer being produced as they are illegal. Some stores might have older stock on hand, but the manufacturer (H&S) discontinued the product.

Summary: Dealer contact indicated that H&S has discontinued the XRT and Mini Maxx tuners (that are capable of DPF/EGR delete). They do not have any units in-stock.

CONTACT REPORT

DATE: 24 April 2013

CONTACT FACILITY: The Power Shop, Inc.

FACILITY POC(S): Riley

ERG STAFF: Gopi Manne

Gopi Manne identified The Power Shop, Inc. as an authorized H&S Performance Dealer from H&S's Dealer Locator Website (http://www.hsperformance.com/1/united-states?sid=54:United-States). Gopi Manne called The Power Shop, Inc. on 24 April 2013 and discussed options to purchase an H&S tuner and defeat exhaust gas recirculation (EGR) and diesel particulate filter (DPF) emission control devices on diesel trucks. The following bullets detail the discussion with The Power Shop, Inc. point of contact:

- Called asking for help in picking a tuner for a 2010 Dodge Ram 3500 to delete DPF/EGR and mentioned H&S tuners. Riley said that they have XRT Pro and Mini Maxx in stock. He said they are discontinued products due to EPA regulations and so are expensive. He also mentioned that they have delete pipe which is a cheaper alternative.

- I asked if any additional downloads or unlock code purchase is required and he said no. They are pre-programmed and the dealer will give the unlock code at time of purchase.

Summary: Dealer contact indicated that H&S has discontinued the XRT and Mini Maxx tuners (that are capable of DPF/EGR delete). He offered the XRT and Mini Max for sale (XRT: $1099; Mini Max: $1399), these are units they have in-stock.

CONTACT REPORT

DATE: 24 April 2013

CONTACT FACILITY: Trucks Unique, Inc.

FACILITY POC(S): Phil

ERG STAFF: Gopi Manne

Gopi Manne identified Trucks Unique, Inc. as an authorized H&S Performance Dealer from H&S's Dealer Locator Website (http://www.hsperformance.com/1/united-states?sid=54:United-States). Gopi Manne called Trucks Unique, Inc. on 24 April 2013 and discussed options to purchase an H&S tuner and defeat exhaust gas recirculation (EGR) and diesel particulate filter (DPF) emission control devices on diesel trucks. The following bullets detail the discussion with the Trucks Unique, Inc. point of contact:

- Called dealer asking for information on tuners for a 2010 Dodge Ram 3500 Diesel truck. Asked for tuners that will do DPF/EGR delete. He said they are not available anymore due to EPA restrictions.

- He mentioned he has other tuners that will provide extra horsepower, but no DPF/EGR delete capabilities.

- I asked about hack files that are available online that I can use for DPF/EGR deletes. He said he heard about them but is not sure where I can find them online and what their success rate is.

- I asked if any tuners are available in stock somewhere, he mentioned they might but he is not aware of any dealer/person that has them in stock.

Summary: Dealer contact indicated that H&S has discontinued the XRT and Mini Maxx tuners (that are capable of DPF/EGR delete). They do not have any units in-stock.

CONTACT REPORT

DATE: 24 April 2013

CONTACT FACILITY: Underground Diesel

FACILITY POC(S): Matt

ERG STAFF: Gopi Manne

Gopi Manne identified Underground Diesel as an authorized H&S Performance Dealer from H&S's Dealer Locator Website (http://www.hsperformance.com/1/united-states?sid=54:United-States). Gopi Manne called Underground Diesel on 24 April 2013 and discussed options to purchase an H&S tuner and defeat exhaust gas recirculation (EGR) and diesel particulate filter (DPF) emission control devices on diesel trucks. The following bullets detail the discussion with the Underground Diesel point of contact:

- Called asking for help picking to a diesel truck tuner for 2010 Dodge Ram 3500. Asked how to get the DPF/EGR off the truck.

- Matt initially said that there is no tuner for Dodge that will do DPF deletes and that is readily available. He recommended that I could get a DPF R System and a delete pipe and use it in conjunction with any tuner (he mentioned smarty and edge tuners).

- Specifically asked for H&S tuner where the user can download delete files for DPF/EGR. To this Matt responded saying such H&S tuners are not available anymore. But he said that I could buy an H&S Street tuner and use it in conjunction with the DPF R system and delete pipe to get rid of the DPF/EGR/CAT.

- Matt spoke with someone there (could hear muffled noises over the phone) and then he came back and mentioned the H&S tuners. He said that they could get the discontinued tuners for $1250. He said they are not in production and so are expensive. When asked if they have the product on shelf, he said that they will have to order it (discontinued??). He also mentioned that with this product I do not need to use the DPR R module.

Summary: Dealer contact indicated that H&S has discontinued the XRT and Mini Maxx tuners (that are capable of DPF/EGR delete). He indicated that they can get them ordered (ordered from another facility or the dealer network???) for $1250.

Invoice

Date	Invoice #
4/16/2013	10702

PAID
04/16/2013

Bill To	Ship To
[redacted]	[redacted]

P.O. Number	Terms	Rep	Ship	Via
			4/16/2013	UPS

Tracking#	Tracking#

Quantity	Item Code	Description	Price Each	Amount
1	109007	H&S Performance Mini Maxx Street Tuner	849.00	849.00
1	Unlock	High Sulfur Unlock/ H&S Mini Maxx Unlock Code for DPF delete - 29278 Install instructions: Main menu select emissions and input code	400.00	400.00
1	111009	MAXX CALIBRATION CONTROL TUNING SOFTWARE VIN#: 3D73M4CL3AG143607 Email For unlock: [redacted]	200.00	200.00
	Ship	Shipping Expenuse UPS Tracking Number:1Z84689R1390844410	24.41	24.41
		Sales Tax	8.10%	0.00

Total $1,473.41

Phone #	E-mail	Web Site
702-461-7425	sales@truckwurx.com	www.truckwurx.com

Alan S <alans.austin@gmail.com>

H&S Performance Maxx Calibration Control Unlock Code

1 message

H&S Performance <noreply@hsperformance.com> Tue, Apr 16, 2013 at 2:45 PM
To [redacted]

Dear Valued H&S Performance Customer,

Here is the unlock code for your **Maxx Calibration Control**:

Vehicle VIN ending with: **143607**
Unlock Code: **A61166AA87626E59**

Important Notes:

Please save this code in a safe place. We recommend saving this email as well as printing it out for future reference.

For instructions on how to use the MCC software, visit the MCC Section on our website.

Click here for MCC software instructions

To install this option onto your vehicle, you must be at the latest software level for your Black Maxx or Mini Maxx. Here is a link to the updates section of our website:

Click here to update your tuner

No Reply:

Do not respond to this message.

For technical assistance please visit our online forum.
Custom tuning information is locate under vehicle specific sections.

Thank you for using H&S Performance for all your tuning needs!

Sincerely,

H&S Performance
4160 S. River Rd
St. George, UT 84790, USA

MEMORANDUM

TO: Anne Wick, EPA/MSEB

FROM: Mike Sabisch, Alan Stanard (ERG)

SUBJECT: TD17_MCC Bundle Preliminary Tuning Tables Evaluation

DATE: June 17, 2013

Task Overview

On June 6, 2013, Anne Wick provided electronic data files to ERG that had been provided to the US EPA by H&S Performance in response to the US EPA's request for Maxx Calibration Control (MCC) software files for both stock calibrations and DPF removed calibrations. The US EPA requested files for a 2010 Cummins 6.7L diesel engine, since this is the type of engine scheduled for testing with the H&S Mini Maxx the week of Jun 24, 2013 at the Cummins Technical Center in Columbus, Indiana.

Four files were provided to ERG for evaluation:

- 2010AUTO_STOCK.hex
- 2010AUTO_RACETUNE.hex
- 2010CumminsAuto_Stock.MCC
- 2010Dodge_Pickup_AutoTrans_DPFRemoved.MCC

ERG was asked to identify the differences between the two calibrations in the Maxx Calibration Control software. To accomplish this, ERG installed the Maxx Calibration Control software, Build 1.00.0161.00 from HS Performance, on a laptop computer. Although ERG was not able to convert data in the "*.hex" files to a human-readable format, Attachment 1, also provided to ERG from EPA, reportedly describes the parameters affected by the MCC software using the software's "*.hex" files. ERG did open the two "*.MCC" files using the MCC software. These files were MCC calibration "tunes" (stock and DPF removed). The following parameter groups appeared within each tune:

Injection Quantity
Injection Pressure
Injection Timing
Torque
Turbo
Speed Limits
Diagnostics
Cooling Fan
Traction Control
Axis

In consultation with EPA, ERG chose to focus on comparing data within the first three parameter groups. Subgroups within these first three groups included:

- Injection Quantity
  - Maps
    - 5 injection duration maps (factory, stock, tow, street, and performance)
    - 6 torque to fuel rate conversion maps (based on engine operating mode [EOM])
  - Curves
    - 6 maximum fuel rate curves (for various EOMs)
- Injection Pressure
  - Maps
    - 10 injection pressure maps (for various EOMs)
  - Values
    - 5 maximum injector pressure setpoints
    - 2 fuel pressure error thresholds
    - 1 rail pressure hysteresis
- Injection Timing
  - Maps
    - 6 injection timing maps (for various EOMs).

The EOM tables listed above provide operating info based on operating conditions (ambient pressures, temps, etc.). Figure 1 is a screen capture of the file structure shown within the software. Part of the list of maps is visible at the left, and two of them are open in the main part of the window.

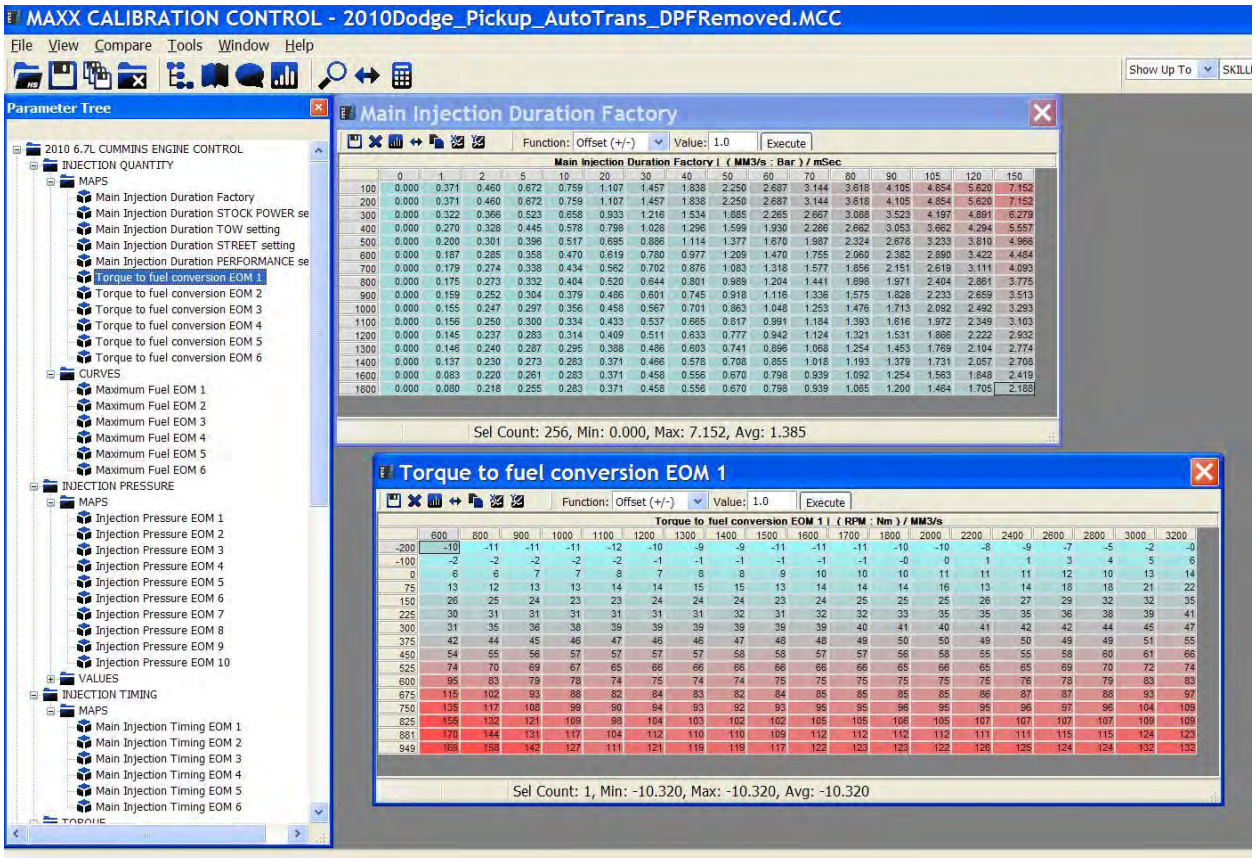

Figure 1. MCC Screen Capture of DPF Removed Tunes

Tune Table Evaluation

The following provides results of ERG's evaluation.

Torque to fuel conversion maps

The "Torque to fuel conversion" maps (under "Injection Quantity"/"Maps") list the engine's fuel flow rate (mm^3/sec) as a function of engine speed (RPM) and commanded torque (newton-meters, or NM). Comparisons were made between the "stock" and "DPF Removed" tunes for EOM 1, 3 and 6 maps. No differences were seen between the maps of the "stock" and "DPF Removed" tunes. Details are provided in Attachment 2.

Injection pressure maps

The "Injection Pressure" maps (under "Injection Pressure"/"Maps") list the engine's injection pressure (PSI) as a function of engine speed (RPM) and commanded torque (NM). Comparisons were made between the "stock" and "DPF Removed" tunes for EOM 1, 5 and 10 maps. No differences were seen between the maps of the "stock" and "DPF Removed" tunes. Details are provided in Attachment 2.

Main injection duration maps

The "Main Injection Duration" maps (under "Injection Quantity" / "Maps") list the engine's main injection duration (mSec) as a function of fuel mass rate (mm^3/sec) and fuel pressure (this time in bar). The following comparisons were made:

- Within the "DPF Removed" Tune,
  - Between "Factory" and "Stock" maps
  - Between "Factory" and "Tow" maps
  - Between "Factory" and "Performance" maps
- Within the "Stock" Tune,
  - Between "Factory" and "Stock" maps
  - Between "Factory" and "Tow" maps
  - Between "Factory" and "Performance" maps
- Between the "DPF Removed" and "Stock" Tunes,
  - Differences between the "Factory" maps
  - Differences between the "Stock" maps
  - Differences between the "Tow" maps
  - Differences between the "Performance" maps

For the first category (within the "DPF Removed" Tune), no differences were seen between the factory and stock maps. However, differences were seen between the "Factory" and "Tow" maps and also the "Factory" and "Performance" maps. The percentage differences found for each cell during these two comparisons are shown in Tables 1 and 2, which follow.

Table 1. Percent Differences between "Factory" and "Tow" Durations for "DPF Removed" Tune

	0	1	2	5	10	20	30	40	50	60	70	80	90	105	120	150
100	0 0%	0.0%	0 0%	0.0%	0 0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
200	0 0%	0.0%	0 0%	0.0%	0 0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
300	0 0%	0.0%	0 0%	0.0%	0 0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
400	0 0%	0.0%	0 0%	0.0%	0 0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
500	0 0%	0.0%	0 0%	0.0%	0 0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
600	0 0%	0.0%	0 0%	0.0%	0 0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
700	0 0%	0.0%	0 0%	0.0%	0 0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
800	0 0%	0.0%	0 0%	0.0%	0 0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.0%	4.0%	4.0%	4.0%	4.0%
900	0 0%	0.0%	0 0%	0.0%	0 0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.0%	5.0%	5.0%	5.0%	5.0%
1000	0 0%	0.0%	0 0%	0.0%	0 0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.0%	6.0%	6.0%	6.0%	6.0%
1100	0 0%	0.0%	0 0%	0.0%	0 0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.0%	6.0%	6.0%	6.0%	6.0%
1200	0 0%	0.0%	0 0%	0.0%	0 0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.0%	7.0%	7.0%	7.0%	7.0%
1300	0 0%	0.0%	0 0%	0.0%	0 0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.0%	5.0%	5.0%	5.0%	5.0%
1400	0 0%	0.0%	0 0%	0.0%	0 0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.0%	5.0%	5.0%	5.0%	5.0%
1600	0 0%	0.0%	0 0%	0.0%	0 0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.0%	5.0%	5.0%	5.0%	5.0%
1800	0 0%	0.0%	0 0%	0.0%	0 0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.0%	5.0%	5.0%	5.0%	5.0%

Top (x) axis is "fuel mass" in cubic mm per second, left (y) axis is fuel pressure (bar), values within table are % difference in injector duration in milliseconds

Table 2. % Differences between "Factory" and "Performance" Durations for "DPF Removed" Tune

	0	1	2	5	10	20	30	40	50	60	70	80	90	105	120	150
100	0 0%	0.0%	0 0%	0.0%	0 0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
200	0 0%	0.0%	0 0%	0.0%	0 0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
300	0 0%	0.0%	0 0%	0.0%	0 0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
400	0 0%	0.0%	0 0%	0.0%	0 0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
500	0 0%	0.0%	0 0%	0.0%	0 0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
600	0 0%	0.0%	0 0%	0.0%	0 0%	0.0%	0.0%	0.0%	2.0%	2.0%	2.0%	2.0%	4.1%	4.0%	5.5%	4.1%
700	0 0%	0.0%	0 0%	0.0%	0 0%	0.0%	0.0%	0.0%	2.0%	4.0%	4.1%	7.9%	11.9%	11 9%	14.7%	8.1%
800	0 0%	0.0%	0 0%	0.0%	0 0%	0.0%	0.0%	0.0%	2.0%	4.1%	6.1%	10 9%	18.3%	18.7%	22.3%	11 9%
900	0 0%	0.0%	0 0%	0.0%	0 0%	0.0%	0.0%	0.0%	2.0%	4.0%	6.1%	12 0%	21.1%	22 6%	27.8%	16.4%
1000	0 0%	0.0%	0 0%	0.0%	0 0%	0.0%	0.0%	0.0%	2.0%	4.0%	6.1%	11 8%	21.2%	24.7%	30.9%	20 2%
1100	0 0%	0.0%	0 0%	0.0%	0 0%	0.0%	0.0%	0.0%	2.0%	4.0%	6.2%	10.1%	21.9%	27 5%	32.5%	21 8%
1200	0 0%	0.0%	0 0%	0.0%	0 0%	0.0%	0.0%	0.0%	2.1%	4.0%	6.1%	9.8%	22.6%	28 2%	33.8%	23 6%
1300	0 0%	0.0%	0 0%	0.0%	0 0%	0.0%	0.0%	0.0%	2.0%	4.0%	6.1%	11 3%	22.6%	29 0%	35.0%	23 9%
1400	0 0%	0.0%	0 0%	0.0%	0 0%	0.0%	0.0%	0.0%	2.0%	4.1%	6.1%	9.3%	21.8%	26 6%	32.3%	21 0%
1600	0 0%	0.0%	0 0%	0.0%	0 0%	0.0%	0.0%	0.0%	1.9%	4.0%	6.2%	12.7%	25.9%	33 9%	39.2%	29.4%
1800	0 0%	0.0%	0 0%	0.0%	0 0%	0.0%	0.0%	0.0%	1.9%	4.0%	6.2%	11.7%	25.7%	36 8%	43.0%	35 5%

Top (x) axis is "fuel mass" in cubic mm per second, left (y) axis is fuel pressure (bar), values within table are % difference in injector duration in milliseconds

For the second category (within the "Stock" Tune), no differences were seen between the factory and stock maps, no differences were seen between the factory and tow maps, and no differences were seen between the factory and performance maps. All injection duration maps were the same within the stock tune. Therefore, for the third category, the differences in "Tow" map values between "DPF Removed" and "Stock" Tunes are the same as shown in Table 1, and the differences in "Performance" map values between "DPF Removed" and "Stock" Tunes are the same as shown in Table 2.

Details of the main injection duration map comparisons are provided in Attachment 2.

Maximum fuel rate curves

The "Maximum Fuel" curves (under "Injection Quantity"/"Curves") list the engine's fuel rate (mm^3/sec) as a function of engine speed (RPM). Comparisons were made between the "stock" and "DPF Removed" values for EOM 1, 3 and 6 curves. Table 3 lists the relative percentage of the differences in maximum fuel rate curve values between the "stock" and "DPF Removed" tunes, and additional details are provided in Attachment 2.

Table 3. % Difference between Maximum Fuel Rate Curves for "DPF Removed" and Stock" Tunes

RPM	800	900	1000	1100	1200	1300	1400	1500	1600	1800	2000	2200	2400	2500	2600	2700	2800	2818	2900	3013	3200
EOM 1	2.5%	2.4%	2.2%	2.2%	2.0%	1.9%	1.9%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	2.1%
EOM 3	2.5%	2.4%	2.2%	2.2%	2.0%	1.9%	1.9%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	2.1%
EOM 6	1.2%	1.2%	1.1%	1.1%	1.0%	1.0%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	1.0%

Injection timing

The "Main injection timing" maps (under "Injection Timing"/"Maps") list the engine's injection timing (degrees) as a function of engine speed (RPM) and commanded torque (NM). Comparisons were made between the "stock" and "DPF Removed" tunes for EOM 1, 3 and 6 maps. Differences were seen in between the "stock" and "DPF Removed" tunes for all three maps. Injection timing changes were seen throughout these tables, and ranged from -0.01 ° up to 10.93°. Additional details are provided in Attachment 2.

Other Tunes

ERG attempted to download and evaluate additional tune files from the MCC website at http://www.hsperformance.com/mcc/. At this site, links were available for the MCC desktop software (as was installed for this evaluation) as well as "Tuner updates", but no other tunes were identified for evaluation. ERG also identified custom tuning files available at

http://www.hsperformance.com/xrt-pro-2010-2011-6-7l-cummins-custom-downloads/ and at http://www.hsperformance.com/xrt-6-7-cummins-custom-downloads-1-28-hardware/. However, the files available for download at this website were intended for use directly in the truck tuning equipment, and no human-readable tunes such as the *.MCC files provided to EPA directly by H&S Performance were identified. In order to read these available custom tunes with MCC, they would have to first be downloaded to the tuner, and then the tuner would have to sync with a truck. The sync process would be the first step in the process of generating viewable *.MCC files that could then be uploaded back to a computer and viewed in the software. ***We recommend that all the tunes used for testing at Cummins be exported as "*.MCC" files while the tuner is synced with a truck at Cummins. This will allow confirmation that the tuner files are the same as those evaluated for this subtask, and if they are not, it will allow comparison of the actual tuner files with stock configuration files, similar to the comparison performed in this subtask.***

Attachment 1: H&S Tuning Changes

Attachment 2: Comparison of "Stock" and "DPF Removed" Tunes

H&S ENGINE TUNING CHANGES (2010AUTO_STOCK.BIN VS 2010AUTO_TUNE.BIN)

Hexadecimal Address	Description of Data Changed	Length of Data Changed
0x01	Race Product Tuning Version. This data is used to match with values in our firmware. When important updates are done, these values are incremented and must match. This protects against file corruption or backdating.	0x02
0x08	Street Product Tuning Version. This data is used to match with values in our firmware. When important updates are done, these values are incremented and must match. This protects against file corruption or backdating.	0x02
0x06AD	Global derate switch. This switch turns off some of the engine protect derates that the ECM is capable of implementing.	0x01
0x0842	RPM value modified to gain higher Engine RPM capabilities.	0x02
0x08FA	Road Speed Limit value. Modified to raise or lower speed limits capabilities as per customer's needs.	0x02
0x00027F40	File changes for Shift On the Fly functions	0x04
0x000B9564	File changes for Shift On the Fly functions	0x04
0x0017BEDC	File changes for Shift On the Fly functions	0x04
0x00218A12	Data group that controls the illumination of the Malfunction Indicator Lamp	0X0564
0x0021EE72	Data group that controls the reporting logic of the Malfunctioning Indicator Lamp	0X0564
0x002213F2	Data group that controls the reporting logic of the Malfunctioning Indicator Lamp	0x036C
0x00222454	Value affecting diagnostics control	0x02
0x00222D5A	Value affecting diagnostics control	0x02
0x00226912	Maximum torque limitation value	0x04
0x0022B0A4	Value affecting diagnostics control	0x02
0x0022D3BE	Value affecting diagnostics control	0x02
0x0022FFCC	Data group controlling Injection Timing. 7 independent maps contained in the block. Tuned values set to 0xFF to enable and end user adjustable option. See installation manual.	0x10A0
0x00231B3D	Maximum torque limitation value	0x4C
0x0023A19D	Data limiting the variable vane turbine exhaust brake	0x34
0x0023A328	Table limiting the variable vane turbo system	0x0200
0x0023AA44	Switch controlling diagnostics operations	0x01
0x0023BA7C	File changes for Shift On the Fly functions	0x08
0x0023EEF1	Switch affecting engine protection derate algorithms	0x01
0x0023EF1E	RPM value affecting engine performance	0x04
0x0023F0EA	Engine torque limitation	0x2A
0x0023FBDA	Engine torque limitation	0xDA
0x0023FCF1	ECM parameter controlling engine acceleration limits	0x02
0x0023FE8D	ECM parameter controlling engine acceleration limits	0x02
0x00240084	RPM value affecting engine performance	0x0C
0x00240544	RPM value affecting engine performance	0x04
0x00240594	Table affecting pedal position to commanded power output	0x1B8
0x0024084C	Maximum torque limitation curve	0x08

H&S ENGINE TUNING CHANGES (2010AUTO_STOCK.BIN VS 2010AUTO_TUNE.BIN)

Hexadecimal Address	Description of Data Changed	Length of Data Changed
0x0024088E	Maximum exhaust brake limitation torque	0x0C
0x0024131E	Values controlling upper and lower thresholds for exhaust system sensors	0x04
0x002413EA	Values controlling upper and lower thresholds for exhaust system sensors	0x04
0x002414BA	Values controlling upper and lower thresholds for exhaust system sensors	0x04
0x0024158A	Values controlling upper and lower thresholds for exhaust system sensors	0x04
0x0024252C	Table used to control fueling	0x04
0x00242C48	Temperature limit value for exhaust system	0x04
0x00243F2C	Upper pressure limit for exhaust system	0x28
0x00244920	Temperature limit value for exhaust system	0x04
0x0024767C	Value controlling maximum setpoint fuel pressure	0x04
0x0024864D	Curves controlling maximum fueling amounts, 6 curves contained in this block	0x01F6
0x00248940	Curves controlling maximum torque amounts, 6 curves contained in this block	0x01F6
0x0024D140	Value affecting fueling based on air density	0x04
0x0024D808	Value affecting fueling based on air density	0x04
0x00252128	Table limiting turbo vane position	0x0260
0x00252388	Table limiting turbo vane position	0x0260
0x002525E8	Table limiting turbo vane position	0x0260
0x00252848	Table limiting turbo vane position	0x0260
0x002547FC	Value affecting EGR operation thresholds	0x04
0x00254800	Value affecting EGR operation thresholds	0x04
0x002549A4	Value affecting fueling based on air density	0x04
0x002549F0	Value affecting fueling based on air density	0x04
0x002549F4	Value affecting fueling based on air density	0x04
0X00254BD0	Table controlling exhaust system pressure limits	0x0190
0x00255170	Curve controlling turbo pressure limitations	0x16
0x00255E38	Turbo limitation threshold	0x04
0x00256218	Value affecting engine derate algorithms	0a04
0x00256258	Value affecting engine derate algorithms	0a04
0x00256288	Value affecting engine derate algorithms	0a04
0x002562B8	Value affecting engine derate algorithms	0a04
0x00256300	Value affecting engine derate algorithms	0a04
0x0025633C	Value affecting engine derate algorithms	0a04
0x00256358	Value affecting engine derate algorithms	0a04
0x00257340	Turbo Speed limitation value	0x04
0x00257348	Turbo Speed limitation value	0x04
0x0025B088	Table controlling turbo system	0x0260

H&S ENGINE TUNING CHANGES (2010AUTO_STOCK.BIN VS 2010AUTO_TUNE.BIN)

Hexadecimal Address	Description of Data Changed	Length of Data Changed
0x0025B2E8	Table controlling turbo system	0x0260
0x0025B548	Table controlling turbo system	0x0260
0x0025B7A8	Table controlling turbo system	0x0260
0x0025BA08	Table controlling turbo system	0x0260
0x0025BC68	Table controlling turbo system	0x0260
0x0025BEC8	Table controlling turbo system	0x0260
0x0025C18A	Table controlling turbo system	0x0260
0x0025C44E	Table controlling turbo system	0x0260
0x0025C712	Table controlling turbo system	0x0260
0x0025C9D6	Table controlling turbo system	0x0260
0x0025CC9A	Table controlling turbo system	0x0260
0x0025CEFA	Table controlling turbo system	0x0260
0x0025F9BC	Value affecting DTC routines	0x0C
0x00260250	Value affecting DTC algorithm	0x01
0x00261790	Turbo Boost limitation value	0x02
0x00261798	Time threshold that affects engine derate algorithms	0x02
0x002A74B0	File changes for Shift On the Fly functions	0xA0

IF OVERDRIVE TRANSMISSION TUNING IS UNLOCKED, THE FOLLOWING WILL ALSO BE MODIFIED IN THE CALIBRATION FILE (OD2010STOCK.BIN VS OD2010.BIN)

0x06D0C	Value affecting torque converter lock feature during coasting	0x02
0x06DA4	Maximum torque value	0x01
0x06DA6	Maximum torque value	0x01
0x06DA8	Maximum torque value	0x01
0x06DAA	Maximum torque value	0x01
0x06E20	3-4 shift control	0x10
0x06E30	4-3 shift control	0x10
0x06E40	3-4 shift control	0x10
0x06E50	4-3 shift control	0x10
0x06E60	2'-3 shift control	0x10
0x06E70	3-2' shift control	0x10
0x06EB0	3-4 shift control	0x10

H&S ENGINE TUNING CHANGES (2010AUTO_STOCK.BIN VS 2010AUTO_TUNE.BIN)

Hexadecimal Address	Description of Data Changed	Length of Data Changed
0x06ED0	2'-3 shift control	0x10
0x06EE0	3-2' shift control	0x10
0x06EF0	4-4' shift control	0x10
0x06F00	4'-4 shift control	0x10
0x06F10	4-4' shift control	0x10
0x06F20	4'-4 shift control	0x10
0x06F30	4-4' shift control	0x10
0x06F40	4'-4 shift control	0x10
0x07050	3-4 shift control	0x10
0x07060	4-3 shift control	0x10
0x07070	2'-3 shift control	0x10
0x07080	3-2' shift control	0x10
0x070D0	2'-3 shift control	0x10
0x070E0	3-2' shift control	0x10
0x07120	3-4 shift control	0x10
0x07130	4-3 shift control	0x10
0x07140	4-4' shift control	0x10
0x07150	4'-4 shift control	0x10
0x07232	Shift acceleration value	0x02
0x07234	Gain multiplier used in shift acceleration calculations	0x02
0x07238	Acceleration limit during shift	0x02
0x0723A	Acceleration limit during shift	0x02
0x0723C	Acceleration limit during shift	0x02
0x07250	Gain multiplier used in shift acceleration calculations	0x02
0x07254	Shift acceleration value	0x02
0x0726A	Shift acceleration value	0x02
0x0726C	Gain multiplier used in shift acceleration calculations	0x02
0x07270	Acceleration limit during shift	0x02
0x07278	Acceleration limit during shift	0x02
0x0727E	Acceleration limit during shift	0x02
0x07286	Shift acceleration value	0x02
0x07288	Gain multiplier used in shift acceleration calculations	0x02
0x0728C	Acceleration limit during shift	0x02
0x07294	Shift acceleration value	0x02
0x0729A	Acceleration limit during shift	0x02
0x072A2	Shift acceleration value	0x02

H&S ENGINE TUNING CHANGES (2010AUTO_STOCK.BIN VS 2010AUTO_TUNE.BIN)

Hexadecimal Address	Description of Data Changed	Length of Data Changed
0x072A4	Gain multiplier used in shift acceleration calculations	0x02
0x072A8	Acceleration limit during shift	0x02
0x072B0	Shift acceleration value	0x02
0x072B6	Acceleration limit during shift	0x02
0x072BE	Shift acceleration value	0x02
0x072C0	Gain multiplier used in shift acceleration calculations	0x02
0x072C4	Acceleration limit during shift	0x02
0x072CC	Shift acceleration value	0x02
0x072D2	Acceleration limit during shift	0x02
0x072DA	Shift acceleration value	0x02
0x072E0	Acceleration limit during shift	0x02
0x07633	Duty cycle curve for clutch solenoid	0x10
0x07643	Duty cycle curve for clutch solenoid	0x10
0x07653	Duty cycle for clutch solenoid	0x10
0x07663	Duty cycle for clutch solenoid	0x10
0x07673	Duty cycle for clutch solenoid	0x10
0x07683	Duty cycle for clutch solenoid	0x10
0x07DC4	Desired stall value for torque converter	0x0E
0x07DD2	Desired stall value for torque converter	0x0E
0x07DF9	Switch affecting torque converter control	0x01
0x07DFA	Switch affecting torque management control	0x01
0x07DFC	Switch affecting shifting torque management	0x01
0x07F1A	Desired torque value	0x02
0x07F1E	Desired torque value	0x02
0x07F20	Desired torque value	0x02
0x07F22	Desired torque value	0x02
0x07F47	Maximum line pressure value	0x02
0x07F49	Maximum line pressure value	0x02
0x07F4B	Maximum line pressure value	0x02
0x07F4D	Maximum line pressure value	0x02
0x07F4F	Maximum line pressure value	0x02
0x07F51	Maximum line pressure value	0x02
0x07F56	Maximum line pressure value	0x02
0x07F65	Multiplier value used in line pressure algorithm	0x02
0x07F67	Multiplier value used in line pressure algorithm	0x02
0x07F69	Multiplier value used in line pressure algorithm	0x02

H&S ENGINE TUNING CHANGES (2010AUTO_STOCK.BIN VS 2010AUTO_TUNE.BIN)

Hexadecimal Address	Description of Data Changed	Length of Data Changed
0x07F6B	Multiplier value used in line pressure algorithm	0x02
0x07F6D	Multiplier value used in line pressure algorithm	0x02
0x07F6F	Multiplier value used in line pressure algorithm	0x02
0x07F74	Maximum line pressure curve	0x16
0x08062	Curve controlling torque converter lock	0x10
0x08072	Curve controlling torque converter lock	0x10
0x08082	Curve controlling torque converter lock	0x10
0x080D2	Curve controlling torque converter lock	0x10
0x08122	Curve controlling torque converter lock	0x10
0x081C2	Curve controlling torque converter lock	0x10
0x08262	Curve controlling torque converter lock	0x10
0x082E2	Curve controlling torque converter lock	0x10
0x082F2	Curve controlling torque converter lock	0x10
0x08302	Curve controlling torque converter lock	0x10
0x08352	Curve controlling torque converter lock	0x10
0x0862E	Curve controlling accelerator pedal input to the TCM	0x14

2010Dodge Pickup AutoTrans DPFRemoved.MCC
2010 6.7L Cummins Engine Control
Torque
Maps
(RPM : %) / NM: Top (x) axis is engine speed (RPM), Left (y) axis throttle position (%),
units within table are newton meters

Accelerator to Torque Map

	700	750	800	900	1000	1200	1300	1400	1500	1600	1800	1900	2200	2400	2600	2800	2900	3013	3200	3300	3400	3500
-10	-400	-400	-400	-400	-400	-400	-400	-400	-400	-400	-400	-400	-400	-400	-400	-400	-400	-400	-400	-400	-400	-400
0	-100	-101	-103	-104	-107	-109	-110	-114	-115	-116	-119	-119	-120	-121	-121	-122	-122	-128	-129	-129	-130	-131
1	-50	-51	-52	-53	-53	-54	-55	-55	-56	-56	-57	-58	-58	-58	-59	-61	-61	-62	-63	-64	-65	-64
50	357	357	357	357	357	357	357	357	357	357	357	357	357	357	357	357	357	357	295	201	107	107
100	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	708	482	256	256
100	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	708	482	256	256
100	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	708	482	256	256
100	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	708	482	256	256
100	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	708	482	256	256
100	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	708	482	256	256

2010CumminsAuto Stock.MCC
2010 6.7L Cummins Engine Control
Torque
Maps
(RPM : %) / NM: Top (x) axis is engine speed (RPM), Left (y) axis throttle position (%),
units within table are newton meters

Accelerator to Torque Map

	700	750	800	900	1000	1200	1300	1400	1500	1600	1800	1900	2200	2400	2600	2800	2900	3013	3200	3300	3400	3500
-10	-400	-400	-400	-400	-400	-400	-400	-400	-400	-400	-400	-400	-400	-400	-400	-400	-400	-400	-400	-400	-400	-400
0	-100	-101	-103	-104	-107	-109	-110	-114	-115	-116	-119	-119	-120	-121	-121	-122	-122	-128	-129	-129	-130	-131
1	-50	-51	-52	-53	-53	-54	-55	-55	-56	-56	-57	-58	-58	-58	-59	-61	-61	-62	-63	-64	-65	-64
50	357	357	357	357	357	357	357	357	357	357	357	357	357	357	357	357	357	357	295	201	107	107
100	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	708	482	256	256
100	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	708	482	256	256
100	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	708	482	256	256
100	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	708	482	256	256
100	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	708	482	256	256
100	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	857	708	482	256	256

Difference in values between "Stock" and "DPFRemoved" tune values

Accelerator to Torque Map

	700	750	800	900	1000	1200	1300	1400	1500	1600	1800	1900	2200	2400	2600	2800	2900	3013	3200	3300	3400	3500
-10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: No differences were seen between the accelerator to torque map from the "stock" tune and the "DPF removed" tune.

2010Dodge Pickup AutoTrans DPFRemoved.MCC
2010 6.7L Cummins Engine Control
Injection Quantity
Maps

(RPM : NM) / MM3/s Top (x) axis is engine speed in RPM, left (y) axis is engine torque in newton meters, units within table are cubic milimeters per second

Torque to fuel conversion EOM 1

	600	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	2000	2200	2400	2600	2800	3000	3200
-200	-10	-11	-11	-11	-12	-10	-9	-9	-11	-11	-11	-10	-10	-8	-9	-7	-5	-2	0
-100	-2	-2	-2	-2	-2	-1	-1	-1	-1	-1	-1	0	0	1	1	3	4	5	6
0	6	6	7	7	8	7	8	8	9	10	10	10	11	11	11	12	10	13	14
75	13	12	13	13	14	14	15	15	13	14	14	14	16	13	14	18	18	21	22
150	26	25	24	23	23	24	24	24	23	24	25	25	25	26	27	29	32	32	35
225	30	31	31	31	31	31	31	32	31	32	32	33	35	35	35	36	38	39	41
300	31	35	36	38	39	39	39	39	39	39	40	41	40	41	42	42	44	45	47
375	42	44	45	46	47	46	46	47	48	48	49	50	50	49	50	49	49	51	55
450	54	55	56	57	57	57	57	58	58	57	57	56	58	55	55	58	60	61	66
525	74	70	69	67	65	66	66	66	66	66	66	65	66	65	65	69	70	72	74
600	95	83	79	78	74	75	74	74	75	75	75	75	75	75	76	78	79	83	83
675	115	102	93	88	82	84	83	82	84	85	85	85	85	86	87	87	88	93	97
750	135	117	108	99	90	94	93	92	93	95	95	96	95	95	96	97	96	104	109
825	155	132	121	109	98	104	103	102	102	105	105	106	105	107	107	107	107	109	109
881	170	144	131	117	104	112	110	110	109	112	112	112	112	111	111	115	115	124	123
949	189	158	142	127	111	121	119	119	117	122	123	123	122	126	125	124	124	132	132

Torque to fuel conversion EOM 3

	600	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	2000	2200	2400	2600	2800	3000	3200
-200	-10	-11	-11	-11	-12	-10	-9	-9	-11	-11	-11	-10	-10	-8	-9	-7	-5	-2	0
-100	-2	-2	-2	-2	-2	-1	-1	-1	-1	-1	-1	0	0	1	1	3	4	5	6
0	6	6	7	7	8	7	8	8	9	10	10	10	11	11	11	12	10	13	14
75	13	13	15	14	14	15	15	16	14	15	16	16	16	17	17	18	18	21	22
150	21	24	23	24	23	24	23	25	24	24	24	25	24	24	24	26	26	28	31
225	26	32	32	31	32	32	32	32	32	32	32	32	32	31	32	33	35	36	39
300	36	39	39	40	39	40	40	39	40	40	40	40	39	39	40	41	42	43	46
375	48	49	49	50	50	49	49	50	49	49	50	49	49	48	48	49	50	53	56
450	59	58	58	58	59	59	59	59	59	59	58	58	57	56	57	60	61	62	65
525	75	70	68	68	68	68	67	68	68	67	67	67	67	66	67	69	70	71	74
600	95	84	79	78	76	76	75	76	76	76	75	75	76	76	76	78	79	80	85
675	114	98	95	89	86	84	84	84	84	85	84	84	86	85	86	87	88	91	96
750	134	111	111	101	98	96	94	94	94	96	95	95	95	95	96	96	96	100	105
825	153	125	128	113	109	110	108	105	105	106	106	106	104	105	105	106	106	111	114
881	168	136	141	122	118	121	119	112	112	112	113	113	112	113	113	115	115	120	120
949	186	148	156	133	129	134	132	121	121	120	121	120	121	121	123	126	126	131	129

Torque to fuel conversion EOM 6

	600	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	2000	2200	2400	2600	2800	3000	3200
-200	-10	-11	-11	-11	-12	-10	-9	-9	-11	-11	-11	-10	-10	-8	-9	-7	-5	-2	0
-100	-2	-2	-2	-2	-2	-1	-1	-1	-1	-1	-1	0	0	1	1	3	4	5	6
0	6	6	7	7	8	7	8	8	9	10	10	10	11	11	11	12	10	13	14
75	13	12	13	13	14	14	15	15	13	14	14	14	16	13	14	18	18	21	22
150	26	25	24	23	23	24	24	24	23	24	25	25	25	26	27	29	32	32	35
225	30	31	31	31	31	31	31	32	31	32	32	33	35	35	35	36	38	39	41
300	31	35	36	38	39	39	39	39	39	39	40	41	40	41	42	42	44	45	47
375	42	44	45	46	47	46	46	47	48	48	49	50	50	49	50	49	49	51	55
450	54	55	56	57	57	57	57	58	58	57	57	56	58	55	55	58	60	61	66
525	74	70	69	67	65	66	66	66	66	66	66	65	66	65	65	69	70	72	74
600	95	83	79	78	74	75	74	74	75	75	75	75	75	75	76	78	79	83	83
675	115	102	93	88	82	84	83	82	84	85	85	85	85	86	87	87	88	93	97
750	135	117	108	99	90	94	93	92	93	95	95	96	95	95	96	97	96	104	109
825	155	132	121	109	98	104	103	102	102	105	105	106	105	107	107	107	107	109	109
881	170	144	131	117	104	112	110	110	109	113	113	112	112	111	111	115	115	124	123
949	189	158	142	127	111	121	119	119	117	122	123	123	122	126	125	124	124	132	132

2010CumminsAuto Stock.MCC
2010 6.7L Cummins Engine Control
Injection Quantity
Maps

(RPM : NM) / MM3/s Top (x) axis is engine speed in RPM, left (y) axis is engine torque in newton meters, units within table are cubic milimeters per second

Torque to fuel conversion EOM 1

	600	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	2000	2200	2400	2600	2800	3000	3200
-200	-10	-11	-11	-11	-12	-10	-9	-9	-11	-11	-11	-10	-10	-8	-9	-7	-5	-2	0
-100	-2	-2	-2	-2	-2	-1	-1	-1	-1	-1	-1	0	0	1	1	3	4	5	6
0	6	6	7	7	8	7	8	8	9	10	10	10	11	11	11	12	10	13	14
75	13	12	13	13	14	14	15	15	13	14	14	14	16	13	14	18	18	21	22
150	26	25	24	23	23	24	24	24	23	24	25	25	25	26	27	29	32	32	35
225	30	31	31	31	31	31	31	32	31	32	32	33	35	35	35	36	38	39	41
300	31	35	36	38	39	39	39	39	39	39	40	41	40	41	42	42	44	45	47
375	42	44	45	46	47	46	46	47	48	48	49	50	50	49	50	49	49	51	55
450	54	55	56	57	57	57	57	58	58	57	57	56	58	55	55	58	60	61	66
525	74	70	69	67	65	66	66	66	66	66	66	65	66	65	65	69	70	72	74
600	95	83	79	78	74	75	74	74	75	75	75	75	75	75	76	78	79	83	83
675	115	102	93	88	82	84	83	82	84	85	85	85	85	86	87	87	88	93	97
750	135	117	108	99	90	94	93	92	93	95	95	96	95	95	96	97	96	104	109
825	155	132	121	109	98	104	103	102	102	105	105	106	105	107	107	107	107	109	109
881	170	144	131	117	104	112	110	110	109	112	112	112	112	111	111	115	115	124	123
949	189	158	142	127	111	121	119	119	117	122	123	123	122	126	125	124	124	132	132

Torque to fuel conversion EOM 3

	600	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	2000	2200	2400	2600	2800	3000	3200
-200	-10	-11	-11	-11	-12	-10	-9	-9	-11	-11	-11	-10	-10	-8	-9	-7	-5	-2	0
-100	-2	-2	-2	-2	-2	-1	-1	-1	-1	-1	-1	0	0	1	1	3	4	5	6
0	6	6	7	7	8	7	8	8	9	10	10	10	11	11	11	12	10	13	14
75	13	13	15	14	14	15	15	16	14	15	16	16	16	17	17	18	18	21	22
150	21	24	23	24	23	24	23	25	24	24	24	25	24	24	24	26	26	28	31
225	26	32	32	31	32	32	32	32	32	32	32	32	32	31	32	33	35	36	39
300	36	39	39	40	39	40	40	39	40	40	40	40	39	39	40	41	42	43	46
375	48	49	49	50	50	49	49	50	49	49	50	49	49	48	48	49	50	53	56
450	59	58	58	58	59	59	59	59	59	59	58	58	57	56	57	60	61	62	65
525	75	70	68	68	68	68	67	68	68	67	67	67	67	66	67	69	70	71	74
600	95	84	79	78	76	76	75	76	76	76	75	75	76	76	76	78	79	80	85
675	114	98	95	89	86	84	84	84	84	85	84	84	86	85	86	87	88	91	96
750	134	111	111	101	98	96	94	94	94	96	95	95	95	95	96	96	96	100	105
825	153	125	128	113	109	110	108	105	105	106	106	106	104	105	105	106	106	111	114
881	168	136	141	122	118	121	119	112	112	112	113	113	112	113	113	115	115	120	120
949	186	148	156	133	129	134	132	121	121	120	121	120	121	121	123	126	126	131	129

Torque to fuel conversion EOM 6

	600	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	2000	2200	2400	2600	2800	3000	3200
-200	-10	-11	-11	-11	-12	-10	-9	-9	-11	-11	-11	-10	-10	-8	-9	-7	-5	-2	0
-100	-2	-2	-2	-2	-2	-1	-1	-1	-1	-1	-1	0	0	1	1	3	4	5	6
0	6	6	7	7	8	7	8	8	9	10	10	10	11	11	11	12	10	13	14
75	13	12	13	13	14	14	15	15	13	14	14	14	16	13	14	18	18	21	22
150	26	25	24	23	23	24	24	24	23	24	25	25	25	26	27	29	32	32	35
225	30	31	31	31	31	31	31	32	31	32	32	33	35	35	35	36	38	39	41
300	31	35	36	38	39	39	39	39	39	39	40	41	40	41	42	42	44	45	47
375	42	44	45	46	47	46	46	47	48	48	49	50	50	49	50	49	49	51	55
450	54	55	56	57	57	57	57	58	58	57	57	56	58	55	55	58	60	61	66
525	74	70	69	67	65	66	66	66	66	66	66	65	66	65	65	69	70	72	74
600	95	83	79	78	74	75	74	74	75	75	75	75	75	75	76	78	79	83	83
675	115	102	93	88	82	84	83	82	84	85	85	85	85	86	87	87	88	93	97
750	135	117	108	99	90	94	93	92	93	95	95	96	95	95	96	97	96	104	109
825	155	132	121	109	98	104	103	102	102	105	105	106	105	107	107	107	107	109	109
881	170	144	131	117	104	112	110	110	109	113	113	112	112	111	111	115	115	124	123
949	189	158	142	127	111	121	119	119	117	122	123	123	122	126	125	124	124	132	132

Note: No differences between stock and "dpf removed" tunes for torque to fuel conversion EOM maps

Difference in values between Torque to fuel conversion "EOM 1" Maps for "DPF Removed" and "Stock" Tunes

	600	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	2000	2200	2400	2600	2800	3000	3200
-200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
225	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
450	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
525	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
675	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
825	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
881	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
949	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Difference in values between Torque to fuel conversion "EOM 3" Maps for "DPF Removed" and "Stock" Tunes

	600	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	2000	2200	2400	2600	2800	3000	3200
-200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
225	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
450	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
525	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
675	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
825	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
881	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
949	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Difference in values between Torque to fuel conversion "EOM 6" Maps for "DPF Removed" and "Stock" Tunes

	600	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	2000	2200	2400	2600	2800	3000	3200
-200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
225	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
450	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
525	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
675	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
825	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
881	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
949	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

2010Dodge_Pickup_AutoTrans_DPFRemoved.MCC
2010 6.7L Cummins Engine Control
Injection Pressure
Maps

(RPM : Nm) / PSI top (x) axis is engine speed (RPM), left (y) axis is commanded torque, and units within table fuel pressure in PSI

Injection Pressure EOM 1

	600	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	2000	2200	2400	2600	2800	3000	3200
-200	3891	4783	5165	5541	5923	6305	6680	7062	7444	7818	8202	8582	9341	10027	10713	11400	12086	12823	13459
-100	3891	4783	5165	5541	5923	6305	6680	7062	7444	7818	8202	8582	9341	10027	10713	11400	12086	12823	13459
0	3911	4817	5206	5588	5983	6346	6727	7102	7490	7863	8236	8603	9341	10027	10713	11400	12086	12823	13518
75	4510	5192	5787	5921	6365	6815	7080	7646	7713	8172	8560	8941	9559	10360	11035	11862	12504	13561	14386
150	5363	6519	6522	6842	7168	7532	7818	8252	8463	8822	9179	9877	10864	12070	12486	13849	14460	15393	16673
225	5363	7951	7961	7803	8331	8805	9065	9500	9703	10116	10566	11652	13301	14775	15495	16345	17468	18026	19219
300	5363	8555	8636	8695	9219	9773	10318	10696	11206	12138	12968	14085	15713	17074	17792	18438	19212	19968	21013
375	5363	8555	8820	9188	9940	10619	11317	12195	12713	13728	14672	15790	17791	19012	19761	20462	21155	22007	22692
450	5363	8555	9216	9583	10551	11310	12291	13254	14051	15062	15848	16949	18855	20226	20941	21717	22257	22882	23630
525	5363	8644	9730	10062	11122	11903	13061	14170	15179	16081	17050	18091	19965	21279	21881	22497	23055	23671	24280
600	5363	9359	10288	10522	11726	12515	13910	15224	16548	17753	18539	19466	21152	22015	22588	23101	23605	24237	24911
675	5363	9425	10585	10877	12327	13104	14824	16312	17862	19346	20158	20988	22313	22744	23455	23905	24321	25112	25656
750	5363	9425	10585	10877	12327	13471	15034	17064	18802	20576	21225	21973	23800	24596	25114	25265	25404	25940	26103
825	5363	9425	10585	10877	12327	13628	15252	17763	19793	21739	22386	22907	24943	26103	26103	26103	26103	26103	26103
881	5363	9425	10585	10877	12327	13628	15425	18243	20480	22455	23030	23457	24943	26103	26103	26103	26103	26103	26103
949	5363	9425	10585	10877	12327	13628	15634	18816	21313	23346	23805	24126	24943	26103	26103	26103	26103	26103	26103

Injection Pressure EOM 5

	600	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	2000	2200	2400	2600	2800	3000	3200
-200	4423	4783	5449	5597	6221	6857	7204	7557	7875	8194	8427	8668	9341	10877	11017	11307	11470	12161	12879
-100	4423	4783	5449	5597	6221	6857	7204	7557	7875	8194	8427	8668	9341	10877	11017	11307	11470	12161	12910
0	4457	4817	5449	5597	6221	6857	7204	7557	7875	8194	8427	8668	9341	10877	11216	11537	11604	12493	13360
75	4953	5192	5629	5606	6349	7178	7474	8397	8043	8519	8743	8925	9559	10877	11451	11884	12482	13509	14388
150	6715	6970	7087	7448	7903	8655	9245	10131	10210	10654	10531	10589	11318	12072	12052	13258	14032	15114	16688
225	7959	8465	8995	9284	9588	9744	10395	11177	11821	13323	12712	12903	13857	15094	15565	16167	17350	18258	20102
300	8967	8983	9765	11582	11701	11966	12342	12609	13462	14752	15095	15852	16953	17587	18246	18832	20102	21022	22199
375	9106	9113	10097	13239	13757	14151	14071	14095	14716	15433	16689	17949	19467	19043	19880	20754	21723	22694	23461
450	9183	9182	10302	12639	13330	14123	14488	14776	15643	16494	17583	18829	20186	19813	20786	21784	22485	23209	23939
525	8518	8969	10525	11554	12682	13756	14620	15336	16434	17406	18481	19605	20867	20819	21698	22430	23055	23736	24386
600	6523	6730	9086	10515	12039	13400	14748	15855	17200	18427	19325	20303	21576	21760	22495	23072	23605	24239	24914
675	6523	6523	8120	9236	11338	13058	14884	16387	17928	19368	20209	21052	22270	22744	23454	23905	24321	25090	25656
750	6523	6523	7975	7921	10465	12574	15034	17064	18802	20576	21225	21973	23205	24596	25114	25265	25404	25936	26103
825	6523	6523	7975	7862	10133	12327	15253	17763	19793	21739	22386	22907	24091	26102	26102	26103	26103	26103	26103
881	6523	6523	7975	7862	10133	12327	15425	18243	20480	22455	23030	23457	24753	26102	26102	26103	26103	26103	26103
949	6523	6523	7975	7862	10133	12327	15634	18816	21313	23346	23805	24126	25535	26103	26103	26103	26103	26103	26103

Injection Pressure EOM 10

	600	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	2000	2200	2400	2600	2800	3000	3200
-200	3891	4783	5165	5541	5923	6305	6680	7062	7444	7818	8202	8582	9341	10027	10713	11400	12086	12823	13459
-100	3891	4783	5165	5541	5923	6305	6680	7062	7444	7818	8202	8582	9341	10027	10713	11400	12086	12823	13459
0	3911	4817	5206	5588	5983	6346	6727	7102	7490	7863	8236	8603	9341	10027	10713	11400	12086	12823	13518
75	4510	5192	5787	5921	6365	6815	7080	7646	7713	8172	8560	8941	9559	10360	11035	11862	12504	13561	14386
150	5944	6519	6522	6842	7168	7532	7818	8252	8463	8822	9179	9877	10864	12070	12486	13849	14460	15393	16673
225	6974	7951	7961	7803	8331	8805	9065	9500	9703	10116	10566	11652	13301	14775	15495	16345	17468	18026	19219
300	8490	8555	8636	8695	9219	9773	10318	10696	11206	12138	12968	14085	15713	17074	17792	18438	19212	19968	21013
375	8555	8555	8820	9188	9940	10619	11317	12195	12713	13728	14672	15790	17791	19012	19761	20462	21155	22007	22692
450	8555	8555	9216	9583	10551	11310	12291	13254	14051	15062	15848	16949	18855	20226	20941	21717	22257	22882	23630
525	8932	8644	9730	10062	11122	11903	13061	14170	15179	16081	17050	18091	19965	21279	21881	22497	23055	23671	24280
600	9425	9359	10288	10522	11726	12515	13910	15224	16548	17753	18539	19466	21152	22015	22588	23101	23605	24237	24911
675	9425	9425	10585	10877	12327	13104	14824	16312	17862	19346	20158	20988	22313	22744	23455	23905	24321	25112	25656
750	9425	9425	10585	10877	12327	13471	15090	17287	19098	21018	21578	22292	23800	24596	25114	25265	25404	25940	26103
825	9425	9425	10585	10877	12327	13628	15329	18128	20314	22342	22911	23360	24943	26103	26103	26103	26103	26103	26103
881	9425	9425	10585	10877	12327	13628	15459	18488	20829	22880	23394	23774	24943	26103	26103	26103	26103	26103	26103
949	9425	9425	10585	10877	12327	13628	15616	18919	21455	23548	23977	24275	24943	26103	26103	26103	26103	26103	26103

2010CumminsAuto_Stock.MCC
2010 6.7L Cummins Engine Control
Injection Pressure
Maps

(RPM : Nm) / PSI top (x) axis is engine speed (RPM), left (y) axis is commanded torque, and units within table fuel pressure in PSI

Injection Pressure EOM 1

	600	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	2000	2200	2400	2600	2800	3000	3200
-200	3891	4783	5165	5541	5923	6305	6680	7062	7444	7818	8202	8582	9341	10027	10713	11400	12086	12823	13459
-100	3891	4783	5165	5541	5923	6305	6680	7062	7444	7818	8202	8582	9341	10027	10713	11400	12086	12823	13459
0	3911	4817	5206	5588	5983	6346	6727	7102	7490	7863	8236	8603	9341	10027	10713	11400	12086	12823	13518
75	4510	5192	5787	5921	6365	6815	7080	7646	7713	8172	8560	8941	9559	10360	11035	11862	12504	13561	14386
150	5363	6519	6522	6842	7168	7532	7818	8252	8463	8822	9179	9877	10864	12070	12486	13849	14460	15393	16673
225	5363	7951	7961	7803	8331	8805	9065	9500	9703	10116	10566	11652	13301	14775	15495	16345	17468	18026	19219
300	5363	8555	8636	8695	9219	9773	10318	10696	11206	12138	12968	14085	15713	17074	17792	18438	19212	19968	21013
375	5363	8555	8820	9188	9940	10619	11317	12195	12713	13728	14672	15790	17791	19012	19761	20462	21155	22007	22692
450	5363	8555	9216	9583	10551	11310	12291	13254	14051	15062	15848	16949	18855	20226	20941	21717	22257	22882	23630
525	5363	8644	9730	10062	11122	11903	13061	14170	15179	16081	17050	18091	19965	21279	21881	22497	23055	23671	24280
600	5363	9359	10288	10522	11726	12515	13910	15224	16548	17753	18539	19466	21152	22015	22588	23101	23605	24237	24911
675	5363	9425	10585	10877	12327	13104	14824	16312	17862	19346	20158	20988	22313	22744	23455	23905	24321	25112	25656
750	5363	9425	10585	10877	12327	13471	15034	17064	18802	20576	21225	21973	23800	24596	25114	25265	25404	25940	26103
825	5363	9425	10585	10877	12327	13628	15252	17763	19793	21739	22386	22907	24943	26103	26103	26103	26103	26103	26103
881	5363	9425	10585	10877	12327	13628	15425	18243	20480	22455	23030	23457	24943	26103	26103	26103	26103	26103	26103
949	5363	9425	10585	10877	12327	13628	15634	18816	21313	23346	23805	24126	24943	26103	26103	26103	26103	26103	26103

Injection Pressure EOM 5

	600	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	2000	2200	2400	2600	2800	3000	3200
-200	4423	4783	5449	5597	6221	6857	7204	7557	7875	8194	8427	8668	9341	10877	11017	11307	11470	12161	12879
-100	4423	4783	5449	5597	6221	6857	7204	7557	7875	8194	8427	8668	9341	10877	11017	11307	11470	12161	12910
0	4457	4817	5449	5597	6221	6857	7204	7557	7875	8194	8427	8668	9341	10877	11216	11537	11604	12493	13360
75	4953	5192	5629	5606	6349	7178	7474	8397	8043	8519	8743	8925	9559	10877	11451	11884	12482	13509	14388
150	6715	6970	7087	7448	7903	8655	9245	10131	10210	10654	10531	10589	11318	12072	12052	13258	14032	15114	16688
225	7959	8465	8995	9284	9588	9744	10395	11177	11821	13323	12712	12903	13857	15094	15565	16167	17350	18258	20102
300	8967	8983	9765	11582	11701	11966	12342	12609	13462	14752	15095	15852	16953	17587	18246	18832	20102	21022	22199
375	9106	9113	10097	13239	13757	14151	14071	14095	14716	15433	16689	17949	19467	19043	19880	20754	21723	22694	23461
450	9183	9182	10302	12639	13330	14123	14488	14776	15643	16494	17583	18829	20186	19813	20786	21784	22485	23209	23939
525	8518	8969	10525	11554	12682	13756	14620	15336	16434	17406	18481	19605	20867	20819	21698	22430	23055	23736	24386
600	6523	6730	9086	10515	12039	13400	14748	15855	17200	18427	19325	20303	21576	21760	22495	23072	23605	24239	24914
675	6523	6523	8120	9236	11338	13058	14884	16387	17928	19368	20209	21052	22270	22744	23454	23905	24321	25090	25656
750	6523	6523	7975	7921	10465	12574	15034	17064	18802	20576	21225	21973	23205	24596	25114	25265	25404	25936	26103
825	6523	6523	7975	7862	10133	12327	15253	17763	19793	21739	22386	22907	24091	26102	26102	26103	26103	26103	26103
881	6523	6523	7975	7862	10133	12327	15425	18243	20480	22455	23030	23457	24753	26102	26102	26103	26103	26103	26103
949	6523	6523	7975	7862	10133	12327	15634	18816	21313	23346	23805	24126	25535	26103	26103	26103	26103	26103	26103

Injection Pressure EOM 10

	600	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	2000	2200	2400	2600	2800	3000	3200
-200	3891	4783	5165	5541	5923	6305	6680	7062	7444	7818	8202	8582	9341	10027	10713	11400	12086	12823	13459
-100	3891	4783	5165	5541	5923	6305	6680	7062	7444	7818	8202	8582	9341	10027	10713	11400	12086	12823	13459
0	3911	4817	5206	5588	5983	6346	6727	7102	7490	7863	8236	8603	9341	10027	10713	11400	12086	12823	13518
75	4510	5192	5787	5921	6365	6815	7080	7646	7713	8172	8560	8941	9559	10360	11035	11862	12504	13561	14386
150	5944	6519	6522	6842	7168	7532	7818	8252	8463	8822	9179	9877	10864	12070	12486	13849	14460	15393	16673
225	6974	7951	7961	7803	8331	8805	9065	9500	9703	10116	10566	11652	13301	14775	15495	16345	17468	18026	19219
300	8490	8555	8636	8695	9219	9773	10318	10696	11206	12138	12968	14085	15713	17074	17792	18438	19212	19968	21013
375	8555	8555	8820	9188	9940	10619	11317	12195	12713	13728	14672	15790	17791	19012	19761	20462	21155	22007	22692
450	8555	8555	9216	9583	10551	11310	12291	13254	14051	15062	15848	16949	18855	20226	20941	21717	22257	22882	23630
525	8932	8644	9730	10062	11122	11903	13061	14170	15179	16081	17050	18091	19965	21279	21881	22497	23055	23671	24280
600	9425	9359	10288	10522	11726	12515	13910	15224	16548	17753	18539	19466	21152	22015	22588	23101	23605	24237	24911
675	9425	9425	10585	10877	12327	13104	14824	16312	17862	19346	20158	20988	22313	22744	23455	23905	24321	25112	25656
750	9425	9425	10585	10877	12327	13471	15090	17287	19098	21018	21578	22292	23800	24596	25114	25265	25404	25940	26103
825	9425	9425	10585	10877	12327	13628	15329	18128	20314	22342	22911	23360	24943	26103	26103	26103	26103	26103	26103
881	9425	9425	10585	10877	12327	13628	15459	18488	20829	22880	23394	23774	24943	26103	26103	26103	26103	26103	26103
949	9425	9425	10585	10877	12327	13628	15616	18919	21455	23548	23977	24275	24943	26103	26103	26103	26103	26103	26103

2010 6.7L Cummins Engine Control
Injection Pressure
Maps

(RPM : Nm) / PSI top (x) axis is engine speed (RPM), left (y) axis is commanded torque,
and units within table fuel pressure in PSI

Difference in values between "EOM 1" Map injection pressures for "DPF Removed" and "Stock" Tunes

	600	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	2000	2200	2400	2600	2800	3000	3200
-200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
225	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
450	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
525	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
675	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
825	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
881	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
949	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Difference in values between "EOM 5" Map injection pressures for "DPF Removed" and "Stock" Tunes

	600	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	2000	2200	2400	2600	2800	3000	3200
-200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
225	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
450	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
525	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
675	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
825	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
881	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
949	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Difference in values between "EOM 10" Map injection pressures for "DPF Removed" and "Stock" Tunes

	600	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	2000	2200	2400	2600	2800	3000	3200
-200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
225	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
450	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
525	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
675	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
825	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
881	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
949	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

2010Dodge_Pickup_AutoTrans_DPFRemoved.MCC
2010 6.7L Cummins Engine Control
Injection Quantity
Maps

(MM3/s : Bar) / msec: Top (x) axis is "fuel mass" in cubic mm per second, Left (y) axis is fuel pressure (bars), units within table are milliseconds

Main Injection Duration Factory

	0	**1**	**2**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**105**	**120**	**150**
100	0	0.371	0.46	0.672	0.759	1.107	1.457	1.838	2.25	2.687	3.144	3.618	4.105	4.854	5.62	7.152
200	0	0.371	0.46	0.672	0.759	1.107	1.457	1.838	2.25	2.687	3.144	3.618	4.105	4.854	5.62	7.152
300	0	0.322	0.366	0.523	0.658	0.933	1.216	1.534	1.885	2.265	2.667	3.088	3.523	4.197	4.891	6.279
400	0	0.27	0.328	0.445	0.578	0.798	1.028	1.296	1.599	1.93	2.286	2.662	3.053	3.662	4.294	5.557
500	0	0.2	0.301	0.396	0.517	0.695	0.886	1.114	1.377	1.67	1.987	2.324	2.678	3.233	3.81	4.966
600	0	0.187	0.285	0.358	0.47	0.619	0.78	0.977	1.209	1.47	1.755	2.06	2.382	2.89	3.422	4.484
700	0	0.179	0.274	0.338	0.434	0.562	0.702	0.876	1.083	1.318	1.577	1.856	2.151	2.619	3.111	4.093
800	0	0.175	0.273	0.332	0.404	0.52	0.644	0.801	0.989	1.204	1.441	1.698	1.971	2.404	2.861	3.775
900	0	0.159	0.252	0.304	0.379	0.486	0.601	0.745	0.918	1.116	1.336	1.575	1.828	2.233	2.659	3.513
1000	0	0.155	0.247	0.297	0.356	0.458	0.567	0.701	0.863	1.048	1.253	1.476	1.713	2.092	2.492	3.293
1100	0	0.156	0.25	0.3	0.334	0.433	0.537	0.665	0.817	0.991	1.184	1.393	1.616	1.972	2.349	3.103
1200	0	0.145	0.237	0.283	0.314	0.409	0.511	0.633	0.777	0.942	1.124	1.321	1.531	1.866	2.222	2.932
1300	0	0.146	0.24	0.287	0.295	0.388	0.486	0.603	0.741	0.896	1.068	1.254	1.453	1.769	2.104	2.774
1400	0	0.137	0.23	0.273	0.283	0.371	0.466	0.578	0.708	0.855	1.018	1.193	1.379	1.731	2.057	2.708
1600	0	0.083	0.22	0.261	0.283	0.371	0.458	0.556	0.67	0.798	0.939	1.092	1.254	1.563	1.848	2.419
1800	0	0.08	0.218	0.255	0.283	0.371	0.458	0.556	0.67	0.798	0.939	1.065	1.2	1.464	1.705	2.188

2010Dodge_Pickup_AutoTrans_DPFRemoved.MCC
2010 6.7L Cummins Engine Control
Injection Quantity
Maps

(MM3/s : Bar) / msec: Top (x) axis is "fuel mass" in cubic mm per second, Left (y) axis is fuel pressure (bars), units within table are milliseconds

Main Injection Duration Stock Power Setting

	0	**1**	**2**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**105**	**120**	**150**
100	0	0.371	0.46	0.672	0.759	1.107	1.457	1.838	2.25	2.687	3.144	3.618	4.105	4.854	5.62	7.152
200	0	0.371	0.46	0.672	0.759	1.107	1.457	1.838	2.25	2.687	3.144	3.618	4.105	4.854	5.62	7.152
300	0	0.322	0.366	0.523	0.658	0.933	1.216	1.534	1.885	2.265	2.667	3.088	3.523	4.197	4.891	6.279
400	0	0.27	0.328	0.445	0.578	0.798	1.028	1.296	1.599	1.93	2.286	2.662	3.053	3.662	4.294	5.557
500	0	0.2	0.301	0.396	0.517	0.695	0.886	1.114	1.377	1.67	1.987	2.324	2.678	3.233	3.81	4.966
600	0	0.187	0.285	0.358	0.47	0.619	0.78	0.977	1.209	1.47	1.755	2.06	2.382	2.89	3.422	4.484
700	0	0.179	0.274	0.338	0.434	0.562	0.702	0.876	1.083	1.318	1.577	1.856	2.151	2.619	3.111	4.093
800	0	0.175	0.273	0.332	0.404	0.52	0.644	0.801	0.989	1.204	1.441	1.698	1.971	2.404	2.861	3.775
900	0	0.159	0.252	0.304	0.379	0.486	0.601	0.745	0.918	1.116	1.336	1.575	1.828	2.233	2.659	3.513
1000	0	0.155	0.247	0.297	0.356	0.458	0.567	0.701	0.863	1.048	1.253	1.476	1.713	2.092	2.492	3.293
1100	0	0.156	0.25	0.3	0.334	0.433	0.537	0.665	0.817	0.991	1.184	1.393	1.616	1.972	2.349	3.103
1200	0	0.145	0.237	0.283	0.314	0.409	0.511	0.633	0.777	0.942	1.124	1.321	1.531	1.866	2.222	2.932
1300	0	0.146	0.24	0.287	0.295	0.388	0.486	0.603	0.741	0.896	1.068	1.254	1.453	1.769	2.104	2.774
1400	0	0.137	0.23	0.273	0.283	0.371	0.466	0.578	0.708	0.855	1.018	1.193	1.379	1.731	2.057	2.708
1600	0	0.083	0.22	0.261	0.283	0.371	0.458	0.556	0.67	0.798	0.939	1.092	1.254	1.563	1.848	2.419
1800	0	0.08	0.218	0.255	0.283	0.371	0.458	0.556	0.67	0.798	0.939	1.065	1.2	1.464	1.705	2.188

2010Dodge_Pickup_AutoTrans_DPFRemoved.MCC
2010 6.7L Cummins Engine Control
Injection Quantity
Maps

(MM3/s : Bar) / msec: Top (x) axis is "fuel mass" in cubic mm per second, Left (y) axis is fuel pressure (bars), units within table are milliseconds

Main Injection Duration Tow Setting

	0	**1**	**2**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**105**	**120**	**150**
100	0	0.371	0.46	0.672	0.759	1.107	1.457	1.838	2.25	2.687	3.144	3.618	4.105	4.854	5.62	7.152
200	0	0.371	0.46	0.672	0.759	1.107	1.457	1.838	2.25	2.687	3.144	3.618	4.105	4.854	5.62	7.152
300	0	0.322	0.366	0.523	0.658	0.933	1.216	1.534	1.885	2.265	2.667	3.088	3.523	4.197	4.891	6.279
400	0	0.27	0.328	0.445	0.578	0.798	1.028	1.296	1.599	1.93	2.286	2.662	3.053	3.662	4.294	5.557
500	0	0.2	0.301	0.396	0.517	0.695	0.886	1.114	1.377	1.67	1.987	2.324	2.678	3.233	3.81	4.966
600	0	0.187	0.285	0.358	0.47	0.619	0.78	0.977	1.209	1.47	1.755	2.06	2.382	2.89	3.422	4.484
700	0	0.179	0.274	0.338	0.434	0.562	0.702	0.876	1.083	1.318	1.577	1.856	2.151	2.619	3.111	4.093
800	0	0.175	0.273	0.332	0.404	0.52	0.644	0.801	0.989	1.204	1.441	1.783	2.05	2.5	2.975	3.926
900	0	0.159	0.252	0.304	0.379	0.486	0.601	0.745	0.918	1.116	1.336	1.654	1.919	2.345	2.792	3.689
1000	0	0.155	0.247	0.297	0.356	0.458	0.567	0.701	0.863	1.048	1.253	1.55	1.816	2.218	2.642	3.491
1100	0	0.156	0.25	0.3	0.334	0.433	0.537	0.665	0.817	0.991	1.184	1.463	1.713	2.09	2.49	3.289
1200	0	0.145	0.237	0.283	0.314	0.409	0.511	0.633	0.777	0.942	1.124	1.387	1.638	1.997	2.378	3.137
1300	0	0.146	0.24	0.287	0.295	0.388	0.486	0.603	0.741	0.896	1.068	1.317	1.526	1.857	2.209	2.913
1400	0	0.137	0.23	0.273	0.283	0.371	0.466	0.578	0.708	0.855	1.018	1.253	1.448	1.818	2.16	2.843
1600	0	0.083	0.22	0.261	0.283	0.371	0.458	0.556	0.67	0.798	0.939	1.147	1.317	1.641	1.94	2.54
1800	0	0.08	0.218	0.255	0.283	0.371	0.458	0.556	0.67	0.798	0.939	1.118	1.26	1.537	1.79	2.297

2010Dodge_Pickup_AutoTrans_DPFRemoved.MCC
2010 6.7L Cummins Engine Control
Injection Quantity
Maps

(MM3/s : Bar) / msec: Top (x) axis is "fuel mass" in cubic mm per second, Left (y) axis is fuel pressure (bars), units within table are milliseconds

Main Injection Duration Performance Setting

	0	**1**	**2**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**105**	**120**	**150**
100	0	0.371	0.46	0.672	0.759	1.107	1.457	1.838	2.25	2.687	3.144	3.618	4.105	4.854	5.62	7.152
200	0	0.371	0.46	0.672	0.759	1.107	1.457	1.838	2.25	2.687	3.144	3.618	4.105	4.854	5.62	7.152
300	0	0.322	0.366	0.523	0.658	0.933	1.216	1.534	1.885	2.265	2.667	3.088	3.523	4.197	4.891	6.279
400	0	0.27	0.328	0.445	0.578	0.798	1.028	1.296	1.599	1.93	2.286	2.662	3.053	3.662	4.294	5.557
500	0	0.2	0.301	0.396	0.517	0.695	0.886	1.114	1.377	1.67	1.987	2.324	2.678	3.233	3.81	4.966
600	0	0.187	0.285	0.358	0.47	0.619	0.78	0.977	1.233	1.5	1.79	2.101	2.479	3.007	3.611	4.666
700	0	0.179	0.274	0.338	0.434	0.562	0.702	0.876	1.105	1.371	1.641	2.003	2.406	2.93	3.568	4.423
800	0	0.175	0.273	0.332	0.404	0.52	0.644	0.801	1.009	1.253	1.529	1.883	2.332	2.853	3.5	4.224
900	0	0.159	0.252	0.304	0.379	0.486	0.601	0.745	0.936	1.161	1.418	1.764	2.214	2.738	3.399	4.089
1000	0	0.155	0.247	0.297	0.356	0.458	0.567	0.701	0.88	1.09	1.33	1.65	2.077	2.608	3.263	3.958
1100	0	0.156	0.25	0.3	0.334	0.433	0.537	0.665	0.833	1.031	1.257	1.534	1.97	2.514	3.113	3.781
1200	0	0.145	0.237	0.283	0.314	0.409	0.511	0.633	0.793	0.98	1.193	1.451	1.877	2.393	2.972	3.624
1300	0	0.146	0.24	0.287	0.295	0.388	0.486	0.603	0.756	0.932	1.133	1.396	1.781	2.282	2.841	3.437
1400	0	0.137	0.23	0.273	0.283	0.371	0.466	0.578	0.722	0.89	1.08	1.304	1.679	2.191	2.721	3.276
1600	0	0.083	0.22	0.261	0.283	0.371	0.458	0.556	0.683	0.83	0.997	1.231	1.579	2.093	2.572	3.131
1800	0	0.08	0.218	0.255	0.283	0.371	0.458	0.556	0.683	0.83	0.997	1.19	1.509	2.003	2.438	2.965

2010Dodge_Pickup_AutoTrans_DPFRemoved.MCC
2010 6.7L Cummins Engine Control
Injection Quantity
Maps
(MM3/s : Bar) / msec: Top (x) axis is "fuel mass" in cubic mm per second, Left (y) axis is fuel pressure (bars), units within table are milliseconds

2010Dodge_Pickup_AutoTrans_DPFRemoved.MCC
2010 6.7L Cummins Engine Control
Injection Quantity
Maps

(MM3/s : Bar) / msec: Top (x) axis is "fuel mass" in cubic mm per second, Left (y) axis is fuel pressure (bars), units within table are milliseconds

Difference in values between "Duration Factory" and "Stock Power Setting" for "DPF Removed" Tune

	0	**1**	**2**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**105**	**120**	**150**
100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

2010Dodge_Pickup_AutoTrans_DPFRemoved.MCC
2010 6.7L Cummins Engine Control
Injection Quantity
Maps

(MM3/s : Bar) / msec: Top (x) axis is "fuel mass" in cubic mm per second, Left (y) axis is fuel pressure (bars), units within table are milliseconds

Difference in values between "Duration Factory" and "Tow Setting" for "DPF Removed" Tune

	0	**1**	**2**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**105**	**120**	**150**
100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
800	0	0	0	0	0	0	0	0	0	0	0	0.085	0.079	0.096	0.114	0.151
900	0	0	0	0	0	0	0	0	0	0	0	0.079	0.091	0.112	0.133	0.176
1000	0	0	0	0	0	0	0	0	0	0	0	0.074	0.103	0.126	0.15	0.198
1100	0	0	0	0	0	0	0	0	0	0	0	0.07	0.097	0.118	0.141	0.186
1200	0	0	0	0	0	0	0	0	0	0	0	0.066	0.107	0.131	0.156	0.205
1300	0	0	0	0	0	0	0	0	0	0	0	0.063	0.073	0.088	0.105	0.139
1400	0	0	0	0	0	0	0	0	0	0	0	0.06	0.069	0.087	0.103	0.135
1600	0	0	0	0	0	0	0	0	0	0	0	0.055	0.063	0.078	0.092	0.121
1800	0	0	0	0	0	0	0	0	0	0	0	0.053	0.06	0.073	0.085	0.109

2010Dodge_Pickup_AutoTrans_DPFRemoved.MCC
2010 6.7L Cummins Engine Control
Injection Quantity
Maps
(MM3/s : Bar) / msec: Top (x) axis is "fuel mass" in cubic mm per second, Left (y) axis is fuel pressure (bars), units within table are milliseconds

Difference in values between "Duration Factory" and "Performance Setting" for "DPF Removed" Tune

	0	**1**	**2**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**105**	**120**	**150**
100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
600	0	0	0	0	0	0	0	0	0.024	0.03	0.035	0.041	0.097	0.117	0.189	0.182
700	0	0	0	0	0	0	0	0	0.022	0.053	0.064	0.147	0.255	0.311	0.457	0.33
800	0	0	0	0	0	0	0	0	0.02	0.049	0.088	0.185	0.361	0.449	0.639	0.449
900	0	0	0	0	0	0	0	0	0.018	0.045	0.082	0.189	0.386	0.505	0.74	0.576
1000	0	0	0	0	0	0	0	0	0.017	0.042	0.077	0.174	0.364	0.516	0.771	0.665
1100	0	0	0	0	0	0	0	0	0.016	0.04	0.073	0.141	0.354	0.542	0.764	0.678
1200	0	0	0	0	0	0	0	0	0.016	0.038	0.069	0.13	0.346	0.527	0.75	0.692
1300	0	0	0	0	0	0	0	0	0.015	0.036	0.065	0.142	0.328	0.513	0.737	0.663
1400	0	0	0	0	0	0	0	0	0.014	0.035	0.062	0.111	0.3	0.46	0.664	0.568
1600	0	0	0	0	0	0	0	0	0.013	0.032	0.058	0.139	0.325	0.53	0.724	0.712
1800	0	0	0	0	0	0	0	0	0.013	0.032	0.058	0.125	0.309	0.539	0.733	0.777

2010Dodge_Pickup_AutoTrans_DPFRemoved.MCC
2010 6.7L Cummins Engine Control
Injection Quantity
Maps
(MM3/s : Bar) / msec: Top (x) axis is "fuel mass" in cubic mm per second, Left (y) axis is fuel pressure (bars), units within table are percent difference

2010Dodge_Pickup_AutoTrans_DPFRemoved.MCC
2010 6.7L Cummins Engine Control
Injection Quantity
Maps

(MM3/s : Bar) / msec: Top (x) axis is "fuel mass" in cubic mm per second, Left (y) axis is fuel pressure (bars), units within table are percent difference

Percent difference in values between "Duration Factory" and "Stock Power Setting" for "DPF Removed" Tune

	0	**1**	**2**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**105**	**120**	**150**
100	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
200	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
300	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
400	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
500	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
600	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
700	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
800	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
900	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1000	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1100	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1200	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1300	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1400	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1600	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
1800	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

2010Dodge_Pickup_AutoTrans_DPFRemoved.MCC
2010 6.7L Cummins Engine Control
Injection Quantity
Maps

(MM3/s : Bar) / msec: Top (x) axis is "fuel mass" in cubic mm per second, Left (y) axis is fuel pressure (bars), units within table are percent difference

Percent difference in values between "Duration Factory" and "Tow Setting" for "DPF Removed" Tune

	0	**1**	**2**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**105**	**120**	**150**
100	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
200	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
300	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
400	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
500	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
600	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
700	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
800	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.0%	4.0%	4.0%	4.0%	4.0%
900	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.0%	5.0%	5.0%	5.0%	5.0%
1000	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.0%	6.0%	6.0%	6.0%	6.0%
1100	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.0%	6.0%	6.0%	6.0%	6.0%
1200	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.0%	7.0%	7.0%	7.0%	7.0%
1300	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.0%	5.0%	5.0%	5.0%	5.0%
1400	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.0%	5.0%	5.0%	5.0%	5.0%
1600	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.0%	5.0%	5.0%	5.0%	5.0%
1800	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.0%	5.0%	5.0%	5.0%	5.0%

2010Dodge_Pickup_AutoTrans_DPFRemoved.MCC
2010 6.7L Cummins Engine Control
Injection Quantity
Maps

(MM3/s : Bar) / msec: Top (x) axis is "fuel mass" in cubic mm per second, Left (y) axis is fuel pressure (bars), units within table are percent difference

Percent difference in values between "Duration Factory" and "Performance Setting" for "DPF Removed" Tune

	0	**1**	**2**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**105**	**120**	**150**
100	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
200	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
300	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
400	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
500	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
600	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.0%	2.0%	2.0%	2.0%	4.1%	4.0%	5.5%	4.1%
700	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.0%	4.0%	4.1%	7.9%	11.9%	11.9%	14.7%	8.1%
800	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.0%	4.1%	6.1%	10.9%	18.3%	18.7%	22.3%	11.9%
900	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.0%	4.0%	6.1%	12.0%	21.1%	22.6%	27.8%	16.4%
1000	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.0%	4.0%	6.1%	11.8%	21.2%	24.7%	30.9%	20.2%
1100	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.0%	4.0%	6.2%	10.1%	21.9%	27.5%	32.5%	21.8%
1200	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.1%	4.0%	6.1%	9.8%	22.6%	28.2%	33.8%	23.6%
1300	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.0%	4.0%	6.1%	11.3%	22.6%	29.0%	35.0%	23.9%
1400	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.0%	4.1%	6.1%	9.3%	21.8%	26.6%	32.3%	21.0%
1600	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.9%	4.0%	6.2%	12.7%	25.9%	33.9%	39.2%	29.4%
1800	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.9%	4.0%	6.2%	11.7%	25.7%	36.8%	43.0%	35.5%

2010CumminsAuto_Stock.MCC
2010 6.7L Cummins Engine Control
Injection Quantity
Maps

(MM3/s : Bar) / msec: Top (x) axis is "fuel mass" in cubic mm per second, Left (y) axis is fuel pressure (bars), units within table are milliseconds

Main Injection Duration Factory

	0	**1**	**2**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**105**	**120**	**150**
100	0	0.371	0.46	0.672	0.759	1.107	1.457	1.838	2.25	2.687	3.144	3.618	4.105	4.854	5.62	7.152
200	0	0.371	0.46	0.672	0.759	1.107	1.457	1.838	2.25	2.687	3.144	3.618	4.105	4.854	5.62	7.152
300	0	0.322	0.366	0.523	0.658	0.933	1.216	1.534	1.885	2.265	2.667	3.088	3.523	4.197	4.891	6.279
400	0	0.27	0.328	0.445	0.578	0.798	1.028	1.296	1.599	1.93	2.286	2.662	3.053	3.662	4.294	5.557
500	0	0.2	0.301	0.396	0.517	0.695	0.886	1.114	1.377	1.67	1.987	2.324	2.678	3.233	3.81	4.966
600	0	0.187	0.285	0.358	0.47	0.619	0.78	0.977	1.209	1.47	1.755	2.06	2.382	2.89	3.422	4.484
700	0	0.179	0.274	0.338	0.434	0.562	0.702	0.876	1.083	1.318	1.577	1.856	2.151	2.619	3.111	4.093
800	0	0.175	0.273	0.332	0.404	0.52	0.644	0.801	0.989	1.204	1.441	1.698	1.971	2.404	2.861	3.775
900	0	0.159	0.252	0.304	0.379	0.486	0.601	0.745	0.918	1.116	1.336	1.575	1.828	2.233	2.659	3.513
1000	0	0.155	0.247	0.297	0.356	0.458	0.567	0.701	0.863	1.048	1.253	1.476	1.713	2.092	2.492	3.293
1100	0	0.156	0.25	0.3	0.334	0.433	0.537	0.665	0.817	0.991	1.184	1.393	1.616	1.972	2.349	3.103
1200	0	0.145	0.237	0.283	0.314	0.409	0.511	0.633	0.777	0.942	1.124	1.321	1.531	1.866	2.222	2.932
1300	0	0.146	0.24	0.287	0.295	0.388	0.486	0.603	0.741	0.896	1.068	1.254	1.453	1.769	2.104	2.774
1400	0	0.137	0.23	0.273	0.283	0.371	0.466	0.578	0.708	0.855	1.018	1.193	1.379	1.731	2.057	2.708
1600	0	0.083	0.22	0.261	0.283	0.371	0.458	0.556	0.67	0.798	0.939	1.092	1.254	1.563	1.848	2.419
1800	0	0.08	0.218	0.255	0.283	0.371	0.458	0.556	0.67	0.798	0.939	1.065	1.2	1.464	1.705	2.188

2010CumminsAuto_Stock.MCC
2010 6.7L Cummins Engine Control
Injection Quantity
Maps

(MM3/s : Bar) / msec: Top (x) axis is "fuel mass" in cubic mm per second, Left (y) axis is fuel pressure (bars), units within table are milliseconds

Main Injection Duration Stock Power Setting

	0	**1**	**2**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**105**	**120**	**150**
100	0	0.371	0.46	0.672	0.759	1.107	1.457	1.838	2.25	2.687	3.144	3.618	4.105	4.854	5.62	7.152
200	0	0.371	0.46	0.672	0.759	1.107	1.457	1.838	2.25	2.687	3.144	3.618	4.105	4.854	5.62	7.152
300	0	0.322	0.366	0.523	0.658	0.933	1.216	1.534	1.885	2.265	2.667	3.088	3.523	4.197	4.891	6.279
400	0	0.27	0.328	0.445	0.578	0.798	1.028	1.296	1.599	1.93	2.286	2.662	3.053	3.662	4.294	5.557
500	0	0.2	0.301	0.396	0.517	0.695	0.886	1.114	1.377	1.67	1.987	2.324	2.678	3.233	3.81	4.966
600	0	0.187	0.285	0.358	0.47	0.619	0.78	0.977	1.209	1.47	1.755	2.06	2.382	2.89	3.422	4.484
700	0	0.179	0.274	0.338	0.434	0.562	0.702	0.876	1.083	1.318	1.577	1.856	2.151	2.619	3.111	4.093
800	0	0.175	0.273	0.332	0.404	0.52	0.644	0.801	0.989	1.204	1.441	1.698	1.971	2.404	2.861	3.775
900	0	0.159	0.252	0.304	0.379	0.486	0.601	0.745	0.918	1.116	1.336	1.575	1.828	2.233	2.659	3.513
1000	0	0.155	0.247	0.297	0.356	0.458	0.567	0.701	0.863	1.048	1.253	1.476	1.713	2.092	2.492	3.293
1100	0	0.156	0.25	0.3	0.334	0.433	0.537	0.665	0.817	0.991	1.184	1.393	1.616	1.972	2.349	3.103
1200	0	0.145	0.237	0.283	0.314	0.409	0.511	0.633	0.777	0.942	1.124	1.321	1.531	1.866	2.222	2.932
1300	0	0.146	0.24	0.287	0.295	0.388	0.486	0.603	0.741	0.896	1.068	1.254	1.453	1.769	2.104	2.774
1400	0	0.137	0.23	0.273	0.283	0.371	0.466	0.578	0.708	0.855	1.018	1.193	1.379	1.731	2.057	2.708
1600	0	0.083	0.22	0.261	0.283	0.371	0.458	0.556	0.67	0.798	0.939	1.092	1.254	1.563	1.848	2.419
1800	0	0.08	0.218	0.255	0.283	0.371	0.458	0.556	0.67	0.798	0.939	1.065	1.2	1.464	1.705	2.188

2010CumminsAuto_Stock.MCC
2010 6.7L Cummins Engine Control
Injection Quantity
Maps

(MM3/s : Bar) / msec: Top (x) axis is "fuel mass" in cubic mm per second, Left (y) axis is fuel pressure (bars), units within table are milliseconds

Main Injection Duration Tow Setting

	0	**1**	**2**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**105**	**120**	**150**
100	0	0.371	0.46	0.672	0.759	1.107	1.457	1.838	2.25	2.687	3.144	3.618	4.105	4.854	5.62	7.152
200	0	0.371	0.46	0.672	0.759	1.107	1.457	1.838	2.25	2.687	3.144	3.618	4.105	4.854	5.62	7.152
300	0	0.322	0.366	0.523	0.658	0.933	1.216	1.534	1.885	2.265	2.667	3.088	3.523	4.197	4.891	6.279
400	0	0.27	0.328	0.445	0.578	0.798	1.028	1.296	1.599	1.93	2.286	2.662	3.053	3.662	4.294	5.557
500	0	0.2	0.301	0.396	0.517	0.695	0.886	1.114	1.377	1.67	1.987	2.324	2.678	3.233	3.81	4.966
600	0	0.187	0.285	0.358	0.47	0.619	0.78	0.977	1.209	1.47	1.755	2.06	2.382	2.89	3.422	4.484
700	0	0.179	0.274	0.338	0.434	0.562	0.702	0.876	1.083	1.318	1.577	1.856	2.151	2.619	3.111	4.093
800	0	0.175	0.273	0.332	0.404	0.52	0.644	0.801	0.989	1.204	1.441	1.698	1.971	2.404	2.861	3.775
900	0	0.159	0.252	0.304	0.379	0.486	0.601	0.745	0.918	1.116	1.336	1.575	1.828	2.233	2.659	3.513
1000	0	0.155	0.247	0.297	0.356	0.458	0.567	0.701	0.863	1.048	1.253	1.476	1.713	2.092	2.492	3.293
1100	0	0.156	0.25	0.3	0.334	0.433	0.537	0.665	0.817	0.991	1.184	1.393	1.616	1.972	2.349	3.103
1200	0	0.145	0.237	0.283	0.314	0.409	0.511	0.633	0.777	0.942	1.124	1.321	1.531	1.866	2.222	2.932
1300	0	0.146	0.24	0.287	0.295	0.388	0.486	0.603	0.741	0.896	1.068	1.254	1.453	1.769	2.104	2.774
1400	0	0.137	0.23	0.273	0.283	0.371	0.466	0.578	0.708	0.855	1.018	1.193	1.379	1.731	2.057	2.708
1600	0	0.083	0.22	0.261	0.283	0.371	0.458	0.556	0.67	0.798	0.939	1.092	1.254	1.563	1.848	2.419
1800	0	0.08	0.218	0.255	0.283	0.371	0.458	0.556	0.67	0.798	0.939	1.065	1.2	1.464	1.705	2.188

2010CumminsAuto_Stock.MCC
2010 6.7L Cummins Engine Control
Injection Quantity
Maps

(MM3/s : Bar) / msec: Top (x) axis is "fuel mass" in cubic mm per second, Left (y) axis is fuel pressure (bars), units within table are milliseconds

Main Injection Duration Performance Setting

	0	**1**	**2**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**105**	**120**	**150**
100	0	0.371	0.46	0.672	0.759	1.107	1.457	1.838	2.25	2.687	3.144	3.618	4.105	4.854	5.62	7.152
200	0	0.371	0.46	0.672	0.759	1.107	1.457	1.838	2.25	2.687	3.144	3.618	4.105	4.854	5.62	7.152
300	0	0.322	0.366	0.523	0.658	0.933	1.216	1.534	1.885	2.265	2.667	3.088	3.523	4.197	4.891	6.279
400	0	0.27	0.328	0.445	0.578	0.798	1.028	1.296	1.599	1.93	2.286	2.662	3.053	3.662	4.294	5.557
500	0	0.2	0.301	0.396	0.517	0.695	0.886	1.114	1.377	1.67	1.987	2.324	2.678	3.233	3.81	4.966
600	0	0.187	0.285	0.358	0.47	0.619	0.78	0.977	1.209	1.47	1.755	2.06	2.382	2.89	3.422	4.484
700	0	0.179	0.274	0.338	0.434	0.562	0.702	0.876	1.083	1.318	1.577	1.856	2.151	2.619	3.111	4.093
800	0	0.175	0.273	0.332	0.404	0.52	0.644	0.801	0.989	1.204	1.441	1.698	1.971	2.404	2.861	3.775
900	0	0.159	0.252	0.304	0.379	0.486	0.601	0.745	0.918	1.116	1.336	1.575	1.828	2.233	2.659	3.513
1000	0	0.155	0.247	0.297	0.356	0.458	0.567	0.701	0.863	1.048	1.253	1.476	1.713	2.092	2.492	3.293
1100	0	0.156	0.25	0.3	0.334	0.433	0.537	0.665	0.817	0.991	1.184	1.393	1.616	1.972	2.349	3.103
1200	0	0.145	0.237	0.283	0.314	0.409	0.511	0.633	0.777	0.942	1.124	1.321	1.531	1.866	2.222	2.932
1300	0	0.146	0.24	0.287	0.295	0.388	0.486	0.603	0.741	0.896	1.068	1.254	1.453	1.769	2.104	2.774
1400	0	0.137	0.23	0.273	0.283	0.371	0.466	0.578	0.708	0.855	1.018	1.193	1.379	1.731	2.057	2.708
1600	0	0.083	0.22	0.261	0.283	0.371	0.458	0.556	0.67	0.798	0.939	1.092	1.254	1.563	1.848	2.419
1800	0	0.08	0.218	0.255	0.283	0.371	0.458	0.556	0.67	0.798	0.939	1.065	1.2	1.464	1.705	2.188

2010Dodge_Pickup_AutoTrans_DPFRemoved.MCC
2010 6.7L Cummins Engine Control
Injection Quantity
Maps
(MM3/s : Bar) / msec: Top (x) axis is "fuel mass" in cubic mm per second, Left (y) axis is fuel pressure (bars), units within table are milliseconds

2010Dodge_Pickup_AutoTrans_DPFRemoved.MCC
2010 6.7L Cummins Engine Control
Injection Quantity
Maps

(MM3/s : Bar) / msec: Top (x) axis is "fuel mass" in cubic mm per second, Left (y) axis is fuel pressure (bars), units within table are milliseconds

Difference in values between "Duration Factory" and "Stock Power Setting" for "Stock" Tune

	0	**1**	**2**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**105**	**120**	**150**
100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

2010Dodge_Pickup_AutoTrans_DPFRemoved.MCC
2010 6.7L Cummins Engine Control
Injection Quantity
Maps
(MM3/s : Bar) / msec: Top (x) axis is "fuel mass" in cubic mm per second, Left (y) axis is fuel pressure (bars), units within table are milliseconds

Difference in values between "Duration Factory" and "Tow Setting" for "Stock" Tune

	0	**1**	**2**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**105**	**120**	**150**
100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

2010Dodge_Pickup_AutoTrans_DPFRemoved.MCC
2010 6.7L Cummins Engine Control
Injection Quantity
Maps

(MM3/s : Bar) / msec: Top (x) axis is "fuel mass" in cubic mm per second, Left (y) axis is fuel pressure (bars), units within table are milliseconds

Difference in values between "Duration Factory" and "Performance Setting" for "Stock" Tune

	0	**1**	**2**	**5**	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**105**	**120**	**150**
100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

"2010Dodge_Pickup_AutoTrans_DPFRemoved.MCC" vs. "2010CumminsAuto_Stock.MCC"
2010 6.7L Cummins Engine Control
Injection Quantity
Maps

Difference in "Duration Factory" map values between "DPF Removed" and "Stock" Tunes

	0	1	2	5	10	20	30	40	50	60	70	80	90	105	120	150
100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

"2010Dodge_Pickup_AutoTrans_DPFRemoved.MCC" vs. "2010CumminsAuto_Stock.MCC"
2010 6.7L Cummins Engine Control
Injection Quantity
Maps

Difference in "Stock" map values between "DPF Removed" and "Stock" Tunes

	0	1	2	5	10	20	30	40	50	60	70	80	90	105	120	150
100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
900	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

"2010Dodge_Pickup_AutoTrans_DPFRemoved.MCC" vs. "2010CumminsAuto_Stock.MCC"
2010 6.7L Cummins Engine Control
Injection Quantity
Maps

Difference in "Tow" map values between "DPF Removed" and "Stock" Tunes

	0	1	2	5	10	20	30	40	50	60	70	80	90	105	120	150
100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
700	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
800	0	0	0	0	0	0	0	0	0	0	0	0.085	0.079	0.096	0.114	0.151
900	0	0	0	0	0	0	0	0	0	0	0	0.079	0.091	0.112	0.133	0.176
1000	0	0	0	0	0	0	0	0	0	0	0	0.074	0.103	0.126	0.15	0.198
1100	0	0	0	0	0	0	0	0	0	0	0	0.07	0.097	0.118	0.141	0.186
1200	0	0	0	0	0	0	0	0	0	0	0	0.066	0.107	0.131	0.156	0.205
1300	0	0	0	0	0	0	0	0	0	0	0	0.063	0.073	0.088	0.105	0.139
1400	0	0	0	0	0	0	0	0	0	0	0	0.06	0.069	0.087	0.103	0.135
1600	0	0	0	0	0	0	0	0	0	0	0	0.055	0.063	0.078	0.092	0.121
1800	0	0	0	0	0	0	0	0	0	0	0	0.053	0.06	0.073	0.085	0.109

"2010Dodge_Pickup_AutoTrans_DPFRemoved.MCC" vs. "2010CumminsAuto_Stock.MCC"
2010 6.7L Cummins Engine Control
Injection Quantity
Maps

Difference in "Performance" map values between "DPF Removed" and "Stock" Tunes

	0	1	2	5	10	20	30	40	50	60	70	80	90	105	120	150
100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
600	0	0	0	0	0	0	0	0	0.024	0.03	0.035	0.041	0.097	0.117	0.189	0.182
700	0	0	0	0	0	0	0	0	0.022	0.053	0.064	0.147	0.255	0.311	0.457	0.33
800	0	0	0	0	0	0	0	0	0.02	0.049	0.088	0.185	0.361	0.449	0.639	0.449
900	0	0	0	0	0	0	0	0	0.018	0.045	0.082	0.189	0.386	0.505	0.74	0.576
1000	0	0	0	0	0	0	0	0	0.017	0.042	0.077	0.174	0.364	0.516	0.771	0.665
1100	0	0	0	0	0	0	0	0	0.016	0.04	0.073	0.141	0.354	0.542	0.764	0.678
1200	0	0	0	0	0	0	0	0	0.016	0.038	0.069	0.13	0.346	0.527	0.75	0.692
1300	0	0	0	0	0	0	0	0	0.015	0.036	0.065	0.142	0.328	0.513	0.737	0.663
1400	0	0	0	0	0	0	0	0	0.014	0.035	0.062	0.111	0.3	0.46	0.664	0.568
1600	0	0	0	0	0	0	0	0	0.013	0.032	0.058	0.139	0.325	0.53	0.724	0.712
1800	0	0	0	0	0	0	0	0	0.013	0.032	0.058	0.125	0.309	0.539	0.733	0.777

2010 6.7L Cummins Engine Control
Injection Quantity
Curves

(RPM) / MM3/s This is cubic milimeters per second, by RPM

Maximum Fuel EOM 1

"DPF Removed" Tune

RPM	800	900	1000	1100	1200	1300	1400	1500	1600	1800	2000	2200	2400	2500	2600	2700	2800	2818	2900	3013	3200
	83	87	91	95	100	106	110	115	115	114	113	113	113	114	115	114	114	116	115	112	99

"Stock" Tune

RPM	800	900	1000	1100	1200	1300	1400	1500	1600	1800	2000	2200	2400	2500	2600	2700	2800	2818	2900	3013	3200
	81	85	89	93	98	104	108	113	113	112	111	111	111	112	113	112	112	114	113	110	97

Difference in values between EOM1 maximum fuel curves for "DPF Removed" and Stock" Tunes

RPM	800	900	1000	1100	1200	1300	1400	1500	1600	1800	2000	2200	2400	2500	2600	2700	2800	2818	2900	3013	3200
	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

Percent Difference in values between EOM1 maximum fuel curves for "DPF Removed" and Stock" Tunes

RPM	800	900	1000	1100	1200	1300	1400	1500	1600	1800	2000	2200	2400	2500	2600	2700	2800	2818	2900	3013	3200
	2.5%	2.4%	2.2%	2.2%	2.0%	1.9%	1.9%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	2.1%

Maximum Fuel EOM 3

"DPF Removed" Tune

RPM	800	900	1000	1100	1200	1300	1400	1500	1600	1800	2000	2200	2400	2500	2600	2700	2800	2818	2900	3013	3200
	83	87	91	95	100	106	110	115	115	114	113	113	113	114	115	114	114	116	115	111	99

"Stock" Tune

RPM	800	900	1000	1100	1200	1300	1400	1500	1600	1800	2000	2200	2400	2500	2600	2700	2800	2818	2900	3013	3200
	81	85	89	93	98	104	108	113	113	112	111	111	111	112	113	112	112	114	113	109	97

Difference in values between EOM3 maximum fuel curves for "DPF Removed" and Stock" Tunes

RPM	800	900	1000	1100	1200	1300	1400	1500	1600	1800	2000	2200	2400	2500	2600	2700	2800	2818	2900	3013	3200
	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

Percent Difference in values between EOM3 maximum fuel curves for "DPF Removed" and Stock" Tunes

RPM	800	900	1000	1100	1200	1300	1400	1500	1600	1800	2000	2200	2400	2500	2600	2700	2800	2818	2900	3013	3200
	2.5%	2.4%	2.2%	2.2%	2.0%	1.9%	1.9%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	2.1%

Maximum Fuel EOM 6

"DPF Removed" Tune

RPM	800	900	1000	1100	1200	1300	1400	1500	1600	1800	2000	2200	2400	2500	2600	2700	2800	2818	2900	3013	3200
	82	86	90	94	99	105	109	114	114	113	112	112	112	113	114	113	113	115	114	110	98

"Stock" Tune

RPM	800	900	1000	1100	1200	1300	1400	1500	1600	1800	2000	2200	2400	2500	2600	2700	2800	2818	2900	3013	3200
	81	85	89	93	98	104	108	113	113	112	111	111	111	112	113	112	112	114	113	109	97

Difference in values between EOM6 maximum fuel curves for "DPF Removed" and Stock" Tunes

RPM	800	900	1000	1100	1200	1300	1400	1500	1600	1800	2000	2200	2400	2500	2600	2700	2800	2818	2900	3013	3200
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Percent Difference in values between EOM3 maximum fuel curves for "DPF Removed" and Stock" Tunes

RPM	800	900	1000	1100	1200	1300	1400	1500	1600	1800	2000	2200	2400	2500	2600	2700	2800	2818	2900	3013	3200
	1.2%	1.2%	1.1%	1.1%	1.0%	1.0%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	1.0%

Percent Difference in values between maximum fuel curves for "DPF Removed" and Stock" Tunes

RPM	800	900	1000	1100	1200	1300	1400	1500	1600	1800	2000	2200	2400	2500	2600	2700	2800	2818	2900	3013	3200
EOM 1	2.5%	2.4%	2.2%	2.2%	2.0%	1.9%	1.9%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	2.1%
EOM 3	2.5%	2.4%	2.2%	2.2%	2.0%	1.9%	1.9%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	2.1%
EOM 6	1.2%	1.2%	1.1%	1.1%	1.0%	1.0%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	1.0%

2010Dodge_Pickup_AutoTrans_DPFRemoved.MCC
2010 6.7L Cummins Engine Control
Injection Timing
Maps

(RPM : Nm) / DegCS top (x) axis is engine speed in RPM, left (y) axis is torque in Nm, and units within table are degree of CS (crank sensor?)

Main Injection Timing EOM 1

	600	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	2000	2200	2400	2600	2800	3000	3200
-200	0.99	0.99	1.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	3.99	3.00	5.00	5.00	5.00	6.00	7.00	8.00	8.00
-100	0.99	0.99	1.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	3.99	3.00	5.00	5.00	5.00	6.00	7.00	8.00	8.00
0	0.99	0.99	1.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.98	3.00	5.00	5.00	5.00	6.00	7.00	8.00	8.00
75	0.99	0.99	1.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.98	2.28	4.42	4.06	5.00	6.00	7.00	8.00	8.00
150	0.99	0.99	1.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.98	2.99	3.87	4.00	5.00	6.00	7.00	8.00	8.00
225	0.99	0.99	1.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	3.34	4.00	5.00	6.00	7.00	8.00	8.00
300	0.99	0.99	1.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	4.00	5.00	6.00	7.00	8.00	8.00
375	0.99	0.99	1.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	4.00	5.00	6.00	7.00	8.37	8.91
450	0.99	0.99	1.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	3.71	5.03	6.36	8.07	10.01	10.58
525	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	4.10	5.09	6.73	9.11	11.70	12.20
600	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.98	2.98	3.98	4.98	6.20	8.10	11.09	14.35	15.14
675	2.38	2.38	2.38	2.38	2.87	2.48	2.48	2.98	3.97	3.98	3.96	3.98	4.95	6.95	10.27	12.53	15.34	18.52	19.41
750	1.38	1.38	1.38	1.38	2.27	1.77	2.05	2.41	3.49	4.23	5.32	5.89	7.48	9.45	12.25	15.16	20.23	22.39	22.76
825	0.39	0.39	0.49	0.59	0.70	0.79	0.88	2.07	3.07	4.16	5.05	6.14	9.14	12.04	16.23	19.53	21.45	23.76	23.76
881	0.39	0.39	0.49	0.59	0.70	0.79	0.88	2.07	3.07	4.16	5.05	6.14	9.14	12.04	16.23	19.53	21.45	23.76	23.76
949	0.39	0.39	0.49	0.59	0.70	0.79	0.88	2.07	3.07	4.16	5.05	6.14	9.14	12.04	16.23	19.53	21.45	23.76	23.76

2010 6.7L Cummins Engine Control
Injection Timing
Maps

(RPM : Nm) / DegCS top (x) axis is engine speed in RPM, left (y) axis is torque in Nm, and units within table are degree of CS (crank sensor?)

Main Injection Timing EOM 3

	600	**800**	**900**	**1000**	**1100**	**1200**	**1300**	**1400**	**1500**	**1600**	**1700**	**1800**	**2000**	**2200**	**2400**	**2600**	**2800**	**3000**	**3200**
-200	0.99	0.99	1.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	3.99	3.00	5.00	5.00	5.00	6.00	7.00	8.00	8.00
-100	0.99	0.99	1.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	3.99	3.00	5.00	5.00	5.00	6.00	7.00	8.00	8.00
0	0.99	0.99	1.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.98	3.00	5.00	5.00	5.00	6.00	7.00	8.00	8.00
75	0.99	0.99	1.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.98	2.28	4.42	4.06	5.00	6.00	7.00	8.00	8.00
150	0.99	0.99	1.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.98	2.99	3.87	4.00	5.00	6.00	7.00	8.00	8.00
225	0.99	0.99	1.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	3.34	4.00	5.00	6.00	7.00	8.00	8.00
300	0.99	0.99	1.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	4.00	5.00	6.00	7.00	8.00	8.00
375	0.99	0.99	1.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	4.00	5.00	6.00	7.00	8.37	8.91
450	0.99	0.99	1.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	3.71	5.03	6.36	8.07	10.01	10.58
525	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	4.10	5.09	6.73	9.11	11.70	12.20
600	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.98	2.98	3.98	4.98	6.20	8.10	11.09	14.35	15.14
675	2.38	2.38	2.38	2.38	2.87	2.48	2.48	2.98	3.97	3.98	3.96	3.98	4.95	6.95	10.27	12.53	15.34	18.52	19.41
750	1.38	1.38	1.38	1.38	2.27	1.77	2.05	2.41	3.49	4.23	5.32	5.89	7.48	9.45	12.25	15.16	20.23	22.39	22.76
825	0.39	0.39	0.49	0.59	0.70	0.79	0.88	2.07	3.07	4.16	5.05	6.14	9.14	12.04	16.23	19.53	21.45	23.76	23.76
881	0.39	0.39	0.49	0.59	0.70	0.79	0.88	2.07	3.07	4.16	5.05	6.14	9.14	12.04	16.23	19.53	21.45	23.76	23.76
949	0.39	0.39	0.49	0.59	0.70	0.79	0.88	2.07	3.07	4.16	5.05	6.14	9.14	12.04	16.23	19.53	21.45	23.76	23.76

2010 6.7L Cummins Engine Control
Injection Timing
Maps

(RPM : Nm) / DegCS top (x) axis is engine speed in RPM, left (y) axis is torque in Nm, and units within table are degree of CS (crank sensor?)

Main Injection Timing EOM 6

	600	**800**	**900**	**1000**	**1100**	**1200**	**1300**	**1400**	**1500**	**1600**	**1700**	**1800**	**2000**	**2200**	**2400**	**2600**	**2800**	**3000**	**3200**
-200	0.99	0.99	1.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	3.99	3.00	5.00	5.00	5.00	6.00	7.00	8.00	8.00
-100	0.99	0.99	1.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	3.99	3.00	5.00	5.00	5.00	6.00	7.00	8.00	8.00
0	0.99	0.99	1.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.98	3.00	5.00	5.00	5.00	6.00	7.00	8.00	8.00
75	0.99	0.99	1.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.98	2.28	4.42	4.06	5.00	6.00	7.00	8.00	8.00
150	0.99	0.99	1.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.98	2.99	3.87	4.00	5.00	6.00	7.00	8.00	8.00
225	0.99	0.99	1.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	3.34	4.00	5.00	6.00	7.00	8.00	8.00
300	0.99	0.99	1.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	4.00	5.00	6.00	7.00	8.00	8.00
375	0.99	0.99	1.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	4.00	5.00	6.00	7.00	8.37	8.91
450	0.99	0.99	1.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	3.71	5.03	6.36	8.07	10.01	10.58
525	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	4.10	5.09	6.73	9.11	11.70	12.20
600	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.99	2.98	2.98	3.98	4.98	6.20	8.10	11.09	14.35	15.14
675	2.38	2.38	2.38	2.38	2.87	2.48	2.48	2.98	3.97	3.98	3.96	3.98	4.95	6.95	10.27	12.53	15.34	18.52	19.41
750	1.38	1.38	1.38	1.38	2.27	1.77	2.05	2.41	3.49	4.23	5.32	5.89	7.48	9.45	12.25	15.16	20.23	22.39	22.76
825	0.39	0.39	0.49	0.59	0.70	0.79	0.88	2.07	3.07	4.16	5.05	6.14	9.14	12.04	16.23	19.53	21.45	23.76	23.76
881	0.39	0.39	0.49	0.59	0.70	0.79	0.88	2.07	3.07	4.16	5.05	6.14	9.14	12.04	16.23	19.53	21.45	23.76	23.76
949	0.39	0.39	0.49	0.59	0.70	0.79	0.88	2.07	3.07	4.16	5.05	6.14	9.14	12.04	16.23	19.53	21.45	23.76	23.76

2010CumminsAuto_Stock.MCC
2010 6.7L Cummins Engine Control
Injection Timing
Maps

(RPM : Nm) / DegCS top (x) axis is engine speed in RPM, left (y) axis is torque in Nm,
and units within table are degree of CS (crank sensor?)

Main Injection Timing EOM 1

	600	**800**	**900**	**1000**	**1100**	**1200**	**1300**	**1400**	**1500**	**1600**	**1700**	**1800**	**2000**	**2200**	**2400**	**2600**	**2800**	**3000**	**3200**
-200	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	3.00	5.00	5.00	5.00	6.00	7.00	8.00	8.00
-100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	3.00	5.00	5.00	5.00	6.00	7.00	8.00	8.00
0	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	3.00	5.00	5.00	5.00	6.00	7.00	8.00	8.00
75	1.00	1.00	1.00	1.00	1.00	0.52	0.68	0.17	0.80	1.00	2.00	2.28	4.42	4.06	5.00	6.00	7.00	8.00	8.00
150	1.00	1.00	1.00	1.00	1.00	-2.12	-1.78	-1.50	-0.92	-1.00	-1.00	2.00	3.87	4.00	5.00	6.00	7.00	8.00	8.00
225	0.28	0.00	0.00	0.00	0.00	-4.50	-3.90	-3.02	-2.74	-1.03	-0.44	1.00	2.34	4.00	5.00	6.00	7.00	8.00	8.00
300	-1.20	-2.00	-1.04	-1.11	-1.05	-1.50	-1.06	-1.00	-0.58	0.00	0.00	0.00	1.00	4.00	5.00	6.00	7.00	8.00	8.00
375	-2.00	-2.00	-1.83	-1.90	-1.46	-1.50	-1.42	-1.00	-0.93	0.00	0.00	0.00	1.00	4.00	5.00	6.00	7.00	8.37	8.91
450	-2.00	-2.00	-2.00	-2.00	-1.74	-1.50	-1.50	-1.00	-1.00	0.00	0.00	0.00	1.00	3.71	5.03	6.36	8.07	10.01	10.58
525	-2.00	-2.00	-2.00	-2.00	-2.00	-1.50	-1.50	-1.00	-1.00	0.00	0.00	0.00	1.00	3.11	5.09	6.73	9.11	11.70	12.20
600	-3.46	-2.00	-2.00	-2.00	-2.00	-1.50	-1.50	-1.00	-1.00	-0.49	0.00	0.00	1.00	3.00	5.20	7.11	10.10	13.36	14.15
675	-4.60	-3.93	-3.41	-2.62	-2.11	-1.50	-1.50	-1.00	-1.00	-0.98	0.00	0.00	0.97	2.98	5.30	7.56	11.37	15.55	16.43
750	-4.60	-4.60	-4.50	-4.32	-3.70	-3.21	-2.92	-2.57	-2.48	-2.73	-1.63	-1.07	0.53	2.50	5.30	8.20	13.27	17.43	17.80
825	-4.60	-4.60	-4.50	-4.40	-4.30	-4.20	-4.10	-3.90	-3.90	-3.80	-2.90	-1.80	0.20	2.10	5.30	8.60	14.50	17.80	17.80
881	-4.60	-4.60	-4.50	-4.40	-4.30	-4.20	-4.10	-3.90	-3.90	-3.80	-2.90	-1.80	0.20	2.10	5.30	8.60	14.50	17.80	17.80
949	-4.60	-4.60	-4.50	-4.40	-4.30	-4.20	-4.10	-3.90	-3.90	-3.80	-2.90	-1.80	0.20	2.10	5.30	8.60	14.50	17.80	17.80

2010 6.7L Cummins Engine Control
Injection Timing
Maps

(RPM : Nm) / DegCS top (x) axis is engine speed in RPM, left (y) axis is torque in Nm, and units within table are degree of CS (crank sensor?)

Main Injection Timing EOM 3

	600	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	2000	2200	2400	2600	2800	3000	3200
-200	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	3.00	5.00	5.00	5.00	6.00	7.00	8.00	8.00
-100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	3.00	5.00	5.00	5.00	6.00	7.00	8.00	8.00
0	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	3.00	5.00	5.00	5.00	6.00	7.00	8.00	8.00
75	1.00	1.00	1.00	1.00	1.00	0.52	0.68	0.17	0.80	1.00	2.00	2.28	4.42	4.06	5.00	6.00	7.00	8.00	8.00
150	1.00	1.00	1.00	1.00	1.00	-2.12	-1.78	-1.50	-0.92	-1.00	-1.00	2.00	3.87	4.00	5.00	6.00	7.00	8.00	8.00
225	0.28	0.00	0.00	0.00	0.00	-4.50	-3.90	-3.02	-2.74	-1.03	-0.44	1.00	2.34	4.00	5.00	6.00	7.00	8.00	8.00
300	-1.19	-2.00	-1.04	-1.11	-1.05	-1.50	-1.06	-1.00	-0.58	0.00	0.00	0.00	1.00	4.00	5.00	6.00	7.00	8.00	8.00
375	-2.00	-2.00	-1.83	-1.90	-1.46	-1.50	-1.42	-1.00	-0.93	0.00	0.00	0.00	1.00	4.00	5.00	6.00	7.00	8.37	8.91
450	-2.00	-2.00	-2.00	-2.00	-1.74	-1.50	-1.50	-1.00	-1.00	0.00	0.00	0.00	1.00	3.71	5.03	6.36	8.07	10.01	10.58
525	-2.00	-2.00	-2.00	-2.00	-2.00	-1.50	-1.50	-1.00	-1.00	0.00	0.00	0.00	1.00	3.11	5.10	6.73	9.11	11.70	12.20
600	-3.46	-2.00	-2.00	-2.00	-2.00	-1.50	-1.50	-1.00	-1.00	-0.49	0.00	0.00	1.00	3.00	5.20	7.11	10.10	13.36	14.15
675	-4.60	-3.93	-3.41	-2.62	-2.11	-1.50	-1.50	-1.00	-1.00	-0.98	0.00	0.00	0.97	2.98	5.30	7.56	11.37	16.02	17.23
750	-4.60	-4.60	-4.50	-4.32	-3.70	-3.21	-2.92	-2.57	-2.48	-2.73	-1.63	-1.07	0.53	2.50	5.30	8.20	13.27	18.59	19.10
825	-4.60	-4.60	-4.50	-4.40	-4.30	-4.20	-4.10	-3.90	-3.90	-3.80	-2.90	-1.80	0.20	2.10	5.30	8.60	14.50	19.10	19.10
881	-4.60	-4.60	-4.50	-4.40	-4.30	-4.20	-4.10	-3.90	-3.90	-3.80	-2.90	-1.80	0.20	2.10	5.30	8.60	14.50	19.10	19.10
949	-4.60	-4.60	-4.50	-4.40	-4.30	-4.20	-4.10	-3.90	-3.90	-3.80	-2.90	-1.80	0.20	2.10	5.30	8.60	14.50	19.10	19.10

2010 6.7L Cummins Engine Control
Injection Timing
Maps

(RPM : Nm) / DegCS top (x) axis is engine speed in RPM, left (y) axis is torque in Nm, and units within table are degree of CS (crank sensor?)

Main Injection Timing EOM 6

	600	**800**	**900**	**1000**	**1100**	**1200**	**1300**	**1400**	**1500**	**1600**	**1700**	**1800**	**2000**	**2200**	**2400**	**2600**	**2800**	**3000**	**3200**
-200	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	3.00	5.00	5.00	5.00	6.00	7.00	8.00	8.00
-100	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	3.00	5.00	5.00	5.00	6.00	7.00	8.00	8.00
0	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	3.00	5.00	5.00	5.00	6.00	7.00	8.00	8.00
75	1.00	1.00	1.00	1.00	1.00	0.52	0.68	0.17	0.80	1.00	2.00	2.28	4.42	4.06	5.00	6.00	7.00	8.00	8.00
150	1.00	1.00	1.00	1.00	1.00	-2.12	-1.78	-1.50	-0.92	-1.00	-1.00	2.00	3.87	4.00	5.00	6.00	7.00	8.00	8.00
225	0.28	0.00	0.00	0.00	0.00	-4.50	-3.90	-3.02	-2.74	-1.03	-0.44	1.00	2.34	4.00	5.00	6.00	7.00	8.00	8.00
300	-1.20	-2.00	-1.04	-1.11	-1.05	-1.50	-1.06	-1.00	-0.58	0.00	0.00	0.00	1.00	4.00	5.00	6.00	7.00	8.00	8.00
375	-2.00	-2.00	-1.83	-1.90	-1.46	-1.50	-1.42	-1.00	-0.93	0.00	0.00	0.00	1.00	4.00	5.00	6.00	7.00	8.37	8.91
450	-2.00	-2.00	-2.00	-2.00	-1.74	-1.50	-1.50	-1.00	-1.00	0.00	0.00	0.00	1.00	3.71	5.03	6.36	8.07	10.01	10.58
525	-2.00	-2.00	-2.00	-2.00	-2.00	-1.50	-1.50	-1.00	-1.00	0.00	0.00	0.00	1.00	3.11	5.09	6.73	9.11	11.70	12.20
600	-3.46	-2.00	-2.00	-2.00	-2.00	-1.50	-1.50	-1.00	-1.00	-0.49	0.00	0.00	1.00	3.00	5.20	7.11	10.10	13.36	14.15
675	-4.60	-3.93	-3.41	-2.62	-2.11	-1.50	-1.50	-1.00	-1.00	-0.98	0.00	0.00	0.97	2.98	5.30	7.56	11.37	15.55	16.43
750	-4.60	-4.60	-4.50	-4.32	-3.70	-3.21	-2.92	-2.57	-2.48	-2.73	-1.63	-1.07	0.53	2.50	5.30	8.20	13.27	17.43	17.80
825	-4.60	-4.60	-4.50	-4.40	-4.30	-4.20	-4.10	-3.90	-3.90	-3.80	-2.90	-1.80	0.20	2.10	5.30	8.60	14.50	17.80	17.80
881	-4.60	-4.60	-4.50	-4.40	-4.30	-4.20	-4.10	-3.90	-3.90	-3.80	-2.90	-1.80	0.20	2.10	5.30	8.60	14.50	17.80	17.80
949	-4.60	-4.60	-4.50	-4.40	-4.30	-4.20	-4.10	-3.90	-3.90	-3.80	-2.90	-1.80	0.20	2.10	5.30	8.60	14.50	17.80	17.80

Difference in values between Main Injection Timing EOM 1 Maps for "DPF Removed" and "Stock" Tunes

	600	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	2000	2200	2400	2600	2800	3000	3200
-200	-0.01	-0.01	0.99	1.99	1.99	1.99	1.99	1.99	1.99	1.99	1.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-100	-0.01	-0.01	0.99	1.99	1.99	1.99	1.99	1.99	1.99	1.99	1.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	-0.01	-0.01	0.99	1.99	1.99	1.99	1.99	1.99	1.99	1.99	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
75	-0.01	-0.01	0.99	1.99	1.99	2.47	2.31	2.82	2.19	1.99	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
150	-0.01	-0.01	0.99	1.99	1.99	5.11	4.77	4.49	3.91	3.99	3.98	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00
225	0.71	0.99	1.99	2.99	2.99	7.49	6.89	6.01	5.73	4.02	3.43	1.99	1.00	0.00	0.00	0.00	0.00	0.00	0.00
300	2.19	2.99	3.03	4.10	4.04	4.49	4.05	3.99	3.57	2.99	2.99	2.99	1.99	0.00	0.00	0.00	0.00	0.00	0.00
375	2.99	2.99	3.82	4.89	4.45	4.49	4.41	3.99	3.92	2.99	2.99	2.99	1.99	0.00	0.00	0.00	0.00	0.00	0.00
450	2.99	2.99	3.99	4.99	4.73	4.49	4.49	3.99	3.99	2.99	2.99	2.99	1.99	0.00	0.00	0.00	0.00	0.00	0.00
525	4.99	4.99	4.99	4.99	4.99	4.49	4.49	3.99	3.99	2.99	2.99	2.99	1.99	0.99	0.00	0.00	0.00	0.00	0.00
600	6.45	4.99	4.99	4.99	4.99	4.49	4.49	3.99	3.99	3.48	2.98	2.98	2.98	1.98	1.00	0.99	0.99	0.99	0.99
675	6.98	6.31	5.79	5.00	4.98	3.98	3.98	3.98	4.97	4.96	3.96	3.98	3.98	3.97	4.97	4.97	3.97	2.97	2.98
750	5.98	5.98	5.88	5.70	5.97	4.98	4.97	4.98	5.97	6.96	6.95	6.96	6.95	6.95	6.95	6.96	6.96	4.96	4.96
825	4.99	4.99	4.99	4.99	5.00	4.99	4.98	5.97	6.97	7.96	7.95	7.94	8.94	9.94	10.93	10.93	6.95	5.96	5.96
881	4.99	4.99	4.99	4.99	5.00	4.99	4.98	5.97	6.97	7.96	7.95	7.94	8.94	9.94	10.93	10.93	6.95	5.96	5.96
949	4.99	4.99	4.99	4.99	5.00	4.99	4.98	5.97	6.97	7.96	7.95	7.94	8.94	9.94	10.93	10.93	6.95	5.96	5.96

Difference in values between Main Injection Timing EOM 3 Maps for "DPF Removed" and "Stock" Tunes

	600	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	2000	2200	2400	2600	2800	3000	3200
-200	-0.01	-0.01	0.99	1.99	1.99	1.99	1.99	1.99	1.99	1.99	1.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-100	-0.01	-0.01	0.99	1.99	1.99	1.99	1.99	1.99	1.99	1.99	1.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	-0.01	-0.01	0.99	1.99	1.99	1.99	1.99	1.99	1.99	1.99	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
75	-0.01	-0.01	0.99	1.99	1.99	2.47	2.31	2.82	2.19	1.99	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
150	-0.01	-0.01	0.99	1.99	1.99	5.11	4.77	4.49	3.91	3.99	3.98	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00
225	0.71	0.99	1.99	2.99	2.99	7.49	6.89	6.01	5.73	4.02	3.43	1.99	1.00	0.00	0.00	0.00	0.00	0.00	0.00
300	2.18	2.99	3.03	4.10	4.04	4.49	4.05	3.99	3.57	2.99	2.99	2.99	1.99	0.00	0.00	0.00	0.00	0.00	0.00
375	2.99	2.99	3.82	4.89	4.45	4.49	4.41	3.99	3.92	2.99	2.99	2.99	1.99	0.00	0.00	0.00	0.00	0.00	0.00
450	2.99	2.99	3.99	4.99	4.73	4.49	4.49	3.99	3.99	2.99	2.99	2.99	1.99	0.00	0.00	0.00	0.00	0.00	0.00
525	4.99	4.99	4.99	4.99	4.99	4.49	4.49	3.99	3.99	2.99	2.99	2.99	1.99	0.99	-0.01	0.00	0.00	0.00	0.00
600	6.45	4.99	4.99	4.99	4.99	4.49	4.49	3.99	3.99	3.48	2.98	2.98	2.98	1.98	1.00	0.99	0.99	0.99	0.99
675	6.98	6.31	5.79	5.00	4.98	3.98	3.98	3.98	4.97	4.96	3.96	3.98	3.98	3.97	4.97	4.97	3.97	2.50	2.18
750	5.98	5.98	5.88	5.70	5.97	4.98	4.97	4.98	5.97	6.96	6.95	6.96	6.95	6.95	6.95	6.96	6.96	3.80	3.66
825	4.99	4.99	4.99	4.99	5.00	4.99	4.98	5.97	6.97	7.96	7.95	7.94	8.94	9.94	10.93	10.93	6.95	4.66	4.66
881	4.99	4.99	4.99	4.99	5.00	4.99	4.98	5.97	6.97	7.96	7.95	7.94	8.94	9.94	10.93	10.93	6.95	4.66	4.66
949	4.99	4.99	4.99	4.99	5.00	4.99	4.98	5.97	6.97	7.96	7.95	7.94	8.94	9.94	10.93	10.93	6.95	4.66	4.66

Difference in values between Main Injection Timing EOM 6 Maps for "DPF Removed" and "Stock" Tunes

	600	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	2000	2200	2400	2600	2800	3000	3200
-200	-0.01	-0.01	0.99	1.99	1.99	1.99	1.99	1.99	1.99	1.99	1.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
-100	-0.01	-0.01	0.99	1.99	1.99	1.99	1.99	1.99	1.99	1.99	1.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	-0.01	-0.01	0.99	1.99	1.99	1.99	1.99	1.99	1.99	1.99	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
75	-0.01	-0.01	0.99	1.99	1.99	2.47	2.31	2.82	2.19	1.99	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
150	-0.01	-0.01	0.99	1.99	1.99	5.11	4.77	4.49	3.91	3.99	3.98	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00
225	0.71	0.99	1.99	2.99	2.99	7.49	6.89	6.01	5.73	4.02	3.43	1.99	1.00	0.00	0.00	0.00	0.00	0.00	0.00
300	2.19	2.99	3.03	4.10	4.04	4.49	4.05	3.99	3.57	2.99	2.99	2.99	1.99	0.00	0.00	0.00	0.00	0.00	0.00
375	2.99	2.99	3.82	4.89	4.45	4.49	4.41	3.99	3.92	2.99	2.99	2.99	1.99	0.00	0.00	0.00	0.00	0.00	0.00
450	2.99	2.99	3.99	4.99	4.73	4.49	4.49	3.99	3.99	2.99	2.99	2.99	1.99	0.00	0.00	0.00	0.00	0.00	0.00
525	4.99	4.99	4.99	4.99	4.99	4.49	4.49	3.99	3.99	2.99	2.99	2.99	1.99	0.99	0.00	0.00	0.00	0.00	0.00
600	6.45	4.99	4.99	4.99	4.99	4.49	4.49	3.99	3.99	3.48	2.98	2.98	2.98	1.98	1.00	0.99	0.99	0.99	0.99
675	6.98	6.31	5.79	5.00	4.98	3.98	3.98	3.98	4.97	4.96	3.96	3.98	3.98	3.97	4.97	4.97	3.97	2.97	2.98
750	5.98	5.98	5.88	5.70	5.97	4.98	4.97	4.98	5.97	6.96	6.95	6.96	6.95	6.95	6.95	6.96	6.96	4.96	4.96
825	4.99	4.99	4.99	4.99	5.00	4.99	4.98	5.97	6.97	7.96	7.95	7.94	8.94	9.94	10.93	10.93	6.95	5.96	5.96
881	4.99	4.99	4.99	4.99	5.00	4.99	4.98	5.97	6.97	7.96	7.95	7.94	8.94	9.94	10.93	10.93	6.95	5.96	5.96
949	4.99	4.99	4.99	4.99	5.00	4.99	4.98	5.97	6.97	7.96	7.95	7.94	8.94	9.94	10.93	10.93	6.95	5.96	5.96

[redacted] Re: Follow-up questions for H&S device investigation

[redacted]

[redacted]

Sorry for delayed response. Here are the answers for some of your questions:

1. Can you provide any information on the accuracy and precision/repeatability of the testing equipment? This includes the emissions as well as the engine data you provided us.
The expected ballpark test to test variation on back to back tests with the same truck, engine, cal, and AT system is in the 0.03g/mi range for NOx on the FTP75.

2. Can you confirm that the data point "total fuel (mg/stroke)" is for all cylinders?
The total fueling is per cylinder - see calculation below. The fueling parameter in the log would be in "mg/stroke" and engine speed in "rev/min". If you wanted to calculate total fueling in kg/min, it would be:

Total fueling (kg/min) = Fueling (mg/str) * Engine speed (rpm) * 2pi/rev * 180/pi * 1 stroke / 720deg * 6 cyl * 1kg / 1000000mg

Total fueling (kg/min) = Fueling (mg/str) * Engine Speed (rpm) *0.000003

3. Can you please provide the certified CVN for the 12351331AG calibration ID? We observed 32FEBCE1 (emissions present tune), CCEBBCE1 (emissions deleted tune), 80C5BCE1 (returned to stock).
CVS for 12351331AG is [redacted] The CVNs for "emissions present tune" and "emissions deleted tune" are not valid for any certified calibration.

4. We know the MIL should have been activated for the emissions removed tuning which shows that the tuner tampered with the OBD. Can you verify that the operating conditions for the H&S emissions present (street) would have also triggered the MIL?
There should have been MILs for the aftertreatment removed that weren't present which is a definite sign of tampering with OBD. The street tune didn't appear to be blocking MILs, but also had a much smaller impact on emissions and performance. However, we did not investigate whether or not any fault thresholds were pushed out of the way, even if only slightly. Given the emission #s, we don't think we'd necessarily expect to set MILs with the street tune.

[redacted]

[redacted]

Please consider the environment before printing this e-mail or its attachments.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Please consider the environment before printing this e-mail or its attachments.

From: [redacted]
To: [redacted]
Cc: [redacted]
Date: 07/24/2013 09:10 AM
Subject: Follow-up questions for H&S device investigation

[redacted]

Below are some follow-up questions for our H&S tuner investigation. I can send over a call in number and we can have a discussion over to phone if you would like. Of course, if the answers are simple then an email is fine as well. If you would like to set up a time for a call, please propose some times that work well for you.

1. Can you provide any information on the accuracy and precision/repeatability of the testing equipment? This includes the emissions as well as the engine data you provided us.
2. Can you confirm that the data point "total fuel (mg/stroke)" is for all cylinders?
3. Can you please provide the certified CVN for the 12351331AG calibration ID? We observed 32FEBCE1 (emissions present tune), CCEBBCE1 (emissions deleted tune), 80C5BCE1 (returned to stock).
4. We know the MIL should have been activated for the emissions removed tuning which shows that the tuner tampered with the OBD. Can you verify that the operating conditions for the H&S emissions present (street) would have also triggered the MIL?

[redacted]

[redacted]

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