



# 2013 Midwest & Northeast Equipment Management Joint Meeting




*Josh Lepage*

*Sr. Sales Specialist – Big Bore Engines*




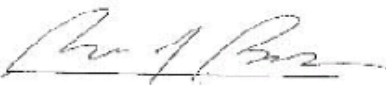
# All Navistar Engines EPA, CARB & OBD



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
OFFICE OF TRANSPORTATION AND AIR QUALITY  
WASHINGTON, DC 20460

**CERTIFICATE OF CONFORMITY**  
2013 MODEL YEAR



<b>Manufacturer:</b> NAVISTAR, INC.	
<b>Engine Family:</b> DNVXHD757DSR	<b>Greenhouse Gas Info:</b>
<b>Certificate Number:</b> NVX-ONHWY-13-08	<b>Primary Intended Service Class:</b>
<b>Intended Service Class:</b> HDDD	<b>Primary Test Configuration FIP (if applicable):</b>
<b>Fuel Type:</b> DIESEL	CO <sub>2</sub> FCL value (g/hp-hr)
<b>FELs:</b> RMHC+NOx: N/A	CO <sub>2</sub> FEL value (g/hp-hr)
NOx: N/A	N <sub>2</sub> O FEL value (g/hp-hr)
PM: N/A	CH <sub>4</sub> FEL value (g/hp-hr)
	<b>Primary Test Configuration Ramp-up-modifier (if applicable):</b>
	CO <sub>2</sub> FCL value (g/hp-hr)
	CO <sub>2</sub> FEL value (g/hp-hr)
<b>Effective Date:</b> 4/15/2013	
<b>Date Issued:</b> 4/15/2013	Byron J. Baker, Director Compliance Division Office of Transportation and Air Quality

Pursuant to Section 206 of the Clean Air Act (42 U.S.C. section 7525), 40 CFR Part 86, and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which represent the following motor vehicle engines, by engine family, and is subject to the terms and conditions prescribed in those provisions.

This certificate of conformity covers only those new motor vehicle engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 86 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 86.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 85.095-7, 86.506, and 86.1006 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 86. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void ab initio for other reasons specified in 40 CFR Part 86.

This certificate does not cover engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

California Environmental Protection Agency  
**Air Resources Board**

NAVISTAR, Inc.

EXECUTIVE ORDER A-004-0352  
New On-Road Heavy-Duty Engines  
Page 1 of 2 Pages

Pursuant to the authority vested in the Air Resources Board by Health and Safety Code Division 26, Part 5, Chapter 2; and pursuant to the authority vested in the undersigned by Health and Safety Code Sections 39515 and 39516 and Executive Order G-02-003;

IT IS ORDERED AND RESOLVED: The engine and emission control systems produced by the manufacturer are certified as described below for use in on-road motor vehicles with a manufacturer's GVWR over 14,000 pounds. Production engines shall be in all material respects the same as those for which certification is granted.

MODEL YEAR	ENGINE FAMILY	ENGINE SIZES (L)	FUEL TYPE <sup>1</sup>	STANDARDS & TEST PROCEDURE	INTENDED SERVICE CLASS <sup>2</sup>	ECS & SPECIAL FEATURES <sup>3</sup>	DIAGNOSTIC <sup>4</sup>
2013	DNVXHD757DSR	12.4	Diesel	Diesel	HFDD	DD, TC(Z), CAC(Z), ECM, EGR, OC, PTOC, SCR-U	OBD (S)
<b>PRIMARY ENGINE'S OBD EMISSIONS CONTROL</b>		<b>ADDITIONAL IDLE EMISSIONS CONTROL<sup>5</sup></b>					
30g		N/A					
<b>ENGINE (L)</b>		<b>ENGINE MODELS / CODES (rated power in hp)</b>					
12.4		A475/A475 (475), A450/A450 (450), A450M/A450M (450), A430/A430 (430), A450M/A450M (430), A410/A410 (410), A390/A390 (390), A370/A370 (370), A365/A365 (365)					


<sup>1</sup> Fuel type(s) (GVWR) (gasoline vehicle registration: 13 CCR 1995.8(a)(1); California Code of Regulations, section 90140.0010) (all other Federal Regulations, Section of all other): Gasoline, methanol, ethanol, kerosene, LP-gas, liquefied petroleum gas, E85 (85% ethanol fuel), M85 (85% methanol fuel), B7 (7% bio fuel), DF (diesel fuel), PF (pilot fuel).

<sup>2</sup> LHM: High-duty medium-duty heavy-duty diesel; LHM: Light-duty; HD: Heavy-duty On-D.

<sup>3</sup> SCR: Selective catalytic reduction; TWC: Three-way catalytic converter; NAO: NOx adsorption catalyst; SCR-U / SCR-N: selective catalytic reduction - urea / - ammonia; WP (pre)cat: warm-up catalyst; DPF: diesel particulate filter; FID: formaldehyde filter; HDS: Diesel Exhaust Sulfur Dioxide sensor; HDS: Diesel Exhaust Sulfur Dioxide sensor (diesel); HDS: Diesel Exhaust Sulfur Dioxide sensor (gasoline); TBM: throttle body fuel injection; SPM: sequential multi-point fuel injection; DSI: direct gasoline injection; GDI: gasoline direct injection; GDI: gasoline direct injection; TCI: turbocharger; supercharger; SAC: charge air cooler; HSE: SCR-Diesel exhaust gas recirculation / cooled EGR; PARS: particulate oxidation catalyst; SPL: smoke puff limiter; SCMP: engine speed control module; SW: engine modification; S: speed limiter; S: speed limiter.

<sup>4</sup> E85: engine shutdown system per 13 CCR 1995.8(a)(1)(A); 30g: 30 g/hp-hr NOx per 13 CCR 1995.8(a)(1)(C); APS: internal combustion auxiliary power system; AL: alternative method per 13 CCR 1995.8(a)(1)(D); Exempt: exempted per 13 CCR 1995.8(a)(1)(E) or for (ENGINE) fuel systems; N/A: not applicable (e.g., On-D engines and vehicles); E85: engine manufacturer diagnostic code - OBD (S) / (D) / (M) / (P) / (T) / (U) / (V) / (W) / (X) / (Y) / (Z) / (AA) / (AB) / (AC) / (AD) / (AE) / (AF) / (AG) / (AH) / (AI) / (AJ) / (AK) / (AL) / (AM) / (AN) / (AO) / (AP) / (AQ) / (AR) / (AS) / (AT) / (AU) / (AV) / (AW) / (AX) / (AY) / (AZ) / (BA) / (BB) / (BC) / (BD) / (BE) / (BF) / (BG) / (BH) / (BI) / (BJ) / (BK) / (BL) / (BM) / (BN) / (BO) / (BP) / (BQ) / (BR) / (BS) / (BT) / (BU) / (BV) / (BW) / (BX) / (BY) / (BZ) / (CA) / (CB) / (CC) / (CD) / (CE) / (CF) / (CG) / (CH) / (CI) / (CJ) / (CK) / (CL) / (CM) / (CN) / (CO) / (CP) / (CQ) / (CR) / (CS) / (CT) / (CU) / (CV) / (CW) / (CX) / (CY) / 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(AZ) / (BA) / (BB) / (BC) / (BD) / (BE) / (BF) / (BG) / (BH) / (BI) / (BJ) / (BK) / (BL) / (BM) / (BN) / (BO) / (BP) / (BQ) / (BR) / (BS) / (BT) / (BU) / (BV) / (BW) / (BX) / (BY) / (BZ) / (CA) / (CB) / (CC) / (CD) / (CE) / (CF) / (CG) / (CH) / (CI) / (CJ) / (CK) / (CL) / (CM) / (CN) / (CO) / (CP) / (CQ) / (CR) / (CS) / (CT) / (CU) / (CV) / (CW) / (CX) / (CY) / (CZ) / (DA) / (DB) / (DC) / (DD) / (DE) / (DF) / (DG) / (DH) / (DI) / (DJ) / (DK) / (DL) / (DM) / (DN) / (DO) / (DP) / (DQ) / (DR) / (DS) / (DT) / (DU) / (DV) / (DW) / (DX) / (DY) / (DZ) / (EA) / (EB) / (EC) / (ED) / (EE) / (EF) / (EG) / (EH) / (EI) / (EJ) / (EK) / (EL) / (EM) / (EN) / (EO) / (EP) / (EQ) / (ER) / (ES) / (ET) / (EU) / (EV) / (EW) / (EX) / (EY) / (EZ) / (FA) / (FB) / (FC) / (FD) / (FE) / (FF) / (FG) / (FH) / (FI) / (FJ) / (FK) / (FL) / (FM) / (FN) / (FO) / (FP) / (FQ) / (FR) / (FS) / (FT) / (FU) / (FV) / (FW) / (FX) / (FY) / (FZ) / (GA) / (GB) / (GC) / (GD) / (GE) / (GF) / (GG) / (GH) / (GI) / (GJ) / (GK) / (GL) / (GM) / (GN) / (GO) / (GP) / (GQ) / (GR) / (GS) / (GT) / (GU) / (GV) / (GW) / (GX) / (GY) / (GZ) / (HA) / (HB) / (HC) / (HD) / (HE) / (HF) / (HG) / (HH) / (HI) / (HJ) / (HK) / (HL) / (HM) / (HN) / (HO) / (HP) / (HQ) / (HR) / (HS) / (HT) / (HU) / (HV) / (HW) / (HX) / (HY) / (HZ) / (IA) / (IB) / (IC) / (ID) / (IE) / (IF) / (IG) / (IH) / (II) / (IJ) / (IK) / (IL) / (IM) / (IN) / (IO) / (IP) / (IQ) / (IR) / (IS) / (IT) / (IU) / (IV) / (IW) / (IX) / (IY) / (IZ) / (JA) / (JB) / (JC) / (JD) / (JE) / (JF) / (JG) / (JH) / (JI) / (JJ) / (JK) / (JL) / (JM) / (JN) / (JO) / (JP) / (JQ) / (JR) / (JS) / (JT) / (JU) / (JV) / (JW) / (JX) / (JY) / (JZ) / (KA) / (KB) / (KC) / (KD) / (KE) / (KF) / (KG) / (KH) / (KI) / (KJ) / (KK) / (KL) / (KM) / (KN) / (KO) / (KP) / (KQ) / (KR) / (KS) / (KT) / (KU) / (KV) / (KW) / (KX) / (KY) / (KZ) / (LA) / (LB) / (LC) / (LD) / (LE) / (LF) / (LG) / (LH) / (LI) / (LJ) / (LK) / (LM) / (LN) / (LO) / (LP) / (LQ) / (LR) / (LS) / (LT) / (LU) / (LV) / (LW) / (LX) / (LY) / (LZ) / (MA) / (MB) / (MC) / (MD) / (ME) / (MF) / (MG) / (MH) / (MI) / (MJ) / (MK) / (ML) / (MN) / (MO) / (MP) / (MQ) / (MR) / (MS) / (MT) / (MU) / (MV) / (MW) / (MX) / (MY) / (MZ) / (NA) / (NB) / (NC) / (ND) / (NE) / (NF) / (NG) / (NH) / (NI) / (NJ) / (NK) / (NL) / (NM) / (NO) / (NP) / (NQ) / (NR) / (NS) / (NT) / (NU) / (NV) / (NW) / (NX) / (NY) / (NZ) / (OA) / (OB) / (OC) / (OD) / (OE) / (OF) / (OG) / (OH) / (OI) / (OJ) / (OK) / (OL) / (OM) / (ON) / (OO) / (OP) / (OQ) / (OR) / (OS) / (OT) / (OU) / (OV) / (OW) / (OX) / (OY) / (OZ) / (PA) / (PB) / (PC) / (PD) / (PE) / (PF) / (PG) / (PH) / (PI) / (PJ) / (PK) / (PL) / (PM) / (PN) / (PO) / (PP) / (PQ) / (PR) / (PS) / (PT) / (PU) / (PV) / (PW) / (PX) / (PY) / (PZ) / (QA) / (QB) / (QC) / (QD) / (QE) / (QF) / (QG) / (QH) / (QI) / (QJ) / (QK) / (QL) / (QM) / (QN) / (QO) / (QP) / (QQ) / (QR) / (QS) / (QT) / (QU) / (QV) / (QW) / (QX) / (QY) / (QZ) / (RA) / (RB) / (RC) / (RD) / (RE) / (RF) / (RG) / (RH) / (RI) / (RJ) / (RK) / (RL) / (RM) / (RN) / (RO) / (RP) / (RQ) / (RR) / (RS) / (RT) / (RU) / (RV) / (RW) / (RX) / (RY) / (RZ) / (SA) / (SB) / (SC) / (SD) / (SE) / (SF) / (SG) / (SH) / (SI) / (SJ) / (SK) / (SL) / (SM) / (SN) / (SO) / (SP) / (SQ) / (SR) / (SS) / (ST) / (SU) / (SV) / (SW) / (SX) / (SY) / (SZ) / (TA) / (TB) / (TC) / (TD) / (TE) / (TF) / (TG) / (TH) / (TI) / (TJ) / (TK) / (TL) / (TM) / (TN) / (TO) / (TP) / (TQ) / (TR) / (TS) / (TU) / (TV) / (TW) / (TX) / (TY) / (TZ) / (UA) / (UB) / (UC) / (UD) / (UE) / (UF) / (UG) / (UH) / (UI) / (UJ) / (UK) / (UL) / (UM) / (UN) / (UO) / (UP) / (UQ) / (UR) / (US) / (UT) / (UU) / (UV) / (UW) / (UX) / (UY) / (UZ) / (VA) / (VB) / (VC) / (VD) / (VE) / (VF) / (VG) / (VH) / (VI) / (VJ) / (VK) / (VL) / (VM) / (VN) / (VO) / (VP) / (VQ) / (VR) / (VS) / (VT) / (VU) / (VV) / (VW) / (VX) / (VY) / (VZ) / (WA) / (WB) / (WC) / (WD) / (WE) / (WF) / (WG) / (WH) / (WI) / (WJ) / (WK) / (WL) / (WM) / (WN) / (WO) / (WP) / (WQ) / (WR) / (WS) / (WT) / (WU) / (WV) / (WW) / (WX) / (WY) / (WZ) / (XA) / (XB) / (XC) / (XD) / (XE) / (XF) / (XG) / (XH) / (XI) / (XJ) / (XK) / (XL) / (XM) / (XN) / (XO) / (XP) / (XQ) / (XR) / (XS) / (XT) / (XU) / (XV) / (XW) / (XZ) / (YA) / (YB) / (YC) / (YD) / (YE) / (YF) / (YG) / (YH) / (YI) / (YJ) / (YK) / (YL) / (YM) / (YN) / (YO) / (YP) / (YQ) / (YR) / (YS) / (YT) / (YU) / (YV) / (YW) / (YX) / (YZ) / (ZA) / (ZB) / (ZC) / (ZD) / (ZE) / (ZF) / (ZG) / (ZH) / (ZI) / (ZJ) / (ZK) / (ZL) / (ZM) / (ZN) / (ZO) / (ZP) / (ZQ) / (ZR) / (ZS) / (ZT) / (ZU) / (ZV) / (ZW) / (ZX) / (ZY) / (ZZ) / (AA) / (AB) / (AC) / (AD) / (AE) / (AF) / (AG) / (AH) / (AI) / (AJ) / (AK) / (AL) / (AM) / (AN) / (AO) / (AP) / (AQ) / (AR) / (AS) / (AT) / (AU) / (AV) / (AW) / (AX) / (AY) / (AZ) / (BA) / (BB) / (BC) / (BD) / (BE) / (BF) / (BG) / (BH) / (BI) / (BJ) / (BK) / (BL) / (BM) / (BN) / (BO) / (BP) / (BQ) / (BR) / (BS) / (BT) / (BU) / (BV) / (BW) / (BX) / (BY) / (BZ) / (CA) / (CB) / (CC) / (CD) / (CE) / (CF) / (CG) / (CH) / (CI) / (CJ) / (CK) / (CL) / (CM) / (CN) / (CO) / (CP) / (CQ) / (CR) / (CS) / (CT) / (CU) / (CV) / (CW) / (CX) / (CY) / (CZ) / (DA) / (DB) / (DC) / (DD) / (DE) / (DF) / (DG) / (DH) / (DI) / (DJ) / (DK) / (DL) / (DM) / (DN) / (DO) / (DP) / (DQ) / (DR) / (DS) / (DT) / (DU) / (DV) / (DW) / (DX) / (DY) / (DZ) / (EA) / (EB) / (EC) / (ED) / (EE) / (EF) / (EG) / (EH) / (EI) / (EJ) / (EK) / (EL) / (EM) / (EN) / (EO) / (EP) / (EQ) / (ER) / (ES) / (ET) / (EU) / (EV) / (EW) / (EX) / (EY) / (EZ) / (FA) / (FB) / (FC) / (FD) / (FE) / (FF) / (FG) / (FH) / (FI) / (FJ) / (FK) / (FL) / (FM) / (FN) / (FO) / (FP) / (FQ) / (FR) / (FS) / (FT) / (FU) / (FV) / (FW) / (FX) / (FY) / (FZ) / (GA) / (GB) / (GC) / (GD) / (GE) / (GF) / (GG) / (GH) / (GI) / (GJ) / (GK) / (GL) / (GM) / (GN) / (GO) / (GP) / (GQ) / (GR) / (GS) / (GT) / (GU) / (GV) / (GW) / (GX) / (GY) / (GZ) / (HA) / (HB) / (HC) / (HD) / (HE) / (HF) / (HG) / (HH) / (HI) / (HJ) / (HK) / (HL) / (HM) / (HN) / (HO) / (HP) / (HQ) / (HR) / (HS) / (HT) / (HU) / (HV) / (HW) / (HX) / (HY) / (HZ) / (IA) / (IB) / (IC) / (ID) / (IE) / (IF) / (IG) / (IH) / (II) / (IJ) / (IK) / (IL) / (IM) / (IN) / (IO) / (IP) / (IQ) / (IR) / (IS) / (IT) / (IU) / (IV) / (IW) / (IX) / (IY) / (IZ) / (JA) / (JB) / (JC) / (JD) / (JE) / (JF) / (JG) / (JH) / (JI) / (JJ) / (JK) / (JL) / (JM) / (JN) / (JO) / (JP) / (JQ) / (JR) / (JS) / (JT) / (JU) / (JV) / (JW) / (JX) / (JY) / (JZ) / (KA) / (KB) / (KC) / (KD) / (KE) / (KF) / (KG) / (KH) / (KI) / (K

# Green House Gas (GHG) Engine Standards

  
**Primary CI Engine CO2 Standards**  
1036.108

- The compression-ignition engine CO2 emissions standards are based on:
  - GVWR of the vehicle for which the engine is primarily designed – 1036.140
  - Whether the engine is designed for installation in a vocational vehicle or combination tractor
- The CO2 emissions for vocational engines are measured over the Heavy-Duty Engine FTP cycle
- The CO2 emissions for tractor engines are measured over the Heavy-Duty Engine SET cycle

Compression-Ignition Engines (g/hp-hr):

Model Years	Light Heavy-Duty	Medium Heavy-Duty – Vocational	Heavy Heavy-Duty – Vocational	Medium Heavy-Duty – Tractor	Heavy Heavy-Duty – Tractor
2014-2016	600	600	567	502	475
2017 and later	576	576	555	487	460

9



- **Engine Standards – Model Year 2014 / 2017**
  - Regulate CO<sub>2</sub>, N<sub>2</sub>O, CH<sub>4</sub>
  - Allows for Average, Banking & Trading Program [ABT]
  - Multiple Strategies in order to Comply in 2014-16
  - Opportunities for Advanced and Innovative Technologies





# EPA Tailpipe GHG Requirements

## Requirement      Certification Timing

PM—0.01 g/bhp-hr NOx—0.20 g/bhp-hr NMHC—0.14 g/bhp-hr	NOx & NMHC standards will be phased in based on % of sales: 50% from 2007-09 100% in 2010  <b>All Competitors are Leveraging ABT (Credits) Strategies</b>
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Link to more detailed info: <http://www.dieselnet.com/standards/us/hd.php#y2007>

	2013	2014	2015
<b>N13L</b>	Announced SCR Launch (0.2 NOx engine) – April 29, 2103		
<b>DT &amp; 9-10</b>	Announced Transition to SCR Spring 2014	Developing SCR engine	
<b>MF7</b>	Leveraging ABT (Credits)	Leveraging ABT (Credits)	Leveraging ABT (Credits)



# Green House Gas GHG



## Vocational Standards



GEM\_sim

### Greenhouse Gas Emissions Model (GEM)

Identification

Manufacturer Name:  Vehicle Configuration:  Date: 22-Feb-2011  
Vehicle Family:  Vehicle Model Year:

Regulatory Subcategory

- Class 8 Combination - Sleeper Cab - High Roof
- Class 8 Combination - Sleeper Cab - Mid Roof
- Class 8 Combination - Sleeper Cab - Low Roof
- Class 8 Combination - Day Cab - High Roof
- Class 8 Combination - Day Cab - Mid Roof
- Class 8 Combination - Day Cab - Low Roof
- Class 7 Combination - Day Cab - High Roof
- Class 7 Combination - Day Cab - Mid Roof
- Class 7 Combination - Day Cab - Low Roof
- Heavy Heavy-Duty - Vocational Truck (Class 8)
- Medium Heavy-Duty - Vocational Truck (Class 6-7)
- Light Heavy-Duty - Vocational Truck (Class 2b-5)

Simulation Inputs

Coefficient of Aerodynamic Drag:

Driver Air Resistance:

Vehicle Speed Limiter [mph]:

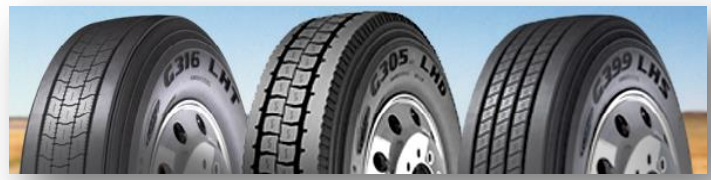
Vehicle Weight Reduction [lbs]:

Extended Idle Reduction:

Simulation Type

- Single Configuration
- Plot Output
- Multiple Configurations

**ASSESS VEH**



**TIRES ONLY!**



**Estimated CO<sub>2</sub>**  
*(g/ton-mile)*

**Purchase the tires you need to do the job each OEM will then factor those tires into their Fleet Average, CAFÉ laws.**

**Compliant?**

**Not Compliant?**



# GHG Certified Vehicles

- **Greenhouse Gas Emissions Label is on vehicles being shipped today.**

**NAVISTAR®**

## **VEHICLE EMISSIONS CONTROL INFORMATION**

THIS CLASS 8 VOCATIONAL TRUCK  
CONFORMS WITH U.S. EPA REGULATIONS FOR 2013 MODEL YEAR  
HEAVY DUTY VEHICLES UNDER 40 CFR PART 1037. THIS VEHICLE  
MAY BE EQUIPPED WITH COMPONENTS THAT REDUCE  
GREENHOUSE GAS EMISSIONS

EMISSION REDUCTION COMPONENTS:

LRRD				
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EPA VEHICLE FAMILY: DNVX2VOCVXXC DATE OF MFG 01/2012

FUEL TYPE: DIESEL

VIN:



# Navistar Engine Transitioning to SCR

- **2013:** Transition to SCR on N13L and ISX 15L Engines
  - WorkStar Severe Service – Jul/Aug.'13 (N13)
  - PayStar Severe Service – Aug./Sept.'13 (ISX & N13)

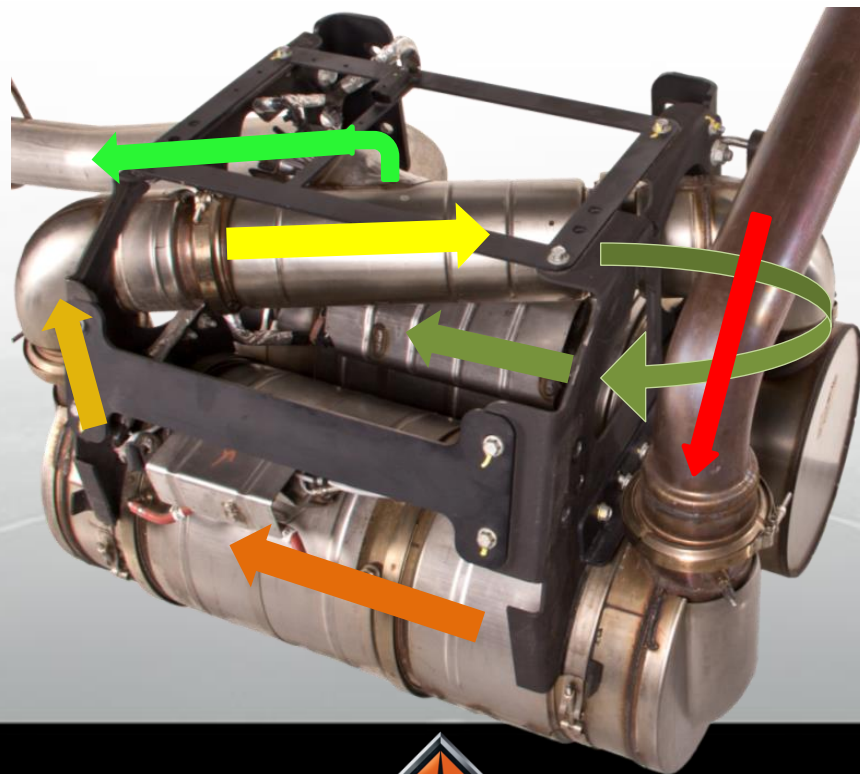


- **2014:** Transition to SCR on DT, 9, 10L Engines
  - Early Spring of 2014 (DT Engines)
  - Late Fall of 2014 (9 and 10L Engines)



# SCR Exhaust System

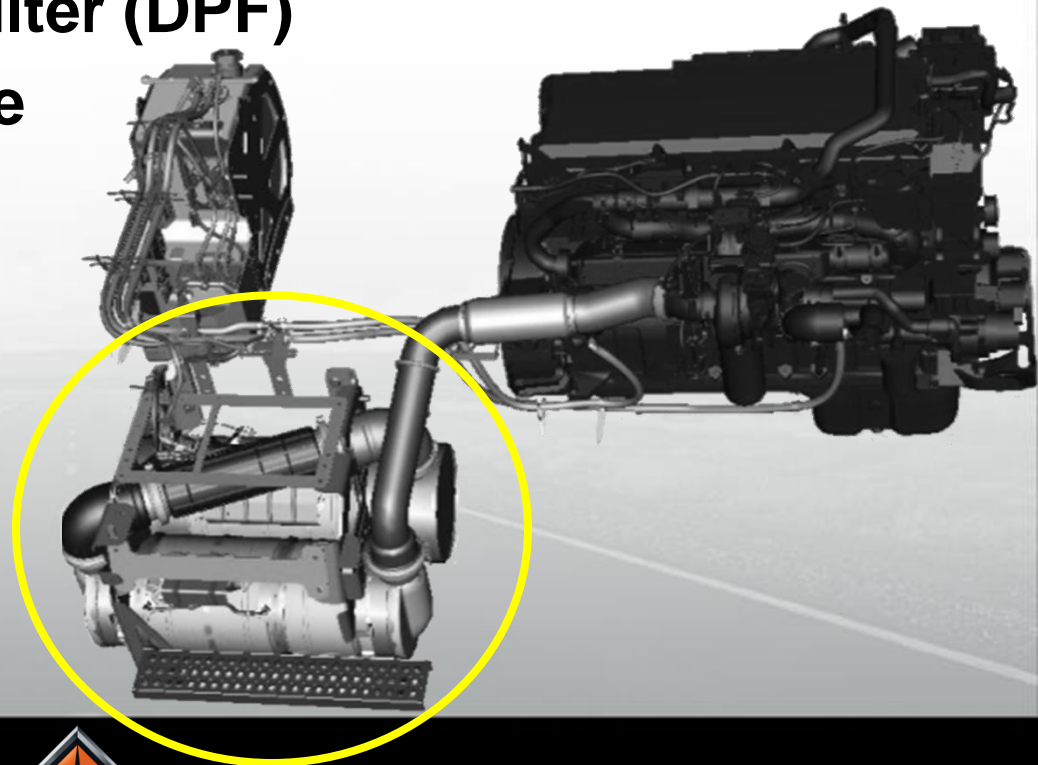
- **Most common layout will be the Cummins 'Switchback'**
  - Exhaust flows into the canister containing the DOC & DPF.
  - Exhaust then flows the opposite direction through the decomposition tube to the SCR Canister.





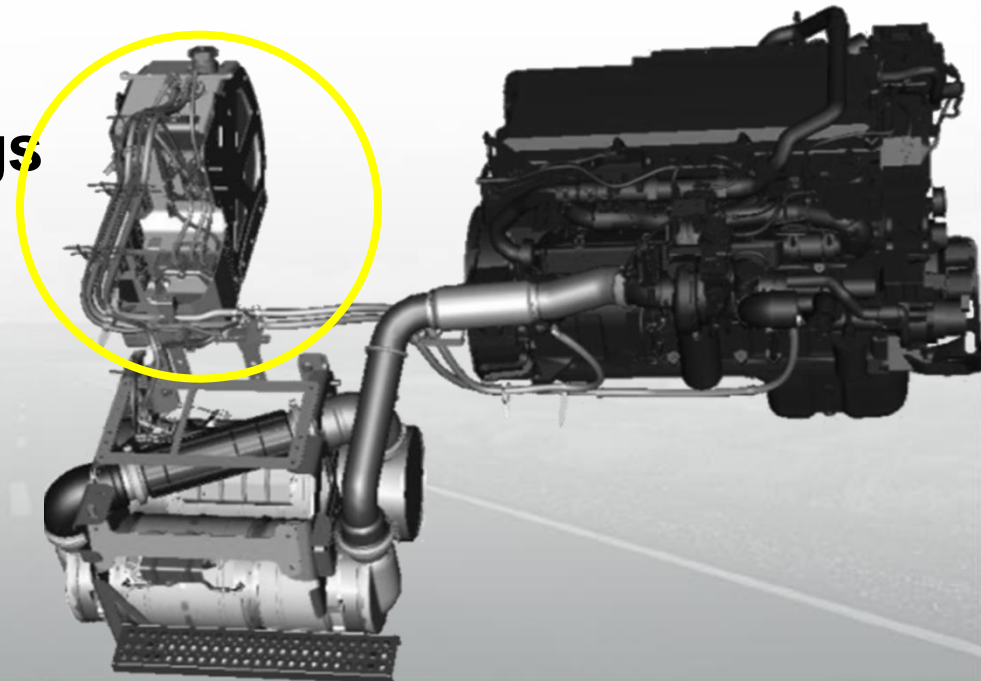
# SCR Exhaust System

- **Contains:**
  - **Selective Catalyst Reduction (SCR) Canister**
  - **Diesel Oxidation Catalyst (DOC)**
  - **Diesel Particulate Filter (DPF)**
  - **Decomposition Tube**
  - **Urea Doser**
  - **Sensors**
  - **Brackets**

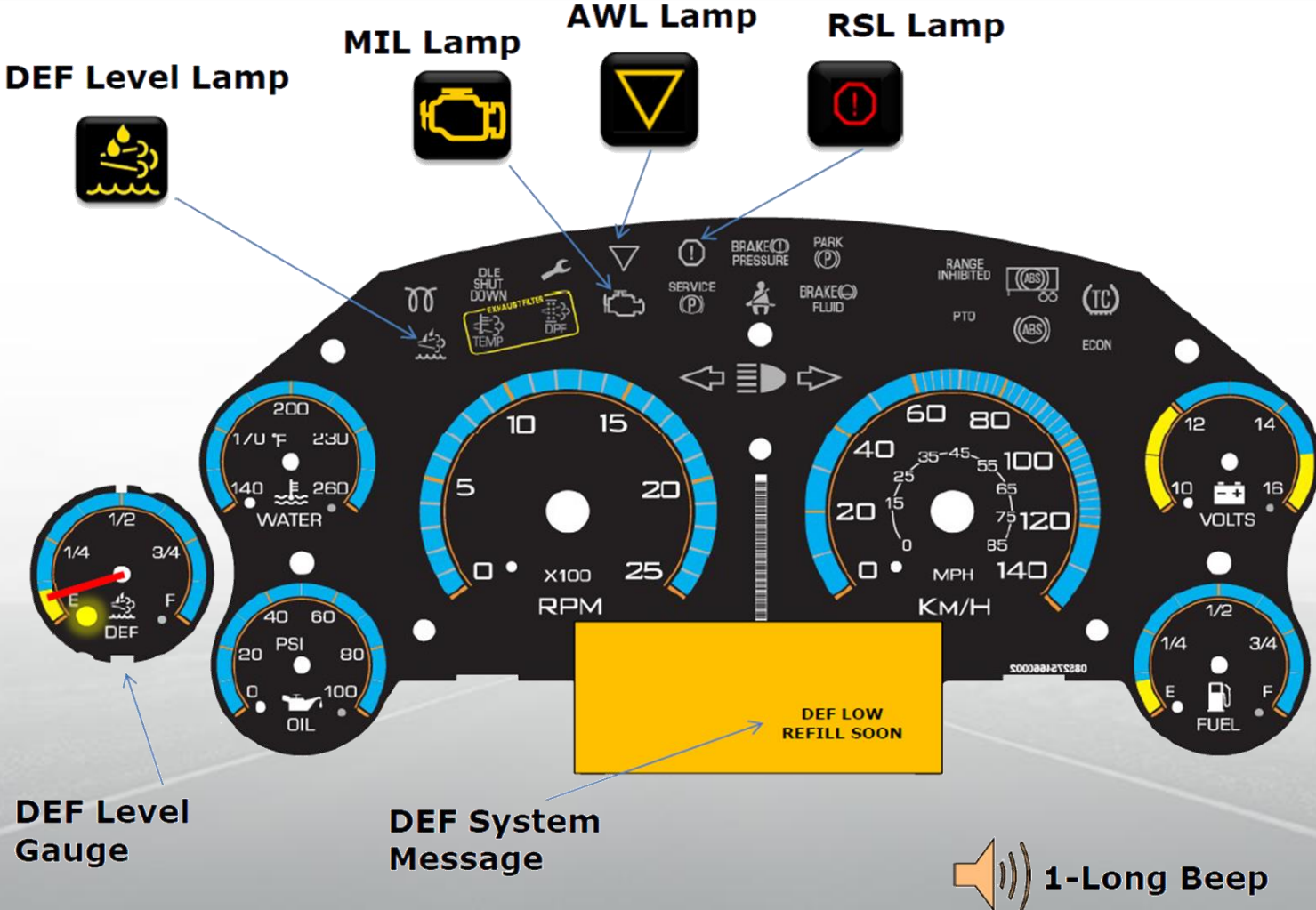


# DEF Storage & Delivery

- **Contains:**
  - **DEF Tank & Mounting Brackets**
    - DEF Tank Internal Pickup & Screen
  - **DEF Supply Module & Mounting Brackets**
  - **DEF Lines & Fittings**
  - **Coolant Lines & Fittings**
    - Coolant Flow Valve
  - **Harnesses & Power Distribution Module**



# DEF Lamp & Gauge - WorkStar



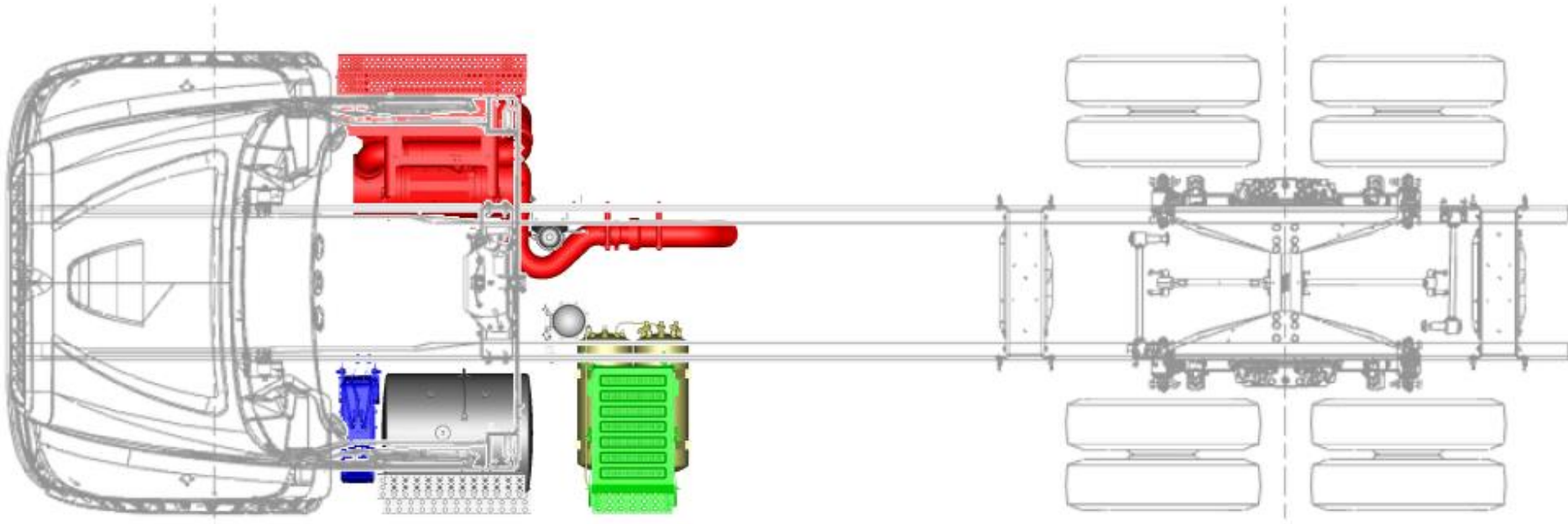
# WorkStar SCR Packaging

- **80% Configurations**
  - Fuel Tank Size & Location
  - Battery Box Location
  - Exhaust Type
  - DEF Tank Size & Location



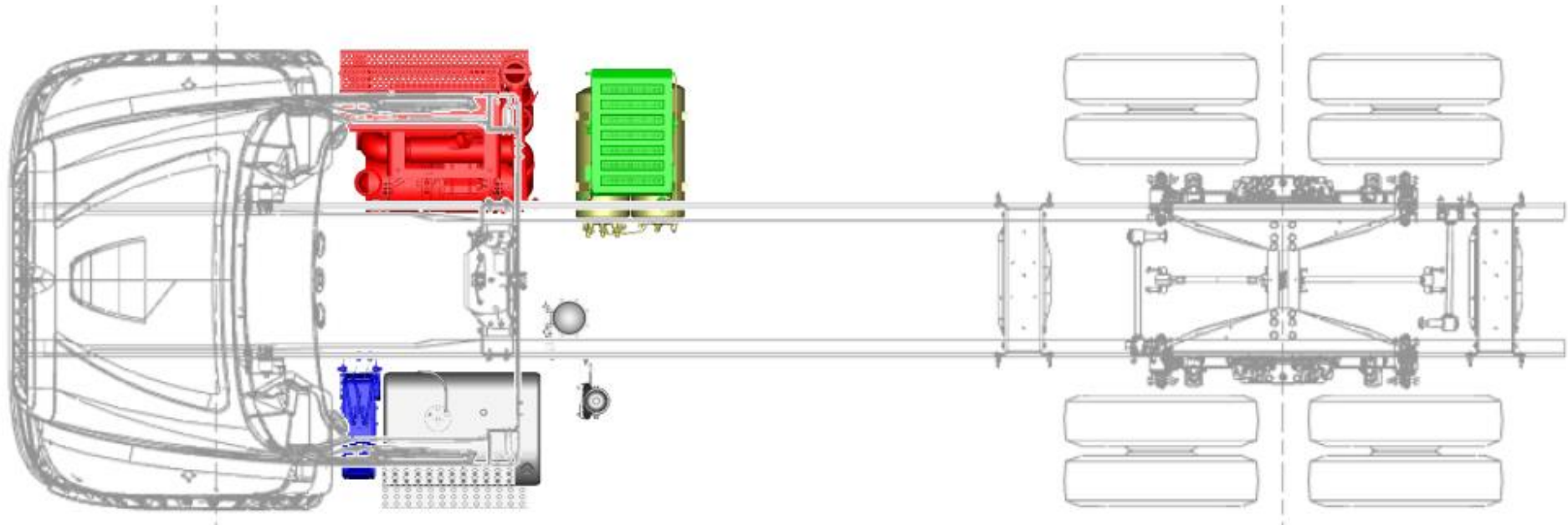
# WorkStar SCR Packaging

- **WorkStar – Switchback Horizontal Tail Pipe**



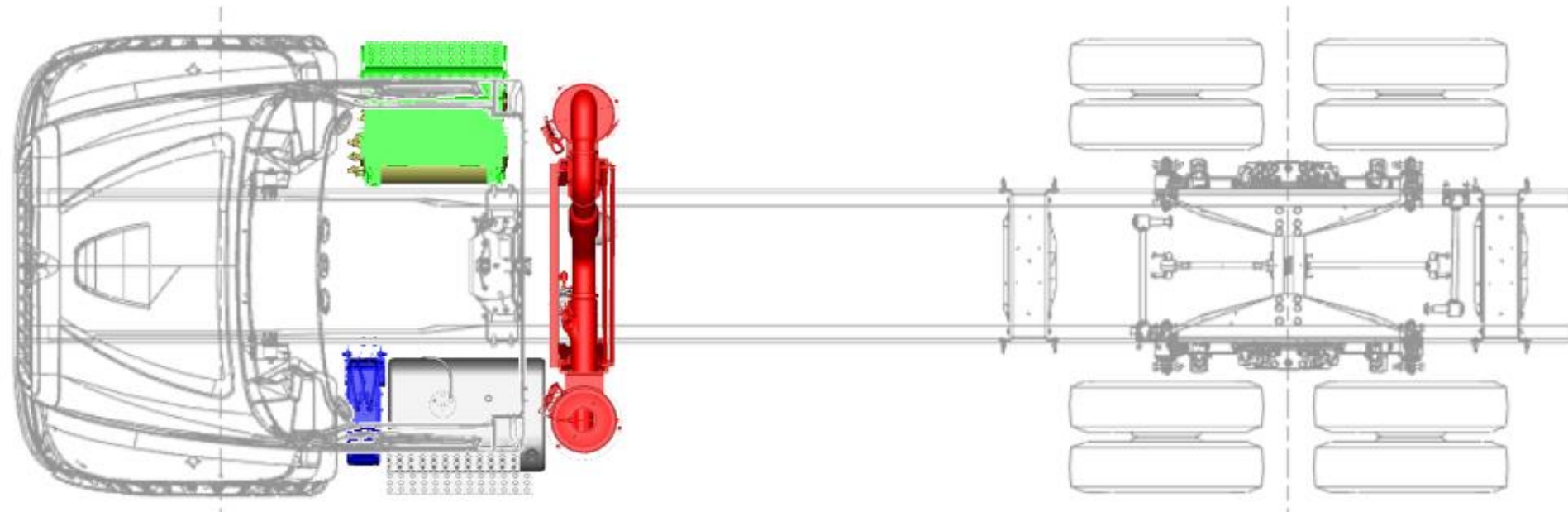
# WorkStar SCR Packaging

- **WorkStar– Switchback - Vertical Stack**



# WorkStar SCR Packaging

- **WorkStar– Vertical - Vertical (24” behind the cab)**





# Thank you



**Josh Lepage**

**Sr. Sales Specialist – Big Bore Engines**

