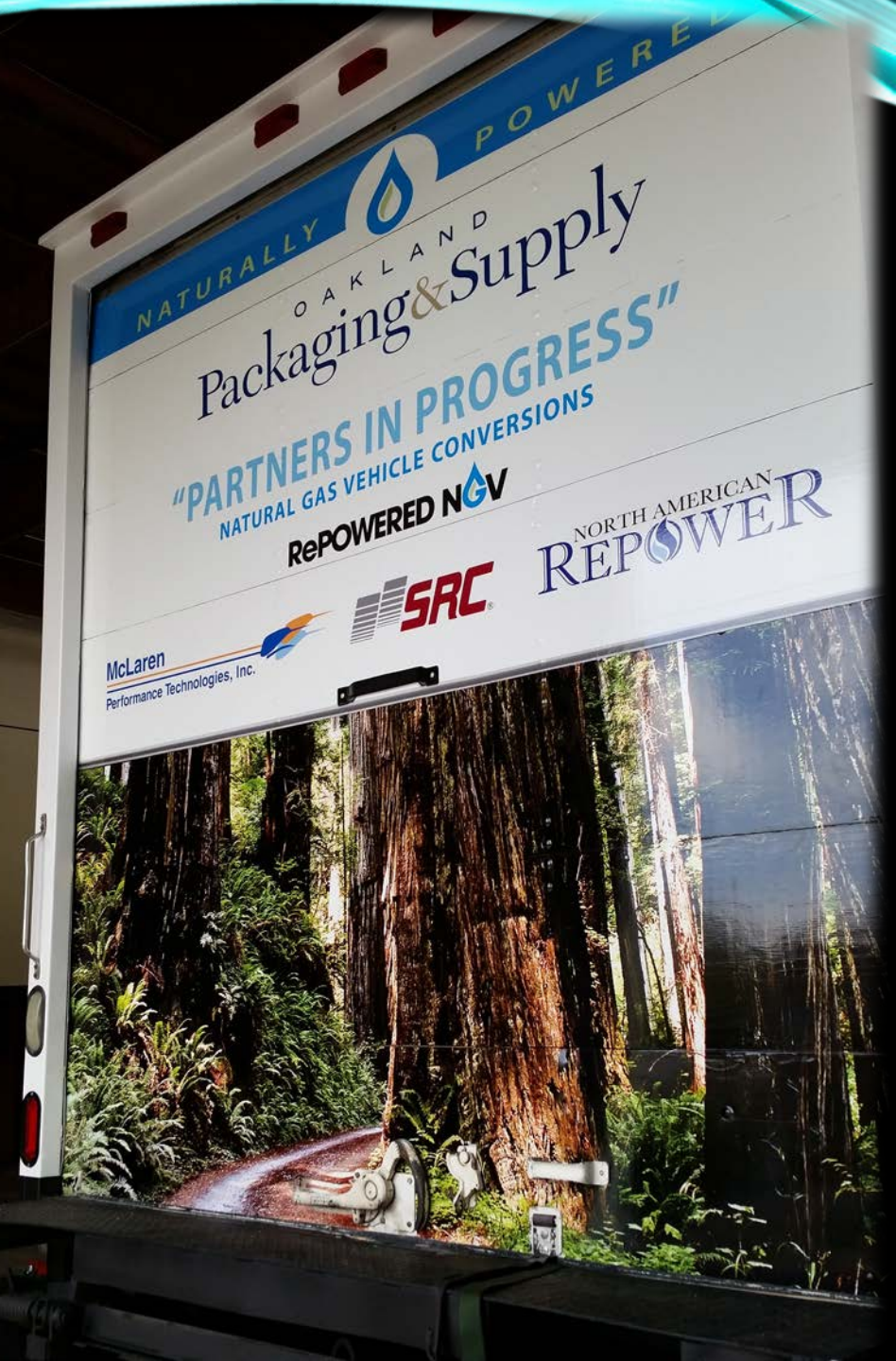




NORTH AMERICAN
REPOWER





NORTH AMERICAN
REPOWER

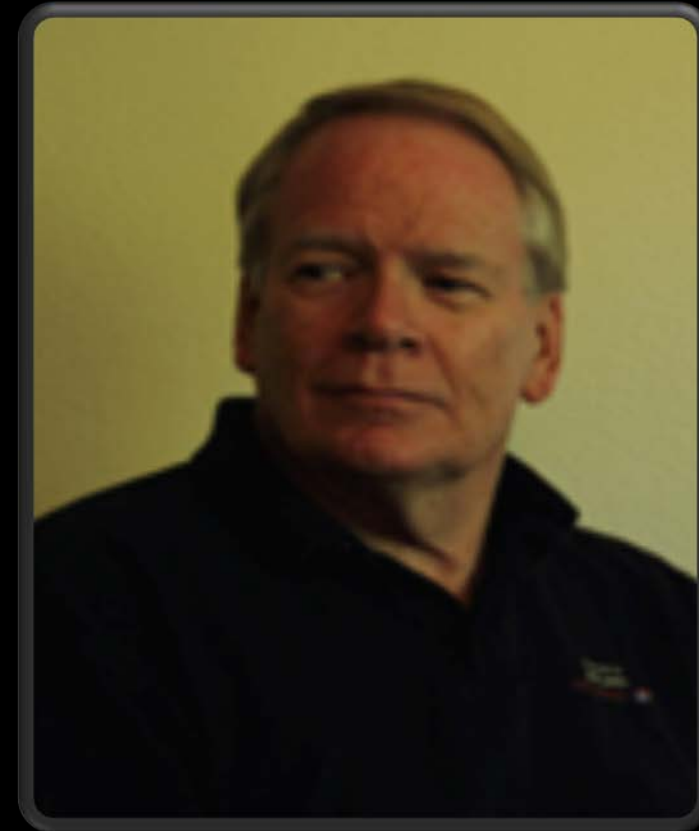




NORTH AMERICAN
REPOWER

Pete Petersen

Baytech, Sturman, IMPCO,
AFS, Clean Air Power, SwRI



NORTH AMERICAN
REPOWER

Wiley McCoy
Founder & CEO McLaren,
Linamar



NORTH AMERICAN
REPOWER

Tim Cyrus

Former Chief Global
Engineer for GM



NORTH AMERICAN
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John Knepp
Founder and CEO
Nissan Performance
Technologies, Electromotive



NORTH AMERICAN
REPOWER

Evan Williams
Founder and CEO
Cambrian Energy



NATURAL GAS HD ENGINES

Brief History and Current Developments

Don Fites, CEO Caterpillar 1990-1999

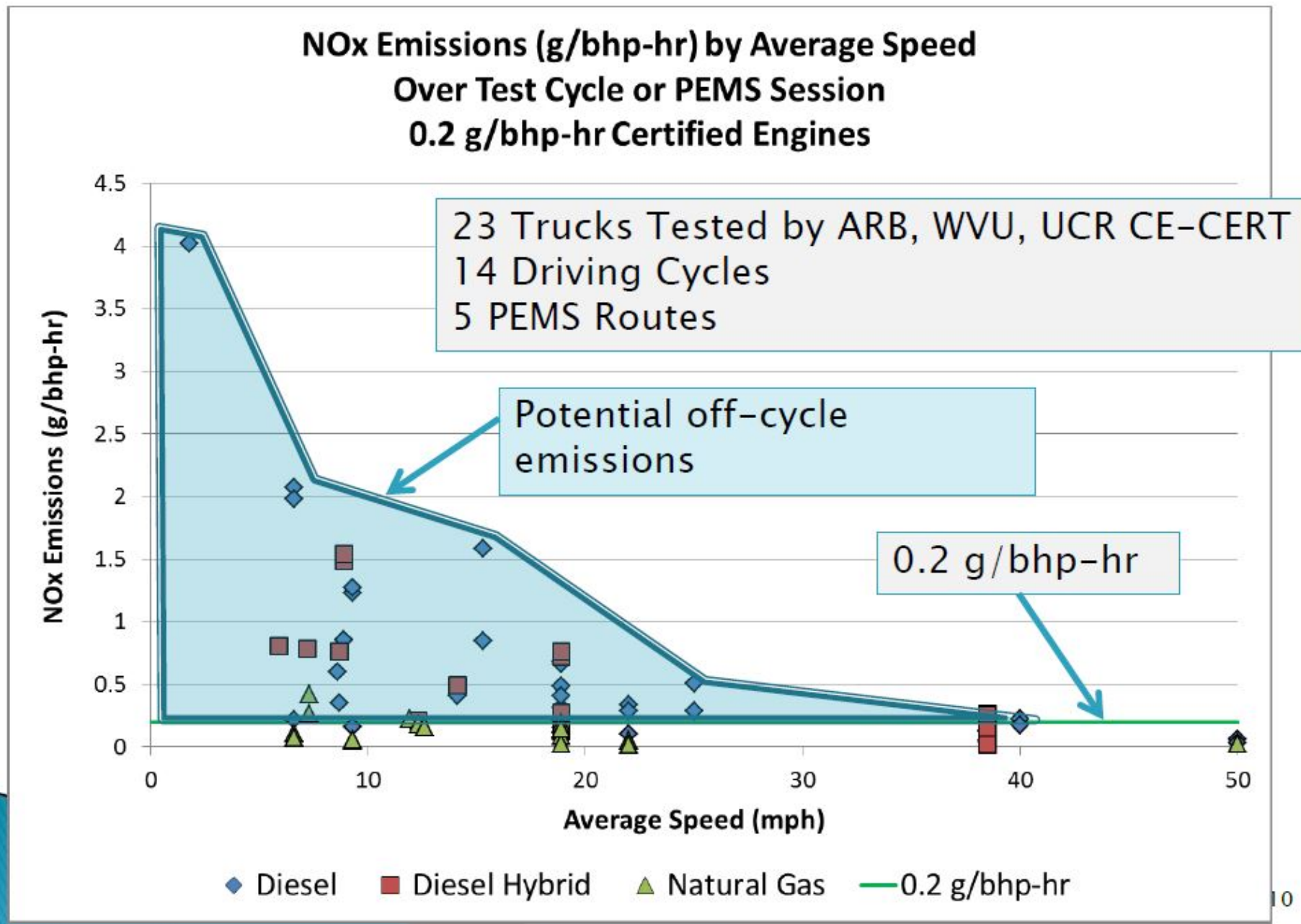
In 2001, when asked about the future of Natural Gas
Engines and Caterpillar

“CAT MAKES DIESELS-
END OF STORY”



Potential Excess NOx Emissions

- Pre-2004
- 2008-
- 2010-



ML
S
Ox

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-14-012;

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 ¹	STANDARDS & TEST PROCEDURE	INTENDED SERVICE CLASS ²	ECS & SPECIAL FEATURES ³	DIAGNOSTIC ⁶	
2016	GCEXH0540LBI	8.9	CNG/LNG	Diesel	UB	TBI, TC, CAC, ECM, EGR, TWC, HO2S	EMD+	
PRIMARY ENGINE'S IDLE EMISSIONS CONTROL		ADDITIONAL IDLE EMISSIONS CONTROL						
EXEMPT		N/A						
ENGINE (L)		ENGINE MODELS / CODES (rated power, in hp)						
8.9		ISL G 250 / 4836;FR95359 (258), ISL G 280 / 4836;FR95354 (280), ISL G 300 / 4836;FR95351 (300), ISL G 320 / 4836;FR95348 (320)						

Following are: 1) the FTP exhaust emission standards, or family emission limit(s) as applicable, under 13 CCR 1956.8; 2) the SET and NTE limits under the applicable California exhaust emission standards and test procedures for heavy-duty diesel engines and vehicles (Test Procedures); and 3) the corresponding certification levels, for this engine family. "Diesel" CO, SET and NTE certification compliance may have been demonstrated by the manufacturer as provided under the applicable Test Procedures in lieu of testing. (For flexible- and dual-fueled engines, the CERT values in brackets [] are those when tested on conventional test fuel. For multi-fueled engines, the STD and CERT values for default operation permitted in 13 CCR 1956.8 are in parentheses.)

in g/bhp-hr	NMHC		NOx		NMHC+NOx		CO		PM		HCHO	
	FTP	SET	FTP	SET	FTP	SET	FTP	SET	FTP	SET	FTP	SET
STD	0.14	0.14	0.02	0.02	*	*	15.5	15.5	0.01	0.01	*	*
CERT	0.01	0.000	0.01	0.004	*	*	1.5	0.3	0.001	0.000	*	*
NTE	0.21		0.03		19.4		0.02		*		*	

BE IT FURTHER RESOLVED: That the listed engine family is certified to the Optional Low NOx Emission Standards as specified in 13 CCR 1956.8(a)(2)(A) and section 11.B.7 of the incorporated "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy Duty Diesel-Engines and Vehicles" adopted Dec. 27, 2002, as last amended Oct. 21, 2014.

BE IT FURTHER RESOLVED: For the listed engine family, the manufacturer has demonstrated compliance with the Greenhouse Gas Emission Standards as specified in Title 13 CCR 1956.8 and part 1036 of the incorporated "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy Duty Diesel-Engines and Vehicles" (HDDE Test Procedures) adopted Dec. 27, 2002, as last amended Oct. 21, 2014.

EPA CERTIFICATE OF CONFORMITY				PRIMARY INTENDED SERVICE CLASS				
VOCATIONAL								
in g/bhp-hr	CO ₂		CH ₄	N ₂ O				
	FTP	SET						
STD	555	*	0.10	0.10				
FCL	476	*	*	*				
FEL	490	*	0.65	*				
CERT	465	*	0.56	0.02				

g/bhp-hr=grams per brake horsepower-hour; FTP=Federal Test Procedure; SET=Supplemental emissions testing; STD=standard or emission test cap; FEL=family emission limit; FCL=family certification level; CERT=certification level; CO₂=carbon dioxide; CH₄=methane; N₂O=nitrous oxide; VOCATIONAL=vocational engine; TRACTOR=tractor engine

BE IT FURTHER RESOLVED: That the listed engine family is certified to the Alternate Phase-in CO₂ Emission Standards as specified in 13 CCR 1956.8 and section 40 CFR 1036.150 (e) as incorporated in the "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy Duty Diesel-Engines and Vehicles" adopted Dec. 27, 2002, as last amended Oct. 21, 2014.

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 ¹	STANDARDS & TEST PROCEDURE	INTENDED SERVICE CLASS ²	ECS & SPECIAL FEATURES ³	DIAGNOSTIC ⁶	
2008	8CEXH0540LBC	8.8	CNG/LNG	Diesel	MHDD	TBI, TC, CAC, ECM, EGR, TWC, HO2S	EMD	
PRIMARY ENGINE'S IDLE EMISSIONS CONTROL		ADDITIONAL IDLE EMISSIONS CONTROL						
EXEMPT		N/A						
ENGINE (L)		ENGINE MODELS / CODES (rated power, in hp)						
8.8		ISL G 320 / 0887;FR92424 (320), ISL G 300 / 0887;FR92104 (300)						
8.8		ISL G 280 / 0887;FR92738 (280), ISL G 260 / 0887;FR92739 (260), ISL G 250 / 0887;FR92847 (250)						

Following are: 1) the FTP exhaust emission standards, or family emission limit(s) as applicable, under 13 CCR 1956.8; 2) the EURO and NTE limits under the applicable California exhaust emission standards and test procedures for heavy-duty diesel engines and vehicles (Test Procedures); and 3) the corresponding certification levels, for this engine family. "Diesel" CO, EURO and NTE certification compliance may have been demonstrated by the manufacturer as provided under the applicable Test Procedures in lieu of testing. (For flexible- and dual-fueled engines, the CERT values in brackets [] are those when tested on conventional test fuel. For multi-fueled engines, the STD and CERT values for default operation permitted in 13 CCR 1956.8 are in parentheses.)

in g/bhp-hr	NMHC		NOx		NMHC+NOx		CO		PM		HCHO	
	FTP	EURO	FTP	EURO	FTP	EURO	FTP	EURO	FTP	EURO	FTP	EURO
STD	0.14	0.14	0.20	0.20	*	*	15.5	15.5	0.01	0.01	*	*
FEL	*	*	*	*	*	*	*	*	*	*	*	*
CERT	0.13	0.04	0.10	0.01	*	*	1.2	0.4	0.009	0.000	*	*
NTE	0.21		0.30		19.4		0.02		*		*	

g/bhp-hr=grams per brake horsepower-hour; FTP=Federal Test Procedure; EURO=Euro III European Steady-State Cycle, including RDE; SET=supplemental emissions testing; NTE=Not-to-Exceed; STD=standard or emission test cap; FEL=family emission limit; CERT=certification level; NMHC/HC=non-methane hydrocarbon; NOx=oxides of nitrogen; CO=carbon monoxide; PM=particulate matter; HCHO=formaldehyde. (Rev.: 2007-02-26)

BE IT FURTHER RESOLVED: Certification to the FEL(s) listed above, as applicable, is subject to the following terms, limitations and conditions. The FEL(s) is the emission level declared by the manufacturer and serves in lieu of an emission standard for certification purposes in any averaging, banking, or trading (ABT) programs. It will be used for determining compliance of any engine in this family and compliance with such ABT programs.

BE IT FURTHER RESOLVED: For the listed engine models the manufacturer has submitted the materials to demonstrate certification compliance with 13 CCR 1965 (emission control labels) and 13 CCR 2035 et seq. (emission control warranty).

Engines certified under this Executive Order must conform to all applicable California emission regulations.

The Bureau of Automotive Repair will be notified by copy of this Executive Order.

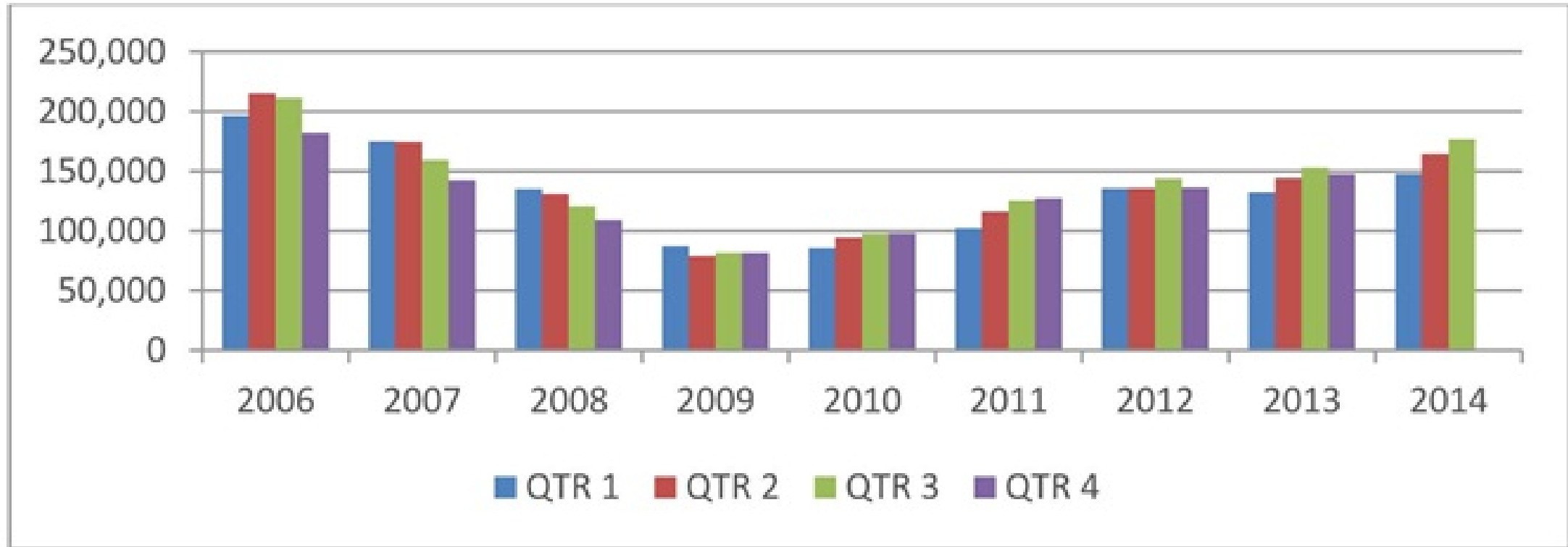
This Executive Order hereby supersedes Executive Order A-021-0456 dated August 23, 2007.

Executed at El Monte, California on this 10th day of October 2008.

Annette Hebert, Chief
Mobile Source Operations Division

AL
ES

New Commercial Registrations (GVW 3-8) quarterly units by calendar year



Source: IHS Automotive, Polk 2006-2014 new registration data

CA.GOV California Environmental Protection Agency
Air Resources Board
 Home Reducing Air Pollution Air Quality Business Assistance Laws & Regulations Health

Tuesday, December 1, 2015

In-Use Off-Road Diesel Vehicle Regulation
 This page last revised November 9, 2015

Knowledge Center Exhaust

Website: <http://www.arb.ca.gov/msprog/usedoffroadtruck/usedoffroadtruck.htm>

Difficulty: **Hard**

California Domiciled Only?: No

Applies to:

- Trucks 20k+ GVWR used for transporting cargo, such as containers, bulk, or break-bulk goods, that operates on or through port or intermodal rail yard property or;
- Off port or intermodal rail yard property transporting cargo or empty containers or chassis that originated from or is destined to a port or intermodal rail yard property (aka "Dry Off") *Current ARB interpretation includes yard trucks to be intermodal property**

Exemptions:

- Trucks less than 20k+ GVWR
- Unit-body type trucks not used for transporting cargo containers. [CLICK HERE TO VIEW EXEMPTIONS](#)

Notes:

- The [Ports of Los Angeles and Long Beach have additional exemptions](#).
- "Ports" are defined as any facility which receives waterborne cargo. As a result, many private facilities have been designated as "ports" for the purpose of this rule.
- "VDECS" = Verified Diesel Emission Control System. VDECS can be other type of treatments as well, but typically are filters of some kind.

Resources

- [Find a level 1 VDECS](#)
- [Find a verified VDECS installer](#)
- [Subscribe to the Prop 1B funding email list for the latest news](#)
- [Report Dry-Off by Email](#)

On July 26 (PM) and of California language about buttons about

What's New

Posted November 2015

Posted December 2015

Posted August 2015

PROGRAM LINKS

- Archived Documents
- Background
- Current Regulation
- Diesel Exhaust Retrofits
- DOORS Public Information
- EIN Label Vendors
- Emails Sent to Fleets
- Fact Sheets, FAQs, Advisories
- Fleet Average Calculators
- Low Population Counties
- ORIG
- Related Links
- Reporting Forms and Tools
- Rulemaking Documents
- Original Regulation
- Jan 2009 Amendments
- July 2009 Amendments
- Dec 2010 Amendments
- Water-Well Drilling Rig Guidance
- What's New Archive
- Workshops / Meetings

RESOURCES

- Contact Us
- Join the Ordesel Email list

Website: <http://www.arb.ca.gov/msprog/anddiesel/anddiesel.htm>

Difficulty: **Hardest**

California Domiciled Only?: No

Applies to:

- Trucks 14k+ GVWR, includes diesel-fuel, dual-fuel, or alternative diesel-fuel that are registered to be driven on public highways, were originally designed to be driven on public highways whether or not they are registered.
- Also includes yard trucks with on-road engines or yard trucks with off-road engines used for agricultural operations, both engines of two-engine sweepers

Exemptions

- Trucks operated less than 1,000 miles and 100hrs annually. These trucks must meet reporting and recordkeeping requirements.
- Trucks subject to Drayage Rule until 1/1/2023
- Generally, equipment subject to other rules (public utility, cargo handling, refuse, etc.)

What is the Statewide Truck and Bus Rule?

The Statewide Truck and Bus Rule is a multi-billion dollar rule which affects all owners/operators of commercial diesel vehicles over 14,000lbs.

All fleets operating in or through California should immediately begin planning for this rule as major deadlines began 1/1/2012. The average lead time for obtaining the retrofits required to comply can take several months.

On the following pages we'll discuss compliance options and the practical steps your fleet should take to cope with this rule.

Resources

- [Find a level 3 VDECS](#)
- [Find a certified VDECS installer](#)
- [Subscribe to the Prop 1B funding email list for the latest news](#)
- [Carl Meyer Program Contact List](#)
- [ARB's Fleet Compliance Calculator \(updated 2/2012\)](#)
- [Report to ARB \(initial deadline passed, must report mileage for law use provisions annually\)](#)
- [Truck and Bus Rule Email List](#)

Website: <http://www.arb.ca.gov/vehd/psip/psip.htm>

Difficulty: **Easy**

California Domiciled Only?: No

Applies to:

- Diesel Fuelled Commercial Vehicles (HDVP/GVWR)

Exemptions:

- You are stuck in traffic
- When idling is necessary for loading or unloading your vehicle
- You are operating a power take-off device
- You cannot move because of adverse weather conditions or mechanical failure
- You are queuing (must be beyond 100 feet from any residential area)
- Your truck's engine meets the optional 10hr idling emission standard and your truck is located beyond 100 feet from any residential area.

What is the Five Minute Idling Program?

One of CARB's simplest programs, the Heavy-Duty Vehicle Idling Emission Reduction Program simply restricts idle times to five minutes, one of 47 state or local ordinances to do so. The American Transportation Research Institute (ATRI) publishes a handy guide to idling restrictions.

Still, despite this program's relative simplicity, most weather conditions must equip with Auxiliary Power Units which conform to CARB clean idle standards. Specifically, the regulation requires diesel APUs installed on trucks with 2007 and newer engines to control particulate matter (PM) emissions by either routing the APU exhaust through the PM trap of the truck engine or by retrofitting the diesel APU with a verified level 3

erding through extreme weather conditions must reduce PM emissions by at least 85 percent.

PM control device that reduces PM emissions by at least 85 percent.

Resources

- [List of idle reduction technologies](#)
- [Idle Regulations Fact Sheet](#)

Website: <http://www.arb.ca.gov/vehd/psip/psip.htm>

Difficulty: **Easy**

California Domiciled Only?: No

Applies to:

- Diesel Fuelled Commercial Vehicles (HDVP/GVWR)

Exemptions:

- You are stuck in traffic
- When idling is necessary for loading or unloading your vehicle
- You are operating a power take-off device
- You cannot move because of adverse weather conditions or mechanical failure
- You are queuing (must be beyond 100 feet from any residential area)
- Your truck's engine meets the optional 10hr idling emission standard and your truck is located beyond 100 feet from any residential area.

What is the Heavy-Duty Vehicle Idling Emission Reduction Program (5-Minute Idling)?

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erding through extreme weather conditions must reduce PM emissions by at least 85 percent.

PM control device that reduces PM emissions by at least 85 percent.

Resources

- [List of idle reduction technologies](#)
- [Idle Regulations Fact Sheet](#)



Tuesday, December 1, 2015

UP LINKS

- [Reducing Air Pollution - ARB Programs](#)
 - [Mobile Sources](#)
 - [Manufacturers](#)
 - [On-Road New Vehicle and Engine Certifications](#)
 - [Alternative Fuel Conversion Certification](#)

PROGRAM LINKS

- [Alternative Fuel Conversion Requirements Background](#)
- [Light-Duty Emissions Certification Requirements](#)

Alternative Fuel Conversion Certification Procedures for New and In-Use On-Road Vehicles and Engines

This page last reviewed February 21, 2013

Background

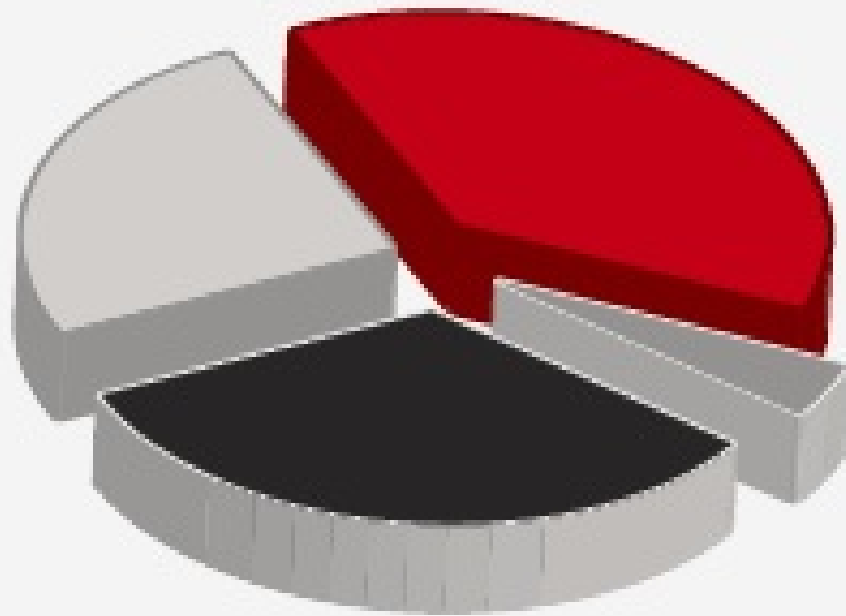
California regulations prohibit the conversion of emission-controlled vehicles to operate on an alternative fuel, such as natural gas or propane, unless the conversion has been evaluated and certified by the Air Resources Board (ARB). If the conversion is done before the legal title has been transferred to an ultimate purchaser the conversion manufacturer is considered the Original Equipment Manufacturer (OEM) and must comply with ARB's new vehicle or engine certification requirements. Conversions done after the legal title has been transferred are considered in-use conversions and must comply with ARB's alternative fuel retrofit system certification procedures. For an overview of these requirements please view the presentation materials and guidance documents from our August 14, 2012 public workshop located [here](#).

This page provides a list of the most common ARB new and in-use on-road vehicle and engine emission-related regulations and test procedures that manufacturers are required to follow to obtain an alternative fuel conversion certification. Manufacturers are strongly encouraged to contact the appropriate certification section prior to submitting an application to schedule a pre-certification meeting to assist them in determining the requirements specific to their application.

Trucks operating in California by model year

2007-09
25%

2010 and newer
33%

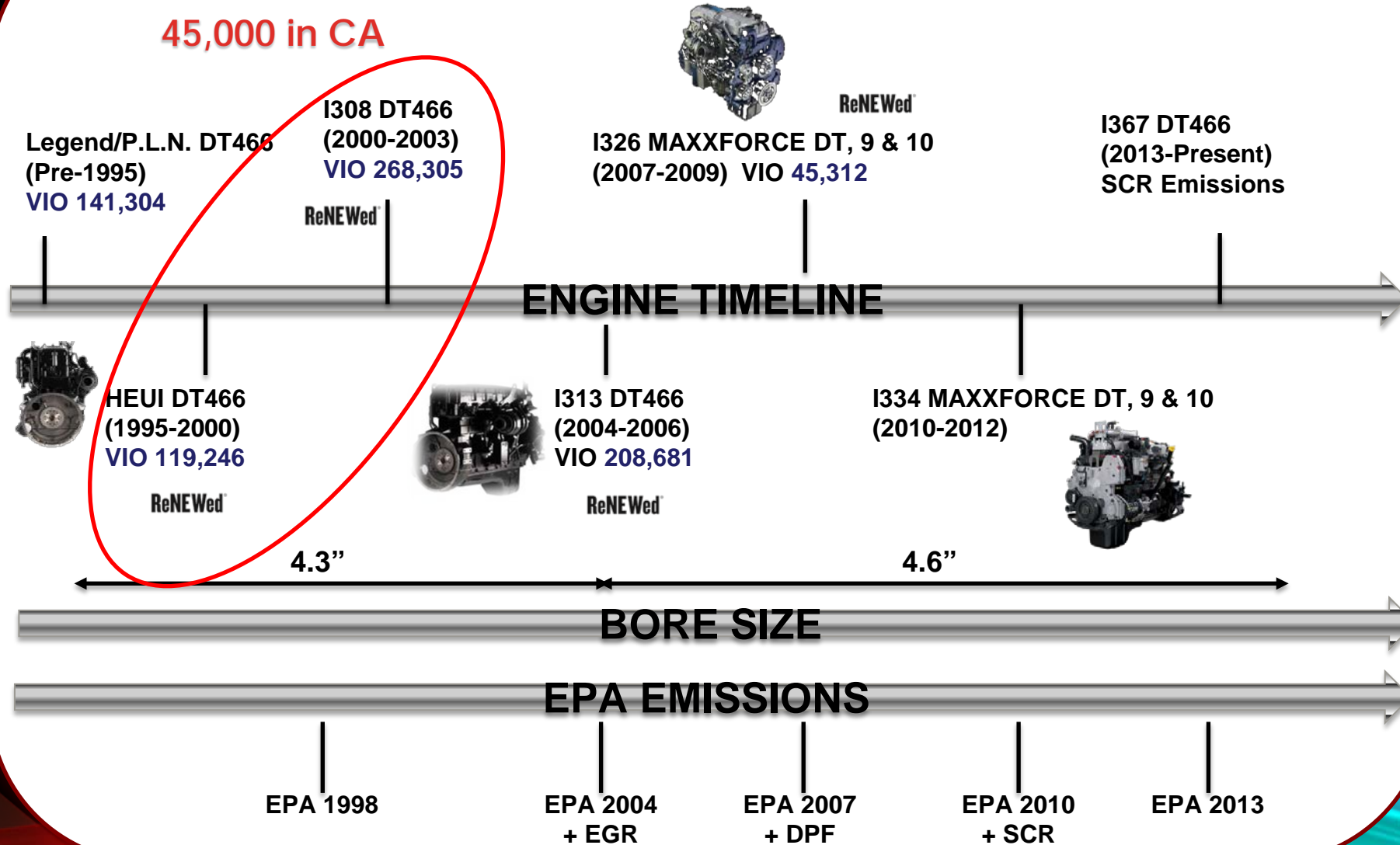


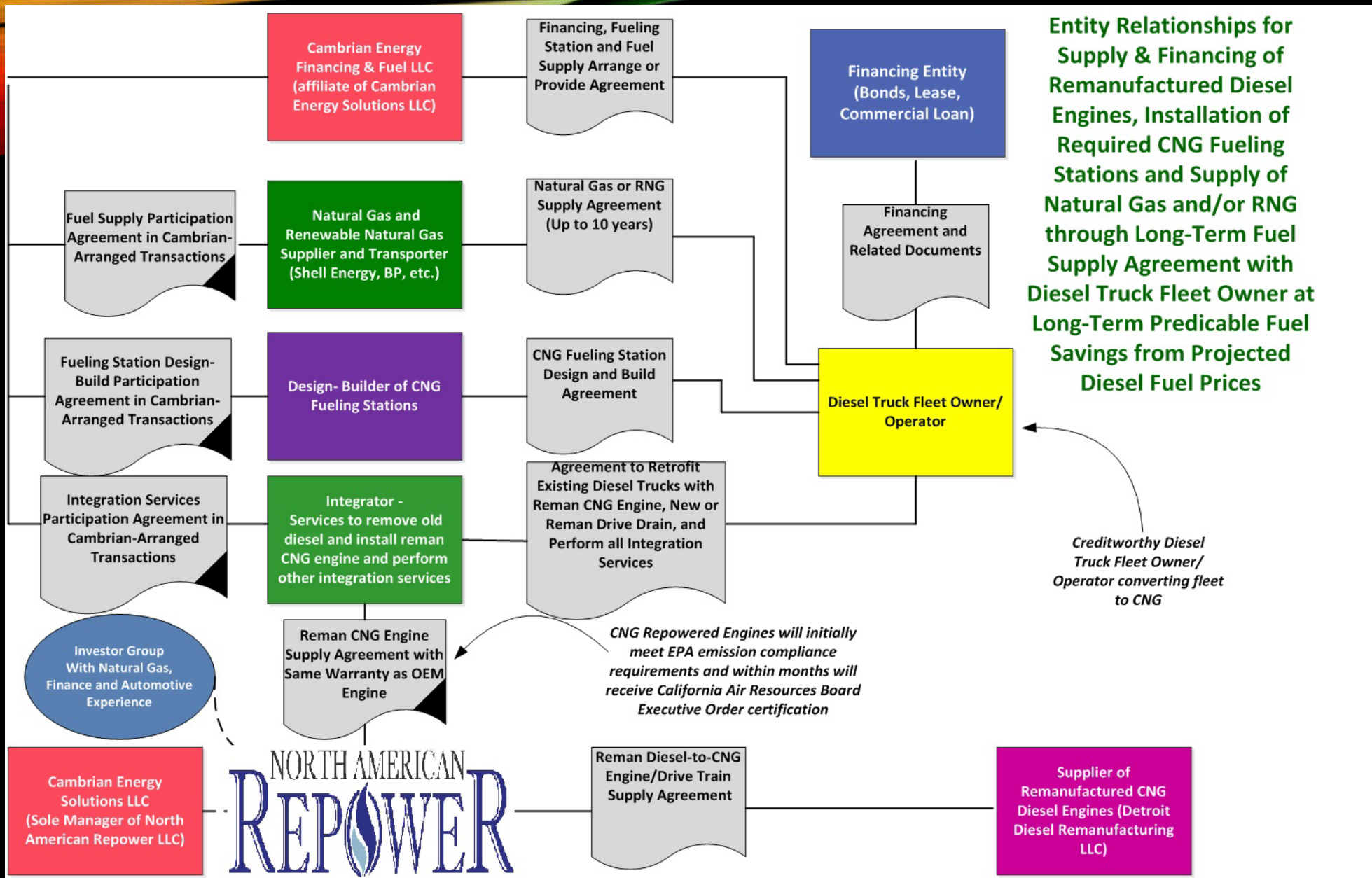
1996-06
38%

1995 and older
4%

Product Timeline

45,000 in CA







[Dashboard](#)
[Fleet](#)
[Reports](#)
[Trips](#)
[Fuel](#)
[Expenses](#)
[State Mileage](#)
[Vehicles](#)
[Locations](#)
[More](#)

Driver:

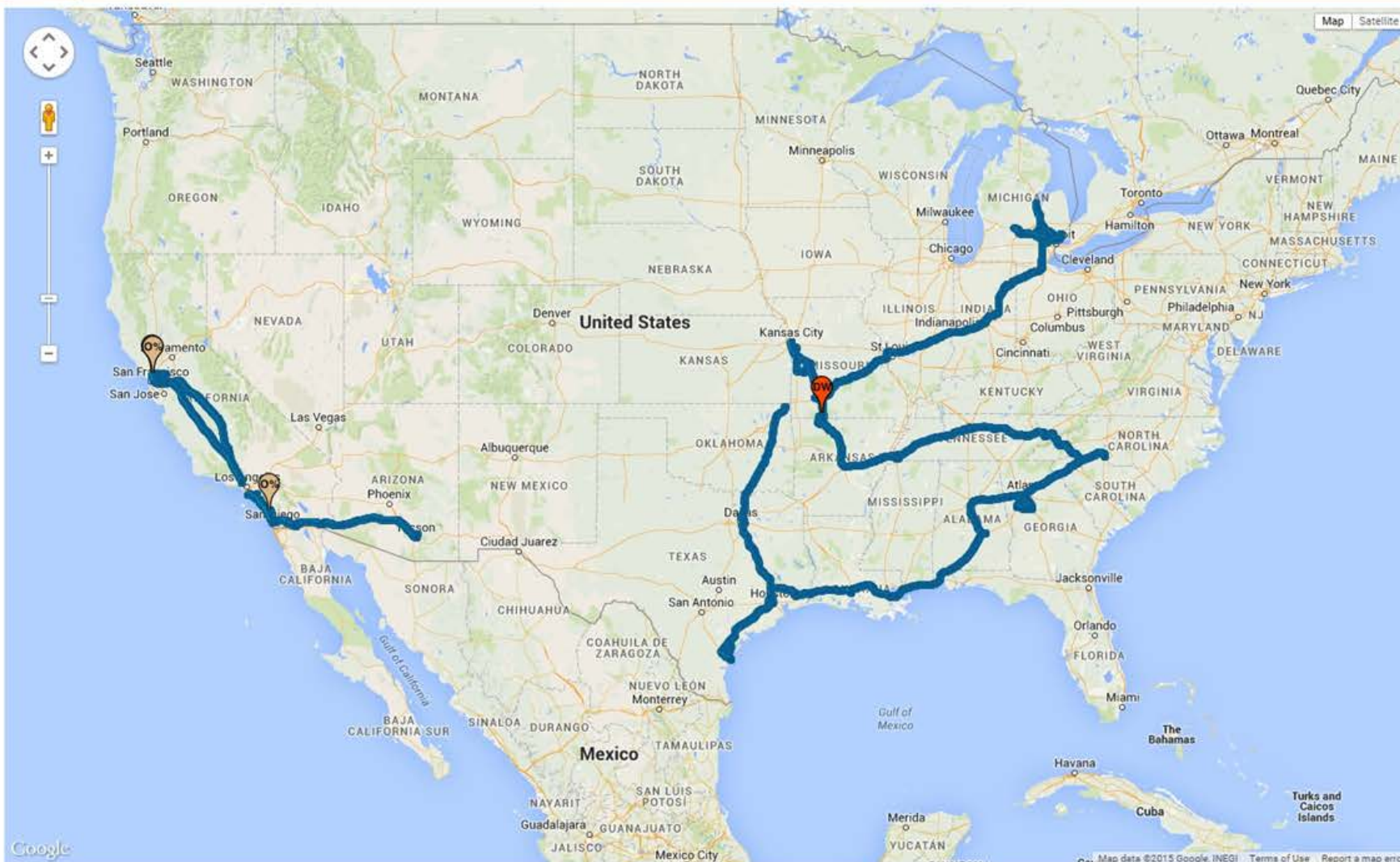
Time:

Trips:

Refresh: every 2 minutes

Click the headers to sort

Driver	Vehicle	Last Recorded
Duanne Whitfield	2000 International 4000 Series 4700 BB15737 MI 1HTSCAAP3YH251841	1:30 PM (00:59 ago)
Keith Sage	2000 International 4000 Series 4700 1HTSCAAP3YH251841	3:47 PM (3213:42 ago)
OP24 #24	2004 Navistar Box truck (Truck) CA	2:29 PM (00:00 ago)
OP24 #24	2004 Navistar 4300 24 ft Box truck (Truck) 7e46221 CA 1HTMMAAL94H658656	8:21 AM (174:08 ago)
OP24 #24	1998 Navistar 4700 (Truck) ert 123 ca	1:20 PM (9744:09 ago)
OP25 #25	2004 Navistar 4300 24ft Box truck (Truck) 7E46221 CA 1HTMMAAL94H658656	7:23 PM (2514:07 ago)



DR. JOHN REED

jreed@NorthAmericanRepower.com

