Service Bulletin

File in Section: -
Bulletin No.: 16-NA-212
Date: October, 2016

INFORMATION

Subject: A New Way to Look at NOx Sensor Readings and Exhaust Temperature During a DPF Regeneration or a Reductant Fluid Quality Test

Brand:	Model:	Model Year:		VIN:		Engine:	Transmission:
		from	to	from	to		
Chevrolet	Express	2014	2016			6.6L (LML, LGH)	
	Silverado						
GMC	Savana						
	Sierra HD						

Involved Region or Country	North America and N.A. Export Regions

Introduction

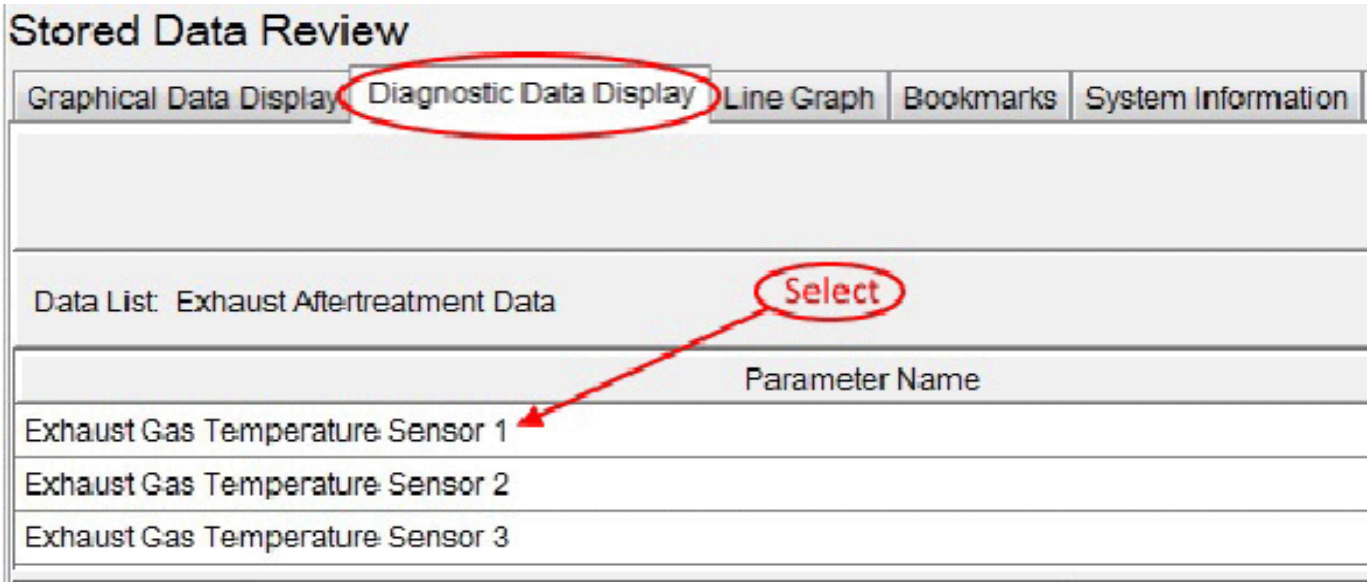
The following procedure is to aid in graphing NOx sensor readings and temperature sensor readings using the GDS2.

Information for the temperatures and NOx sensors can be pulled from the DPF Service Regeneration and the Reductant Fluid Quality Test procedures from session files or stored data in GDS2.

Suggested Procedure for Graphing the DPF Service Regeneration Temperatures

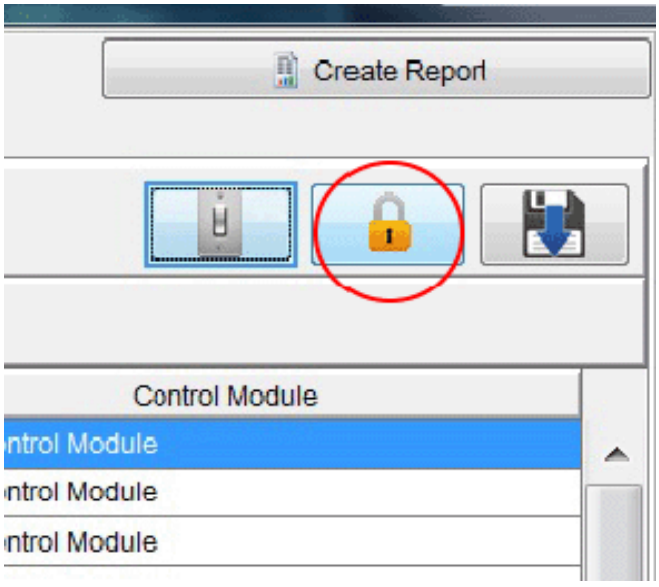
Locate the DPF Service Regeneration in the Stored Data:

1. Select the Review Tab.



4526869

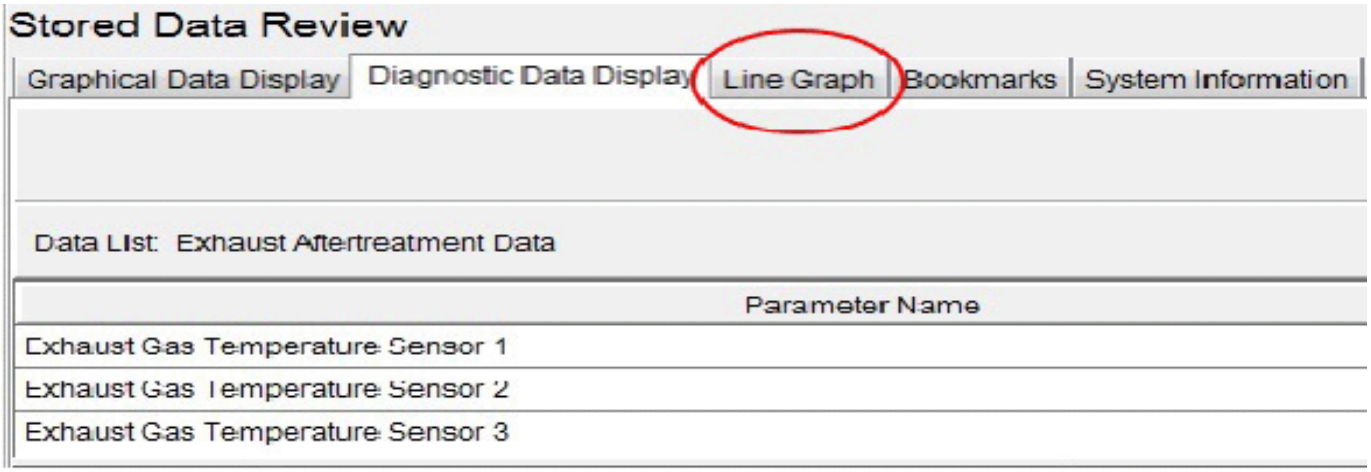
2. Select the Diagnostic Data Display tab.
3. Select the Exhaust Gas Temperature Sensor 1.



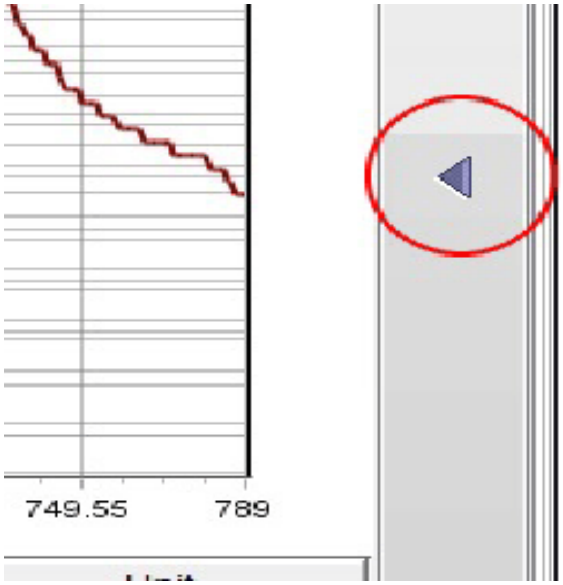
4526889

Note: The LOCK PARAMETER BUTTONS must be selected after each parameter has been selected to be graphed.

4. Select the Lock Parameter button located at the upper right side of display.
5. Repeat the steps above to add the Exhaust Gas Temperature Sensor 2, 3 and 4.
6. Select the DPF Soot Accumulation.



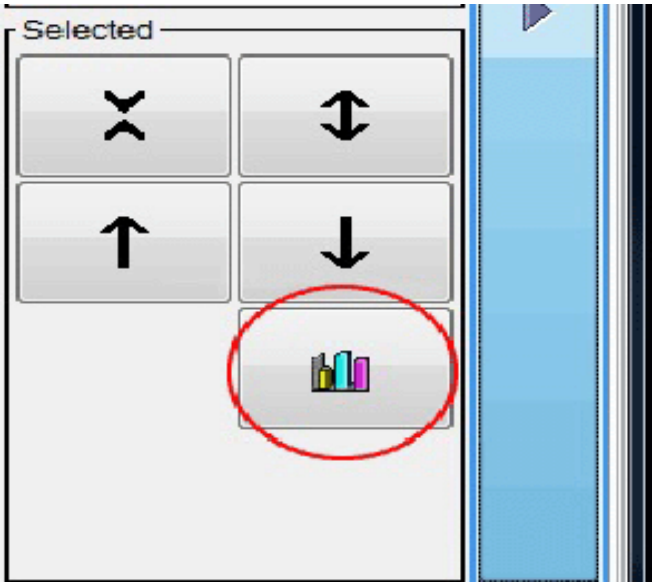
7. Select the Line Graph.



4526913

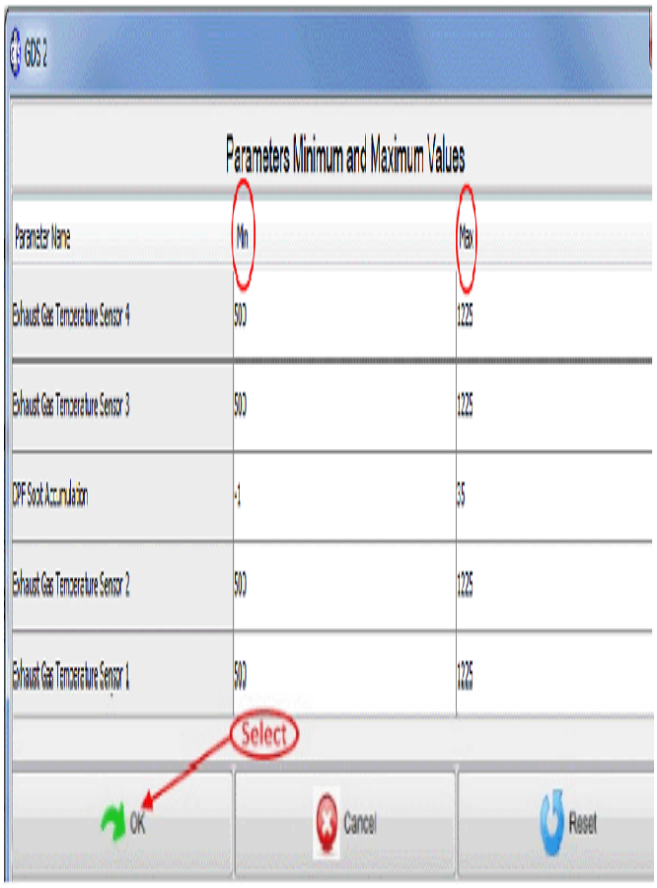
8. On the right side of the display, select the Show/ Hide Control arrow button.

4526908



4526924

9. Select the Change Scale button.

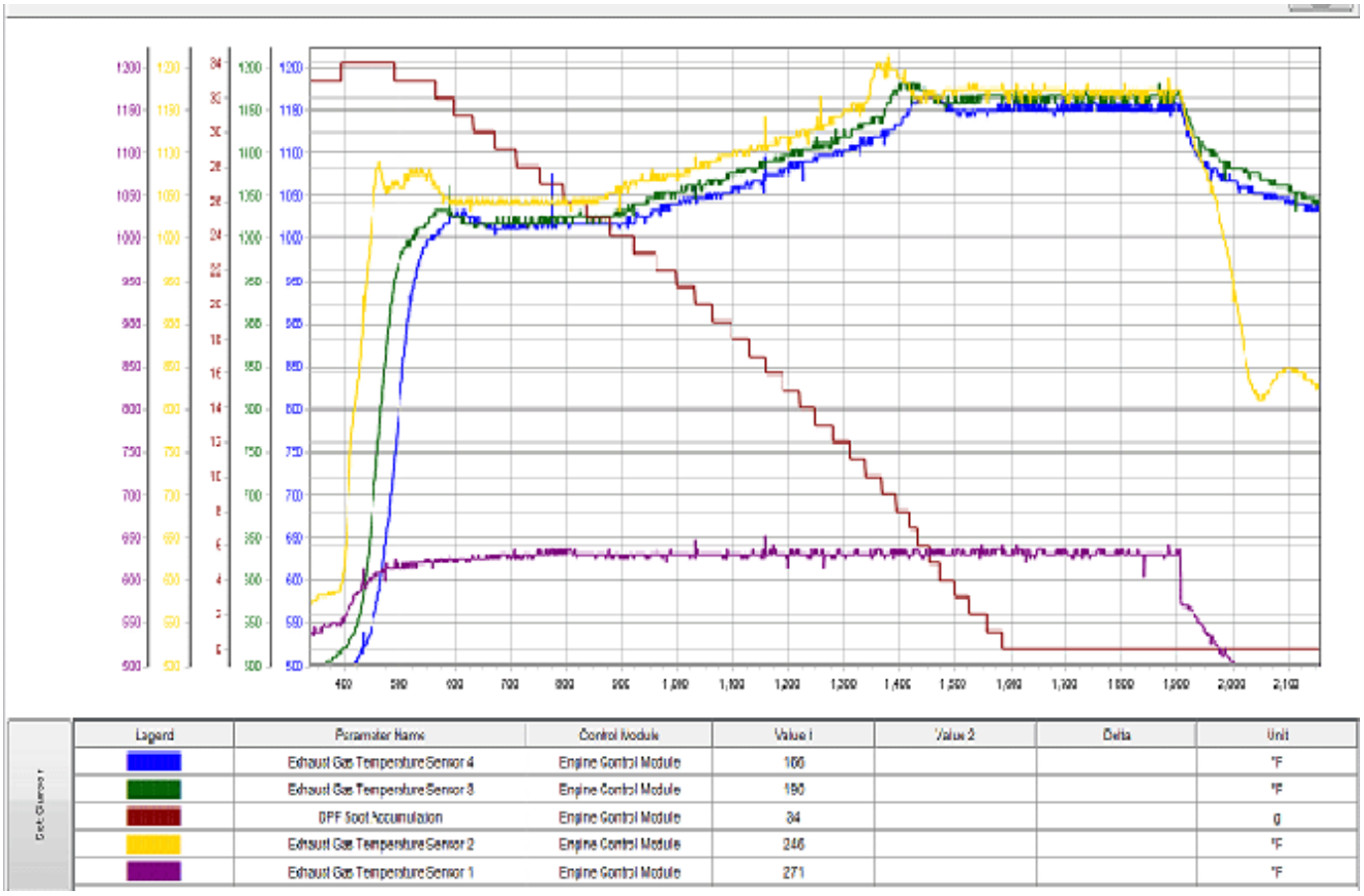


4533521

Note: When selecting the temperature values, the parameters should be all on the same scale.

10. Under the Parameters Values, select the MIN and MAX parameters for graphing out the readings.
11. Select OK.

Graph Results



4533561

Graphed results of the exhaust temperatures during the DPF Service Regeneration.

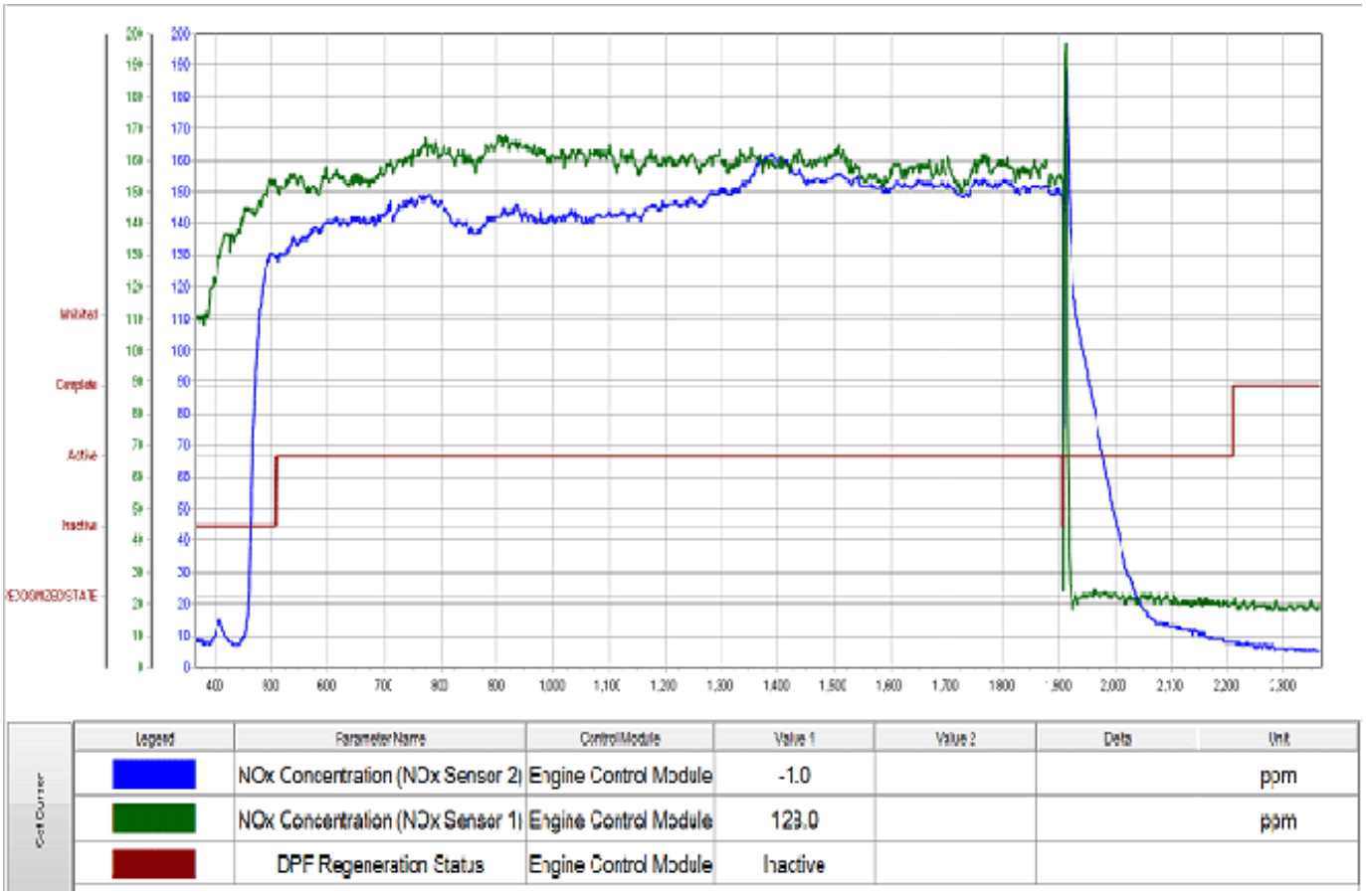
Recommended parameter values;

- Enter 500 under MIN.
- Enter 1225 under MAX.

During a service regeneration, EGT 1 should be the coldest followed by EGT4, EGT3, and EGT2 (the hottest).

If exhaust gas temperature sensor 4 is greater than exhaust gas temperature sensor 2 by more than 100 F during an extended (greater than 5 min) steady state DPF regeneration event, the fuel from the indirect fuel injector is being consumed in the DPF. This may indicate that the diesel oxidation catalyst is not functioning properly.

The Following Temperatures are for Example Only	Q67 Exhaust Aftertreatment Fuel Injector – Little or No Fuel Flow	Q67 Exhaust Aftertreatment Fuel Injector – Low Fuel Flow	Diesel Oxidation Catalyst – Damaged or Contaminated	Diesel Oxidation Catalyst – Damaged or Contaminated
EGT 1	357°C (675°F)	332°C (630°F)	357°C (675°F)	182°C (360°F)
EGT 2	333°C (631°F)	566°C (1050°F)	549°C (1020°F)	302°C (575°F)
EGT 3	272°C (521°F)	471°C (880°F)	632°C (1170°F)	449°C (840°F)
EGT 4	254°C (490°F)	421°C (790°F)	666°C (1230°F)	416°C (780°F)



Legend	Parameter Name	Control Module	Value 1	Value 2	Data	Unit
	NOx Concentration (NOx Sensor 2)	Engine Control Module	-1.0			ppm
	NOx Concentration (NOx Sensor 1)	Engine Control Module	123.0			ppm
	DPF Regeneration Status	Engine Control Module	Inactive			

4533591

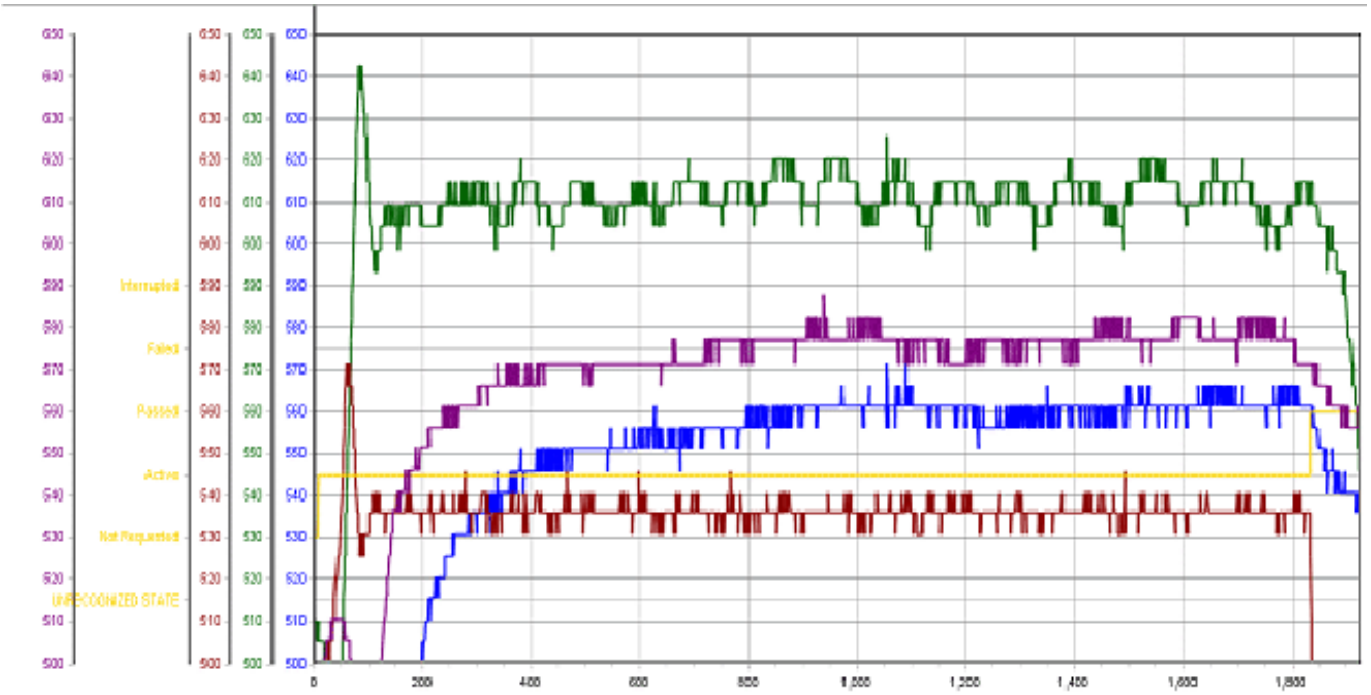
Note: NOx Sensor 2 may have higher readings than the NOx sensor 1 during a regeneration.

Graphed results of the NOx sensors during the DPF Service Regeneration.

Recommended parameter values;

- Enter 0 under MIN.
- Enter 200 under MAX.

During a DPF regeneration, the SCR is too hot to reduce NOx effectively. The upstream and downstream NOx ppm values should be relatively similar. NOx2 can be up to 30% higher than NOx1 in some cases.



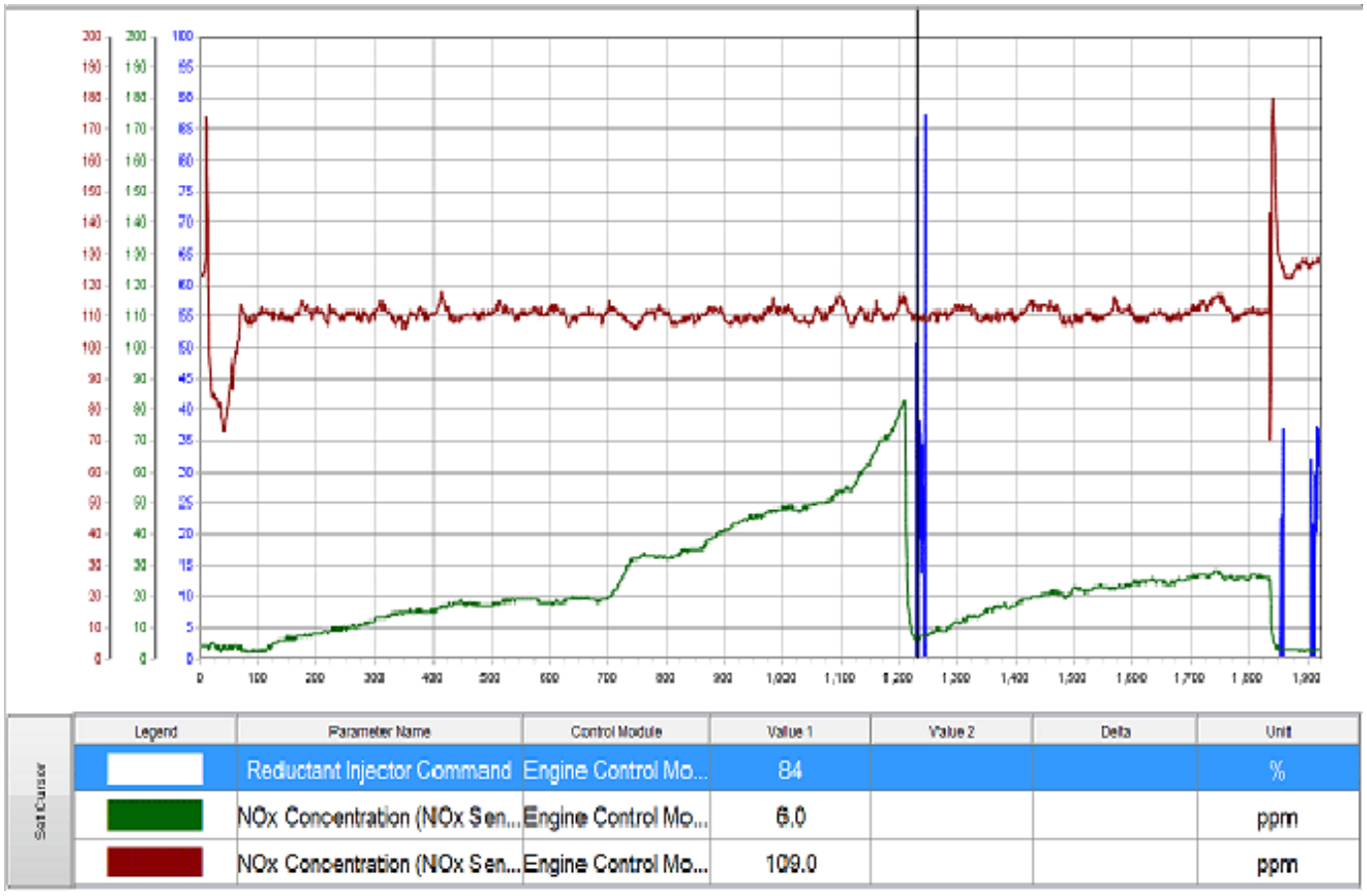
Legend	Parameter Name	Control Module	Value 1	Value 2	Delta	Unit
	Exhaust Gas Temperature Sensor 4	Engine Control Module	437			°F
	Exhaust Gas Temperature Sensor 2	Engine Control Module	505			°F
	Exhaust Gas Temperature Sensor 1	Engine Control Module	451			°F
	Reductant Fluid Quality Test	Engine Control Module	Not Requested			
	Exhaust Gas Temperature Sensor 3	Engine Control Module	406			°F

4533599

Graphed results of the exhaust temperature readings during the Reductant Fluid Quality test.

Recommended parameter values;

- Enter 500 under MIN.
- Enter 650 under MAX.



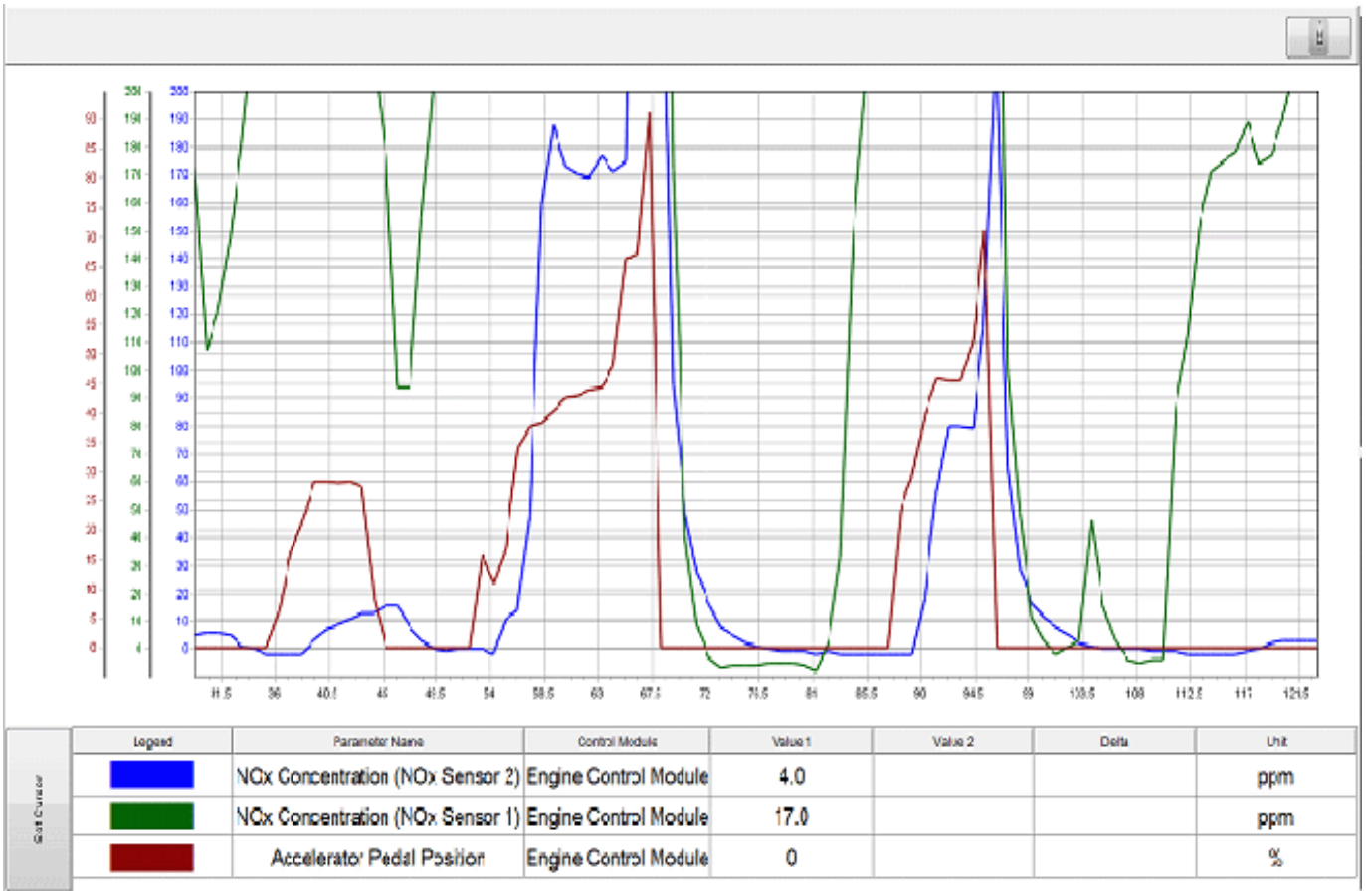
4533604

Graphed results of the NOx sensor readings during the Reductant Fluid Quality Test (RFQT) with DEF Reductant Injector command.

Recommended parameter values;

- Enter 0 under MIN.
- Enter 200 under MAX.
- Enter 100 for the Reductant Injector Command.

During the RFQT, the downstream NOx ppm should read roughly 70% less than the upstream NOx ppm on a healthy system. (As an example the upstream NOx ppm should be near 100ppm when the downstream NOx sensor 2 is around 30ppm or less).



4533620

Graphed results of NOx Concentration during Tip In and Tip Out.

- Enter 0 under MIN.
- Enter 200 under MAX.
- Enter 90 for Pedal position.

During a road test at highway speeds (with system at operating temperature), the downstream NOx sensor should be 70% less than the upstream sensor and transition in the same direction as the upstream sensor, but at a much lower magnitude. During a road test, you can collect transient data for NOx1 and NOx2. After a heavy acceleration followed by a tip out (0 pedal), both sensors should go to zero while coasting down. If NOx2 does not go to zero shortly after NOx1, NOx2 is either faulty or the system is saturated with DEF. Performing this test during or shortly after a DPF regen prevents the system from being saturated with DEF.

If the above NOx sensor comparisons aren't true, there are several possible causes. The NOx sensor cannot distinguish between NOx and liquid NH3 (DEF). High NOx sensor 2 readings can be caused by DEF getting past the SCR catalyst. This can be the result of a degraded SCR catalyst or a condition that causes excessive DEF in the SCR. After a DPF regeneration, the SCR system is purged of excessive DEF. It is easier to evaluate if an SCR brick is compromised right after a regeneration because it eliminates the extra DEF that the system was exposed to.

The SCR system can also store NOx in cold temperatures (extended idle). When the system warms up, this NOx can be released and results in a brief NOx2 increase above NOx1.

If NOx2 is malfunctioning or poisoned, NOx 2 values will be influenced and may be stuck higher than NOx1

This document assumes that the DEF injector volume has been verified and passes with 3 distinct spray plumes from the injector.

Version	2
Modified	Oct. 12, 2016 - Updated the Suggested Procedure for Graphing section.

Additional Keywords: 6.6, soot, fuel, NOx, Nitrogen Oxide, O2, Regen, Regeneration, Fuel, SCR, LML, LGH, DOC, DPF, Poor, Exhaust, Particulate, Filter, Quality, P2463, P20EE, P2459, P2BAD, P2BAA, P249D