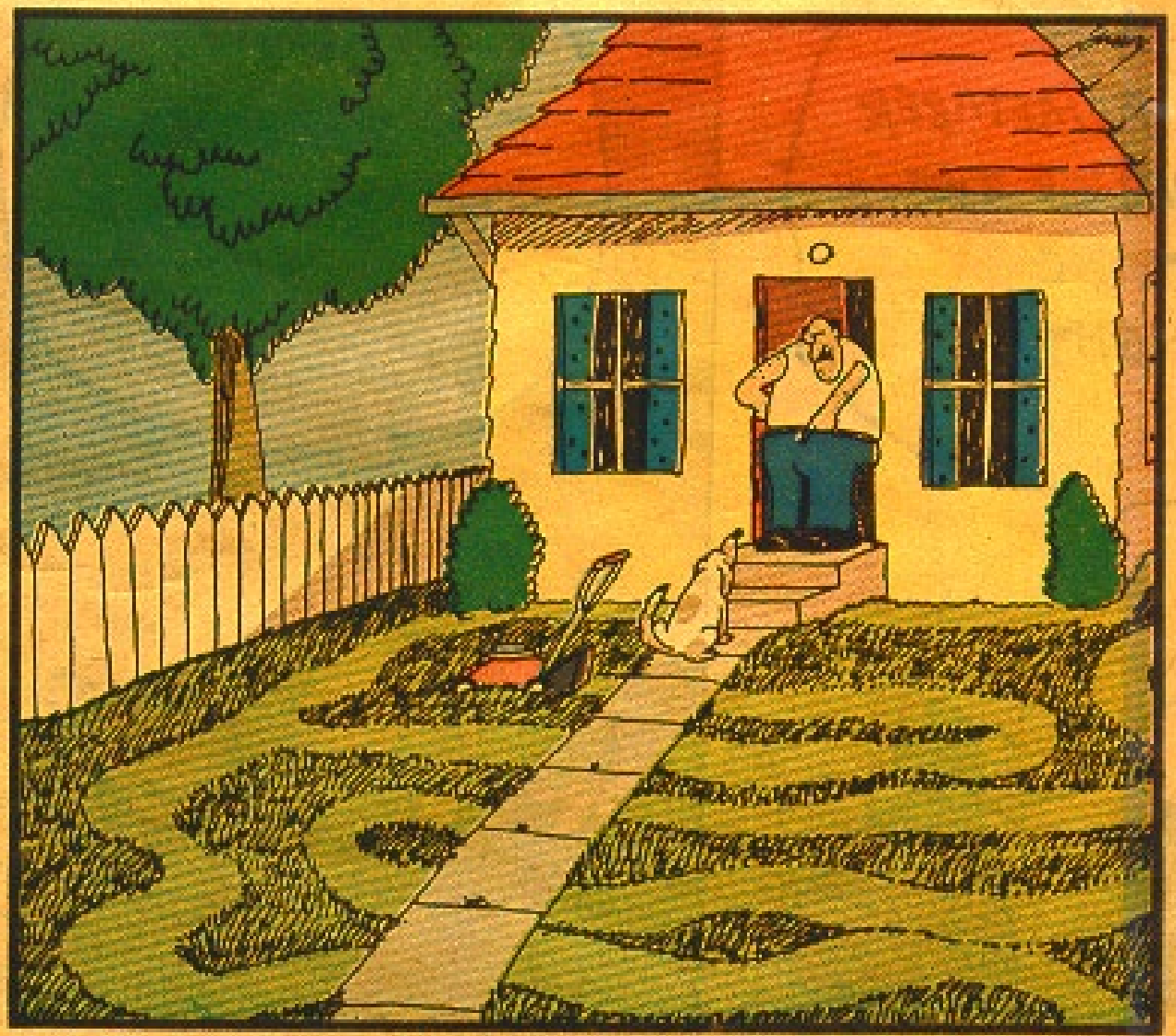
THE FAR SIDE



"You call that mowin' the lawn? . . . Bad dog! . . . No biscuit! . . . Bad dog!"

EPA's Locomotive Emissions Rule

(and a bit about fuel)

Abby Swaine
U.S. EPA New England
Diesel Initiative, SmartWay Transport & Freight Efficiency
New England Railroad Club
March 25, 2014

- *"Control of Emissions of Air Pollution from Locomotive Engines and Marine Compression-Ignition Engines Less Than 30 Liters per Cylinder"*
- *"Control the Emissions of Air Pollution from Nonroad Diesel Engines and Fuel"*
  - What do the rules require and why?
  - To whom and to what equipment do they apply?
  - How is EPA insuring compliance?

TOPICS

- Context
- Locomotive rule requirements: Overview
- Locomotive standards and certification: Detail
- Illustrations
- Fuel requirements
- Locomotive rule: Compliance & Enforcement
- Q&A, Discussion

CONTEXT

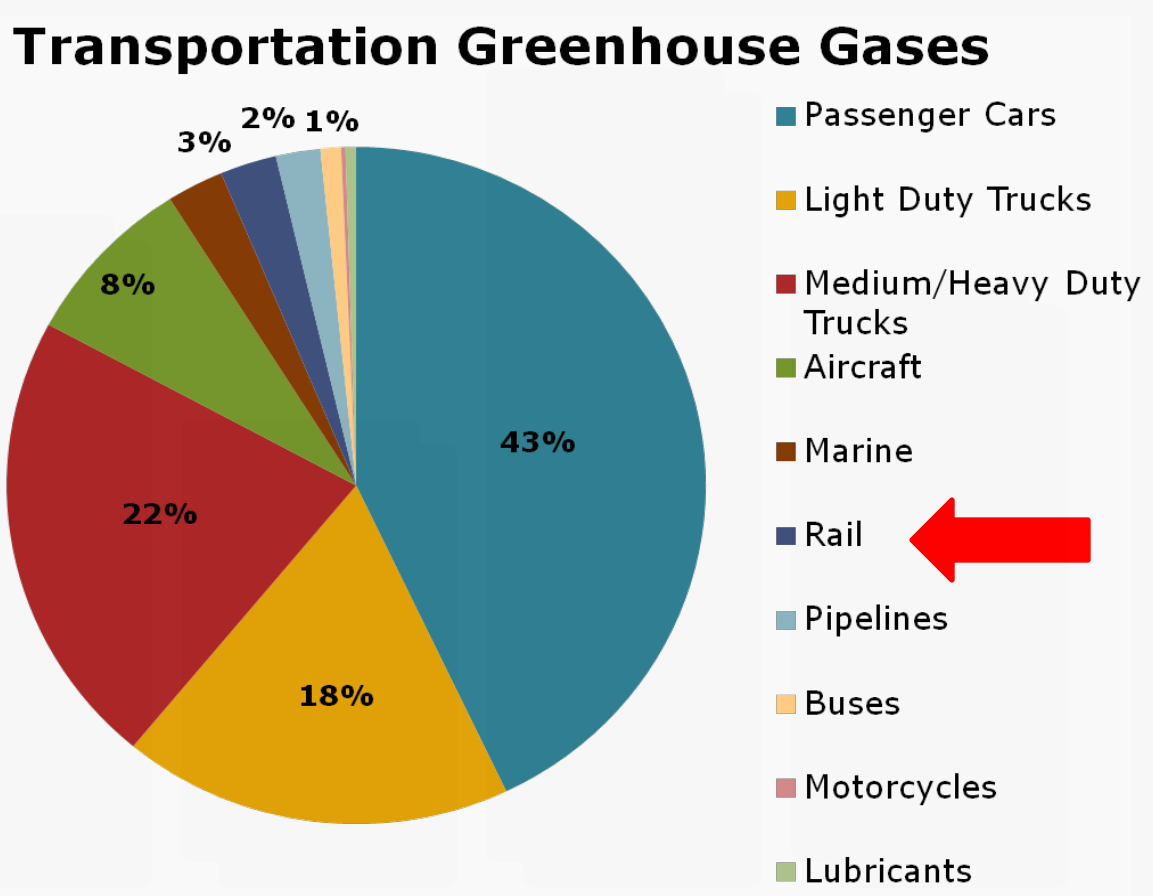
Freight Sector Greenhouse Gas Emissions

Transportation in U.S.:

- Over 1/4 of total GHG emissions;
- About 2/3 of petroleum-based fuel use.

Within Transport Sector:

- Freight accounts for over 25% of all fuel consumed and GHGs emitted.
- Freight is fastest growing source of transport GHGs.



2011 Data - Inventory of U.S. Greenhouse Gas Emissions and Sinks (EPA 2013)

WE'RE STILL CONTRIBUTING TO THE PROBLEM

CARBON POLLUTION IS THE BIGGEST DRIVER OF CLIMATE CHANGE

U.S. GREENHOUSE GAS POLLUTION INCLUDES:

CARBON DIOXIDE (CO2) — 84%

Enters the atmosphere through burning fossil fuels (coal, natural gas, and oil), solid waste, trees and wood products, and also as a result of certain chemical reactions (e.g., manufacture of cement).

FLUORINATED GASES — 2%

Hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride are synthetic, powerful greenhouse gases that are emitted from a variety of industrial processes.

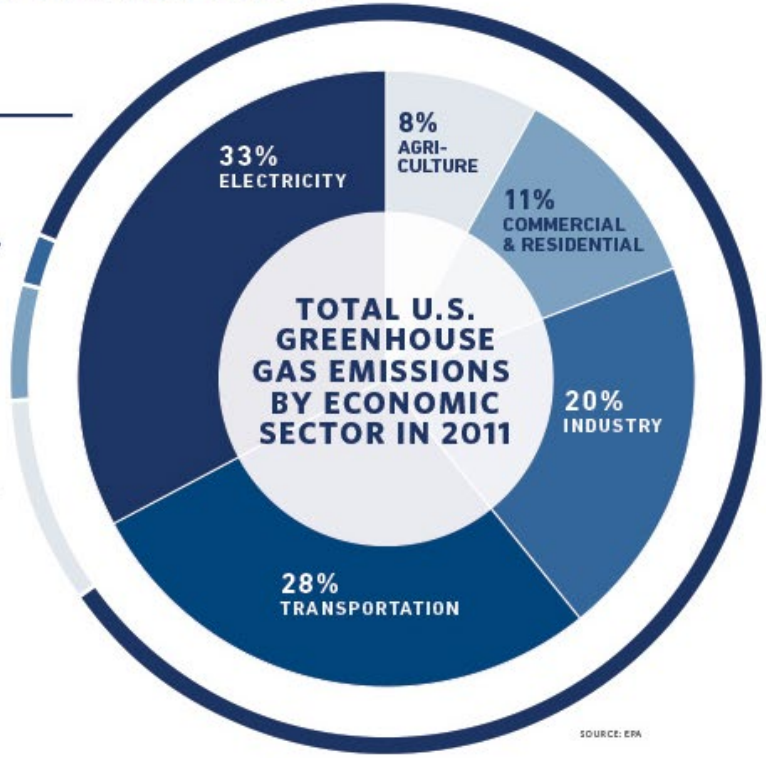
NITROUS OXIDE (N2O) — 5%

Emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste.

METHANE (CH4) — 9%

Emitted during the production and transport of coal, natural gas, and oil as well as from landfills.

SOURCE: EPA



SOURCE: EPA

WE'VE MADE PROGRESS THANKS TO:

STRONGER FUEL ECONOMY STANDARDS

We set the highest fuel economy standards in American history that will double the efficiency of our cars and trucks by 2025.

DOUBLED RENEWABLE ENERGY

We doubled renewable energy generation from from wind and solar resources.

DECREASED CARBON POLLUTION

In 2012, U.S. Energy Sector carbon pollution fell to the lowest level in nearly 20 years.

BUT WE HAVE MORE WORK TO DO.

National Clean Diesel Campaign
Office of Transportation & Air Quality

Tier 2 Light-Duty

final rule 1999

fully phased in 2009*

Diesels held to same standards as gasoline vehicles

Heavy-Duty Highway

sales 800,000 / yr

final rule 2000

fully phased in 2010*

Locomotive/Marine

sales 40,000 marine engines & 1,000 locomotives / yr

final rule 2008

fully phased in 2017

New in 2012: Coastal Emission Control Areas

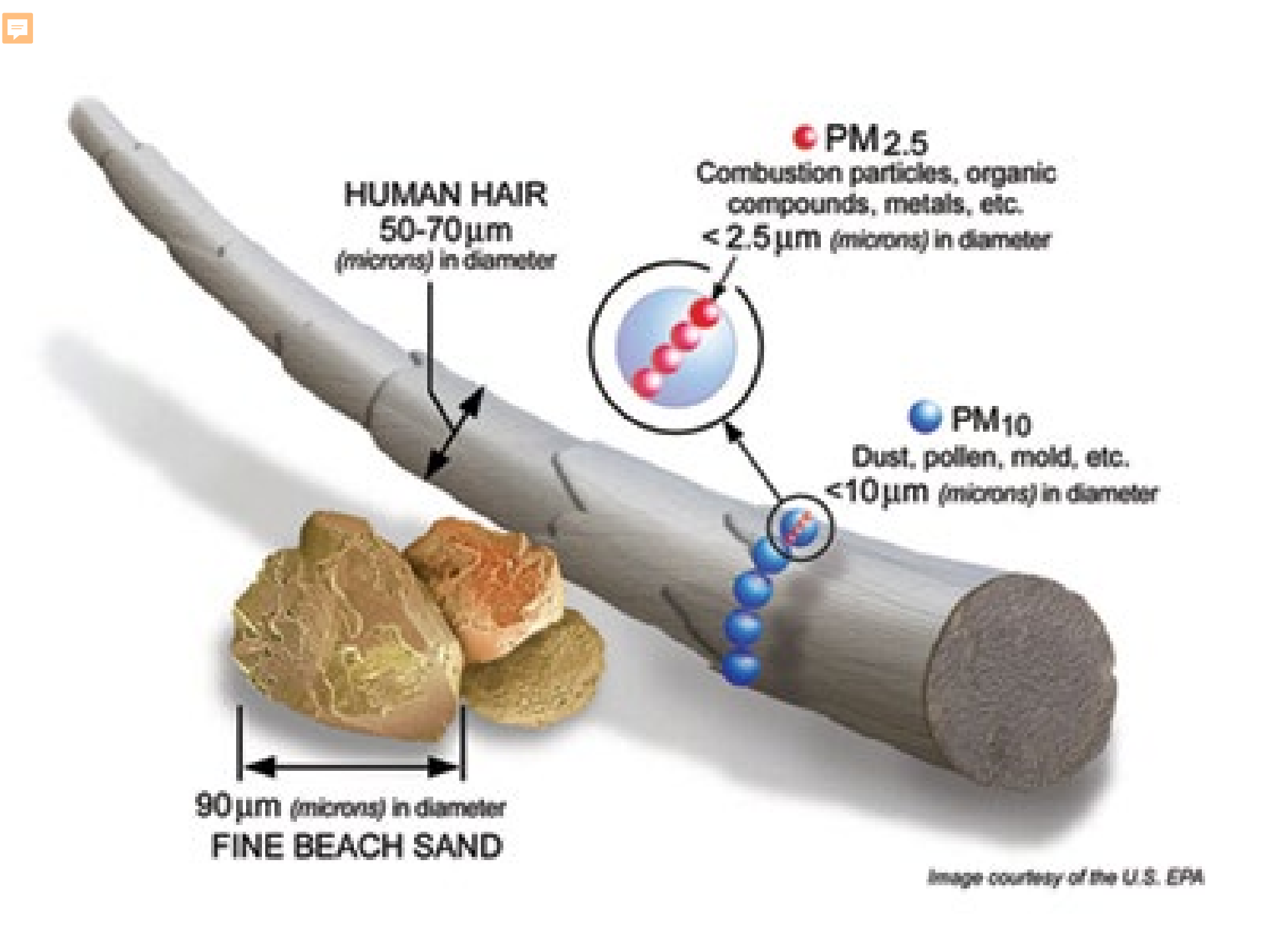
Nonroad Diesel

sales over 650,000 / yr

final rule 2004

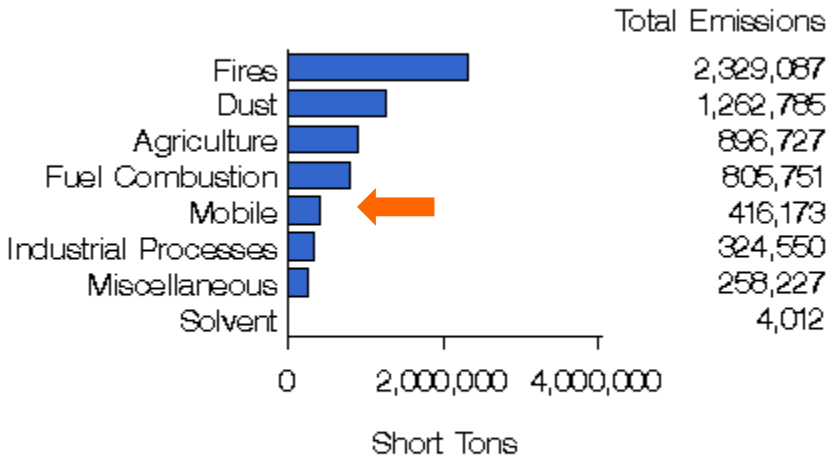
fully phased in 2015

*Not counting new GHG & FE standards.


PM2.5
Combustion particles, organic compounds, metals, etc.
< 2.5 µm (microns) in diameter
HUMAN HAIR
50-70 µm
(microns) in diameter
PM10
Dust, pollen, mold, etc.
<10 µm (microns) in diameter
90 µm (microns) in diameter
FINE BEACH SAND
Image courtesy of the U.S. EPA

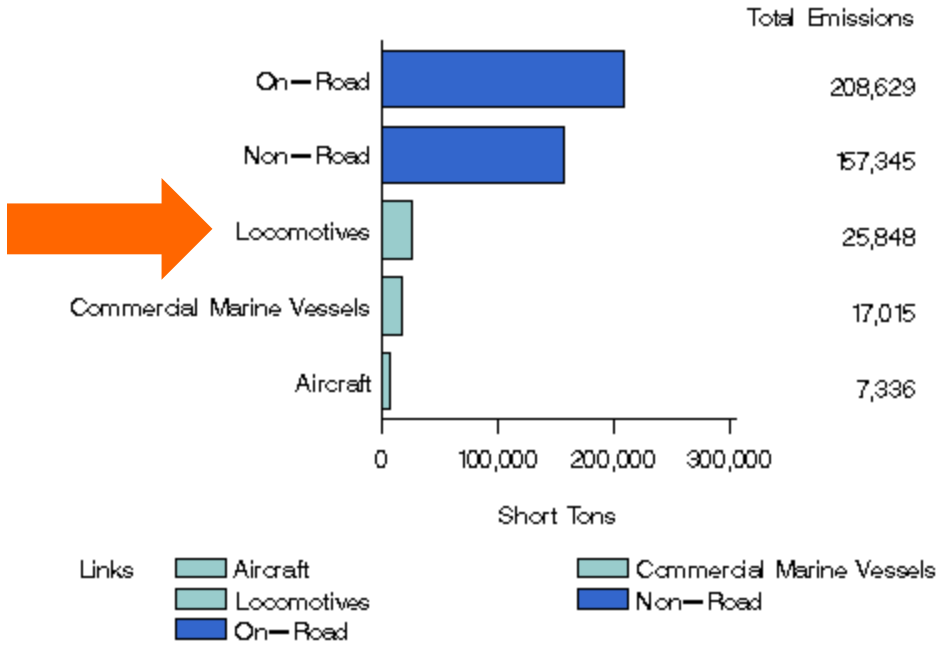
National PM2.5 Emissions by Source Sector

(NEI 2011 v1 GPR)



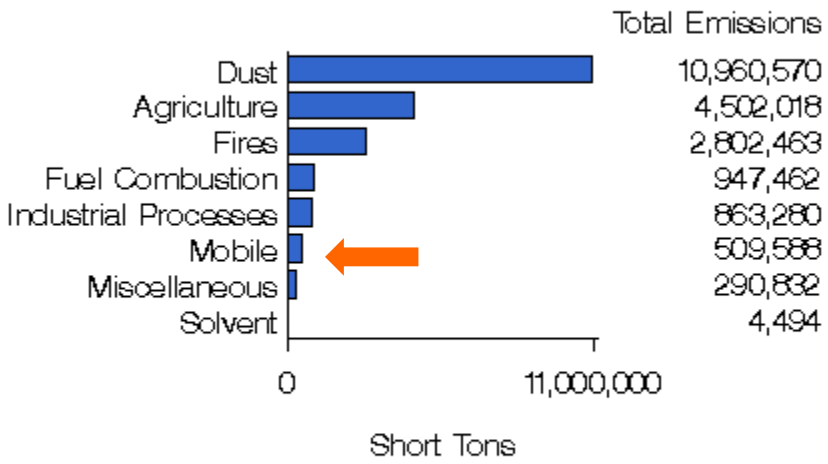
PM2.5 Mobile Breakdown

(NEI 2011 v1 GPR)



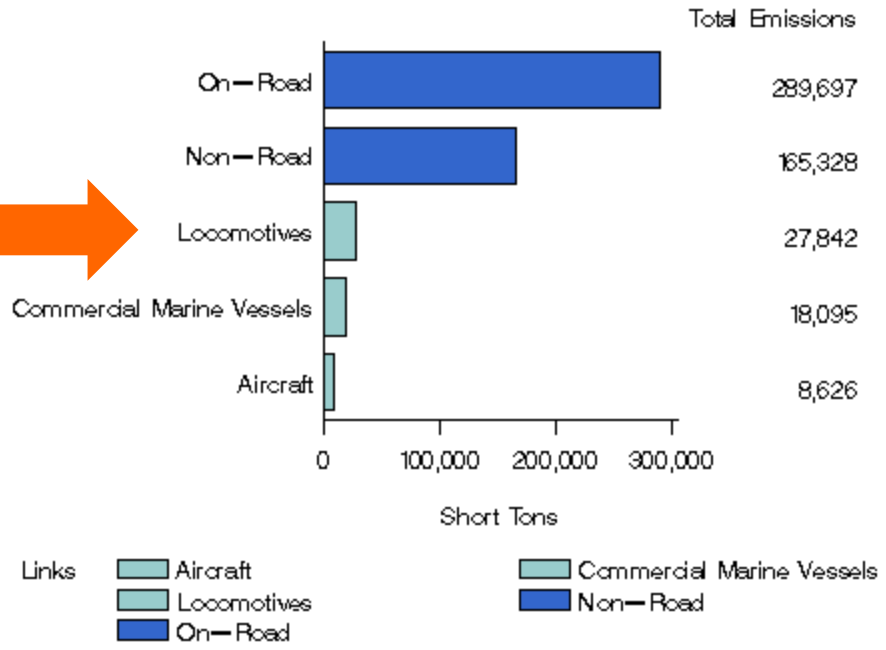
National PM10 Emissions by Source Sector

(NEI 2011 v1 GPR)



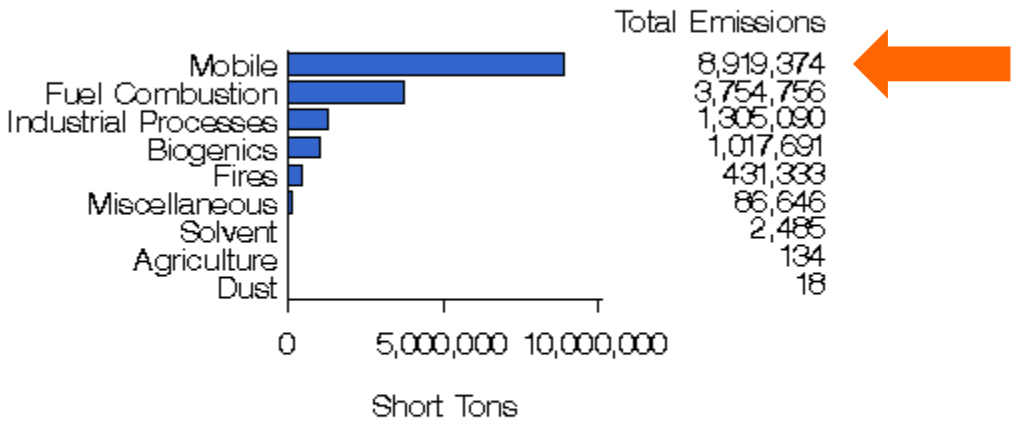
PM10 Mobile Breakdown

(NEI 2011 v1 GPR)



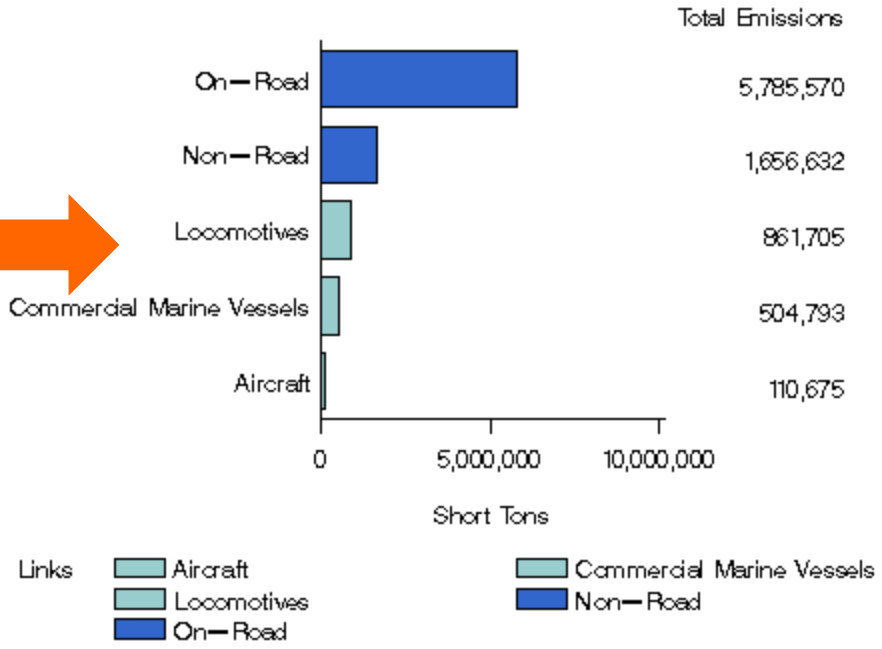
National Nitrogen Oxides Emissions by Source Sector

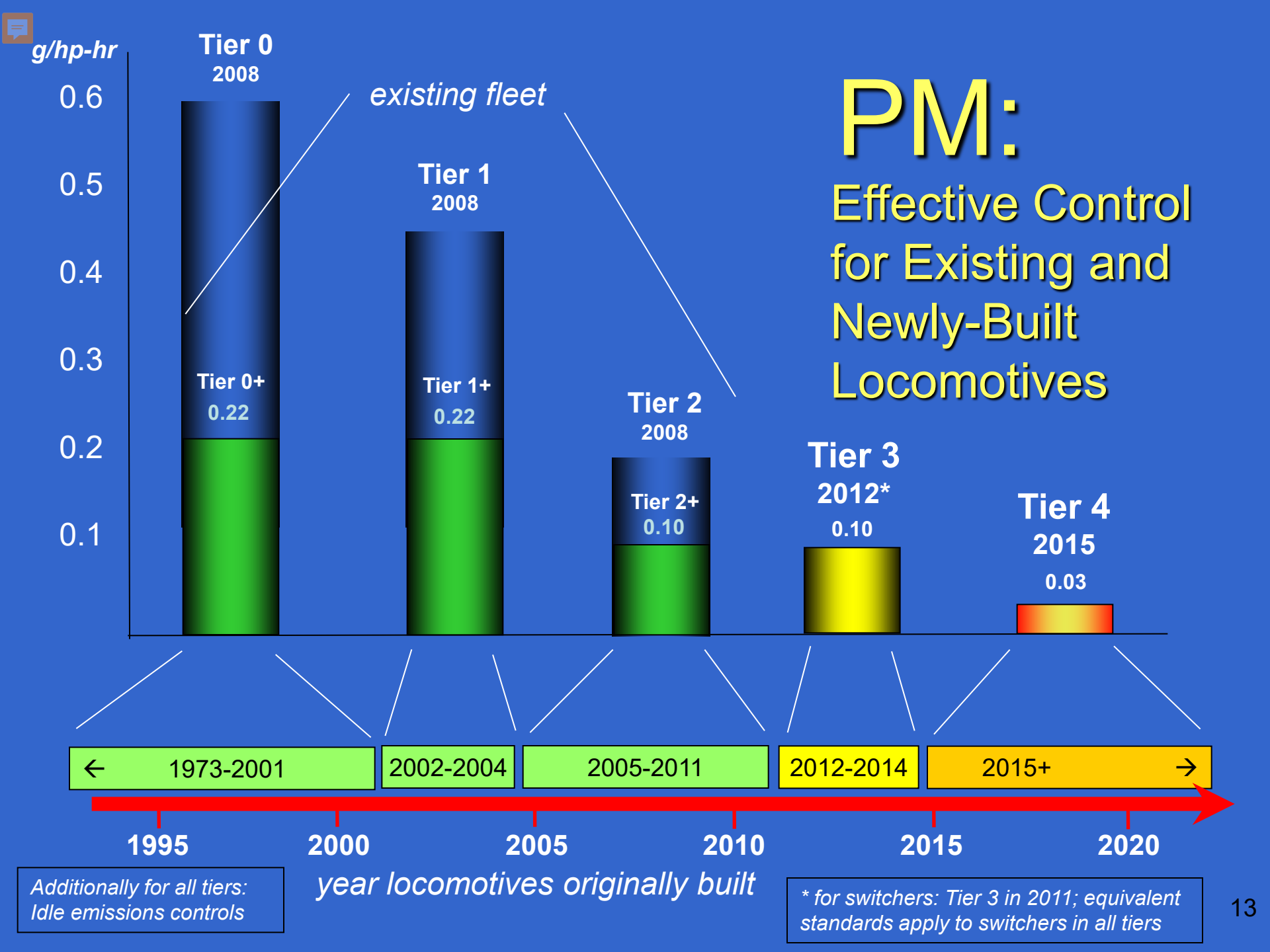
(NEI 2011 v1 GPR)



Nitrogen Oxides Mobile Breakdown

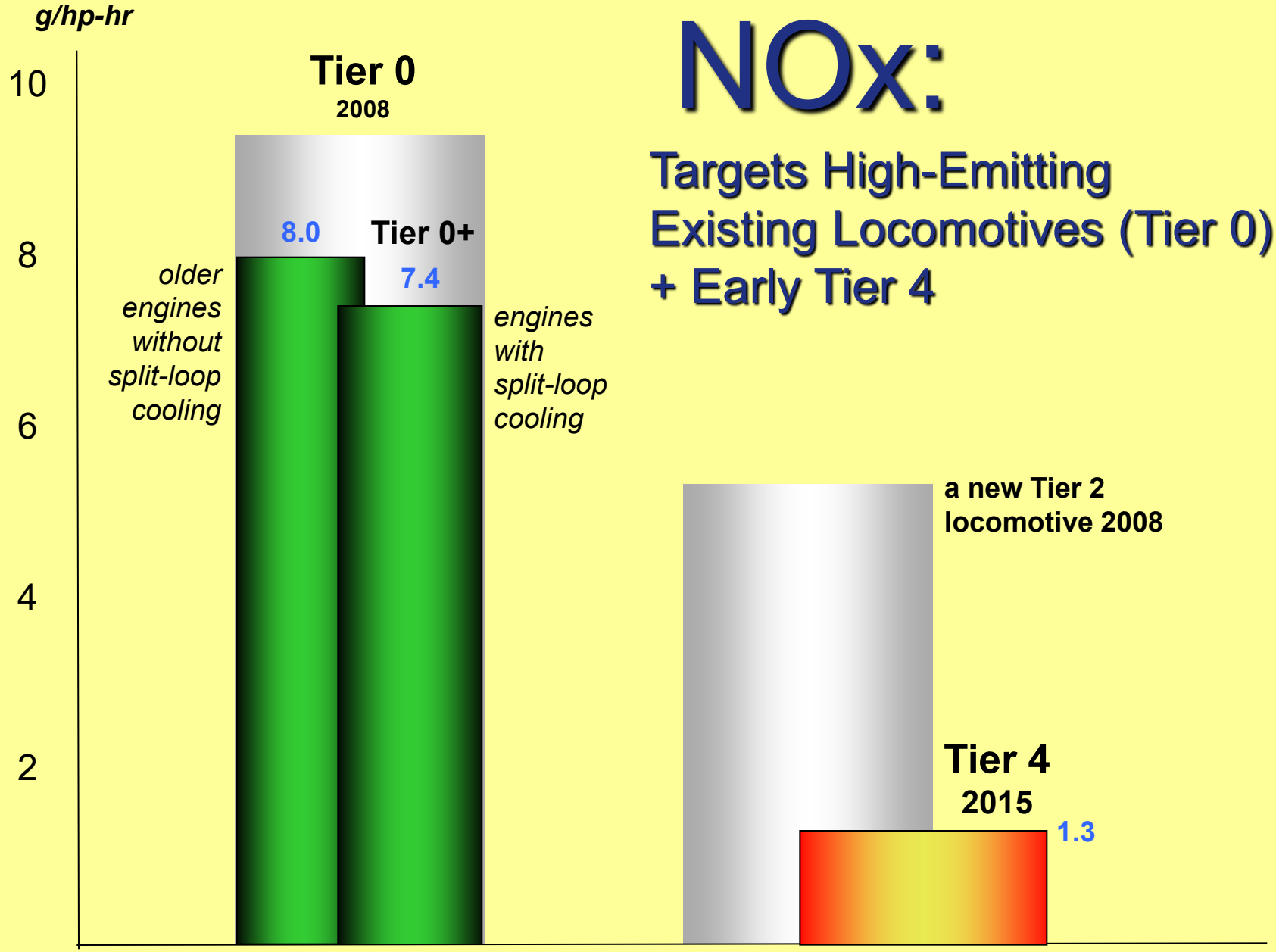
(NEI 2011 v1 GPR)




g/hp-hr
0.6
0.5
0.4
0.3
0.2
0.1
Tier 0
2008
existing fleet
Tier 1
2008
Tier 0+
0.22
Tier 1+
0.22
Tier 2
2008
Tier 2+
0.10
Tier 3
2012*
0.10
Tier 4
2015
0.03
PM:
Effective Control for Existing and Newly-Built Locomotives
1973-2001
2002-2004
2005-2011
2012-2014
2015+
1995
2000
2005
2010
2015
2020
year locomotives originally built
Additionally for all tiers:
Idle emissions controls
* for switchers: Tier 3 in 2011; equivalent standards apply to switchers in all tiers

NOx:

Targets High-Emitting Existing Locomotives (Tier 0) + Early Tier 4



BRACE YOURSELF!

LOCOMOTIVE RULE REQUIREMENTS: OVERVIEW

What standards must locomotives now meet?

- 1998: Original EPA standards for newly-manufactured locomotives (Tier 0, 1 & 2) and for remanufacturing existing locomotives built in 1973 or later.
- 2008: New EPA standards for locomotive & marine engines, including idle control for locomotives. Newly-manufactured locomotives meet Tier 3 & 4.
- 2010 & 2011: minor amendments to 2008 rule.

TABLE 1 TO §1033.101—LINE-HAUL LOCOMOTIVE EMISSION STANDARDS

Year of original manufacture	Tier of standards	Standards (g/bhp-hr)			
		NO_X	PM	HC	CO
1973-1992[a]	Tier 0[b]	8.0	0.22	1.00	5.0
1993[a]-2004	Tier 1[b]	7.4	0.22	0.55	2.2
2005-2011	Tier 2[b]	5.5	[e]0.10	0.30	1.5
2012-2014	Tier 3[c]	5.5	0.10	0.30	1.5
2015 or later	Tier 4[d]	1.3	0.03	0.14	1.5

[a]Locomotive models that were originally manufactured in model years 1993 through 2001, but that were not originally equipped with a separate coolant system for intake air are subject to the Tier 0 rather than the Tier 1 standards.

[b]Line-haul locomotives subject to the Tier 0 through Tier 2 emission standards must also meet switch standards of the same tier.

[c]Tier 3 line-haul locomotives must also meet Tier 2 switch standards.

[d]Manufacturers may elect to meet a combined NO_X+HC standard of 1.4 g/bhp-hr instead of the otherwise applicable Tier 4 NO_X and HC standards, as described in paragraph (j) of this section.

[e]The PM standard for newly remanufactured Tier 2 line-haul locomotives is 0.20 g/bhp-hr until January 1, 2013, except as specified in §1033.150(a).

TABLE 2 TO §1033.101—SWITCH LOCOMOTIVE EMISSION STANDARDS

Year of original manufacture	Tier of standards	Standards (g/bhp-hr)			
		NO_X	PM	HC	CO
1973-2001	Tier 0	11.8	0.26	2.10	8.0
2002-2004	Tier 1[a]	11.0	0.26	1.20	2.5
2005-2010	Tier 2[a]	8.1	[b]0.13	0.60	2.4
2011-2014	Tier 3	5.0	0.10	0.60	2.4
2015 or later	Tier 4	[c]1.3	0.03	[c]0.14	2.4

[a]Switch locomotives subject to the Tier 1 through Tier 2 emission standards must also meet line-haul standards of the same tier.

[b]The PM standard for new Tier 2 switch locomotives is 0.24 g/bhp-hr until January 1, 2013.

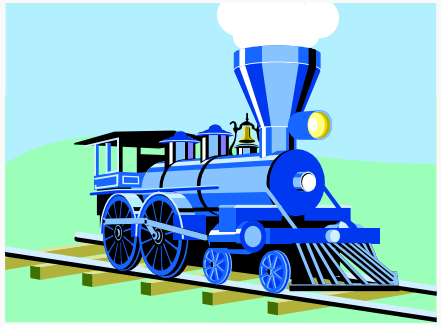
[c]Manufacturers may elect to meet a combined NO_X+HC standard of 1.4 g/bhp-hr instead of the otherwise applicable Tier 4 NO_X and HC standards, as described in paragraph (j) of this section.

Who must comply?

- Manufacturers
- Remanufacturers
  - Suppliers
  - Installers
  - Owners who specify work
- Refurbishers
- Owners
  - Class I, II and IIIs (if owned by large parent co's)
  - Intercity passenger & commuter RRs

What locomotives are covered?

- Regardless of application
- Line haul and switch (< 2300 hp total)
- “Freshly manufactured” (less than 25% used parts)
- “Existing” regardless of age, when refurbished
- “Existing,” 1973 or later vintage, when remanufactured



Small business exemption

- From remanufacturing/refurbishing standards
- For locomotives never certified to any Tier
- Idea: avoid costs of reconfiguring locomotive
- Must be owned AND operated by small biz
- Status of NE shortlines and Class IIs??

What is "Refurbishing?"

- A form of remanufacturing
- Overhauling a locomotive so more new than old
  - > 50% new or reconditioned parts, by value
  - New engine
- One-time event
- Pretty drastic, so
  - all vintages covered
  - standard for new engine somewhat higher than for simple remanufacture

What is "Remanufacturing"?

- Varieties
  - Overhauling engine-- replacing every power assembly
  - Upgrading engine
  - Replacing engine
  - Converting to run on alt fuel
- Single event, or cumulative (over ≤ 5 years)
- Less drastic / sudden than refurbishing, so
  - triggers rule only for 1973+ vintage locomotives
  - standard for new engine somewhat lower than for refurbishing

What does the rule require?

- Certification to current applicable Tier
- Use a certified kit
- An idle reduction device that:
  - Shuts down engine after ≤ 30 min idling
  - Can stop/start ≥ 6 times/day without damage
  - Allows continued idling to
    - Prevent freezing
    - Maintain air pressure
    - Maintain battery
    - Perform maintenance
    - Comply with government regs
    - Heat or cool cab when necessary

GE Transportation Systems

Original Locomotive Emission Control Information

THIS LOCOMOTIVE MUST COMPLY WITH THESE EMISSION LEVELS EACH TIME THAT IT IS REMANUFACTURED EXCEPT AS ALLOWED BY 40 CFR 1033.750

Engine Family: EGETK0668EFF

Engine Drawing Number: 41A113450G5

This engine family has been certified to Tier 1+ standards (Line-Haul NOx FEL = 7.4 g/bhp-hr and Switch NOx FEL = 11.0 g/bhp-hr) per 40 CFR Part 1033.101

Locomotive Emissions Compliance

This engine and locomotive must be maintained per the procedures and materials documented in the operator and service manuals

All warranties and guarantees are defined in the owners contract

GE Diesel Electric Locomotive Made in Erie, Pennsylvania, U.S.A.

AESS or APU or FOH or…?

- Default is AESS, but specific hardware can vary
- APUs encouraged to reduce AESS restarts
- APU challenges:
  - Initial cost
  - Maintenance
  - Installation
  - Brake pressure
- APU success varies by:
  - Application & operations
  - Climate

LOCOMOTIVE STANDARDS & CERTIFICATION: DETAIL

What standards apply?

Depends on:

- Year locomotive was manufactured
- Tier of engine in the locomotive
- Power rating (> or < 2300 hp)
- Calendar year (if refurbishing).

Line Haul

Year of Original Manufacture	Original Locomotive Tier	Minimum Tier for Remanufacture	Minimum Tier for Refurbishment	
			Through 2014	2015 & later
Pre-1973	Unregulated	n/a*	2+	4
1973-1992	Tier 0	0+	2+	4
1993-2004	0 or 1	1+	2+	4
2005-2011	2	2+	2+	4
2012-2014	3	3	3	4
2015 & later	4	4	n/a	4

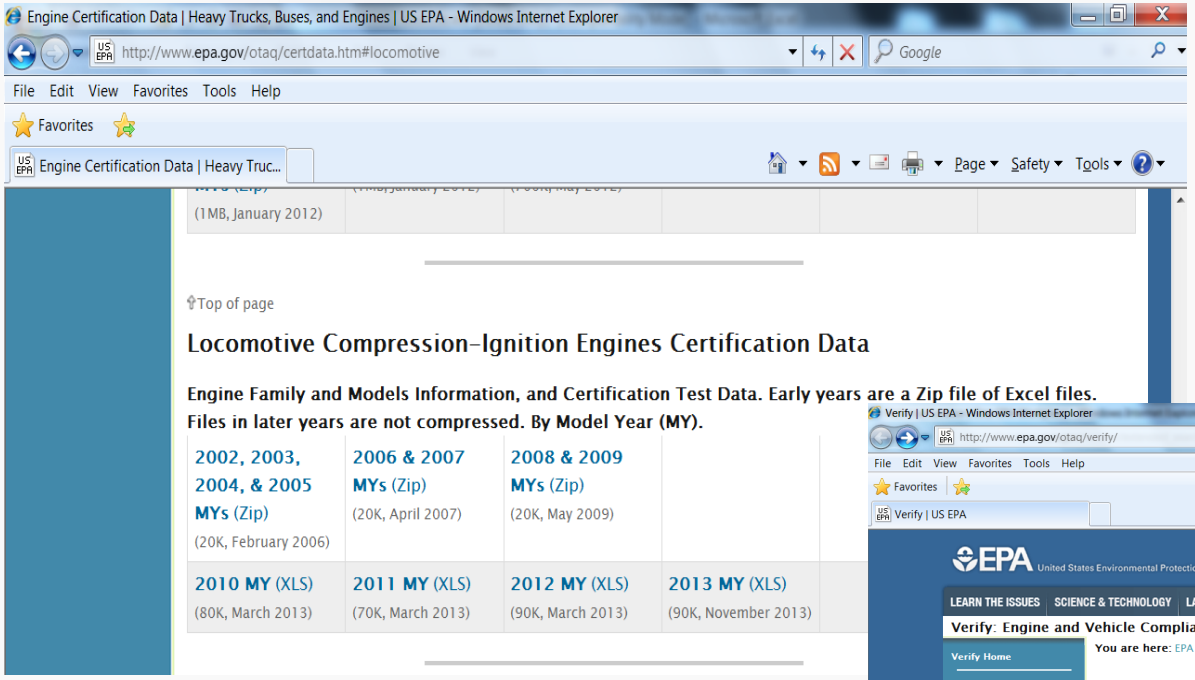
*Don't have to meet any standards for a simple remanufacture, but have to meet Tier 0+ for a repower (new engine).

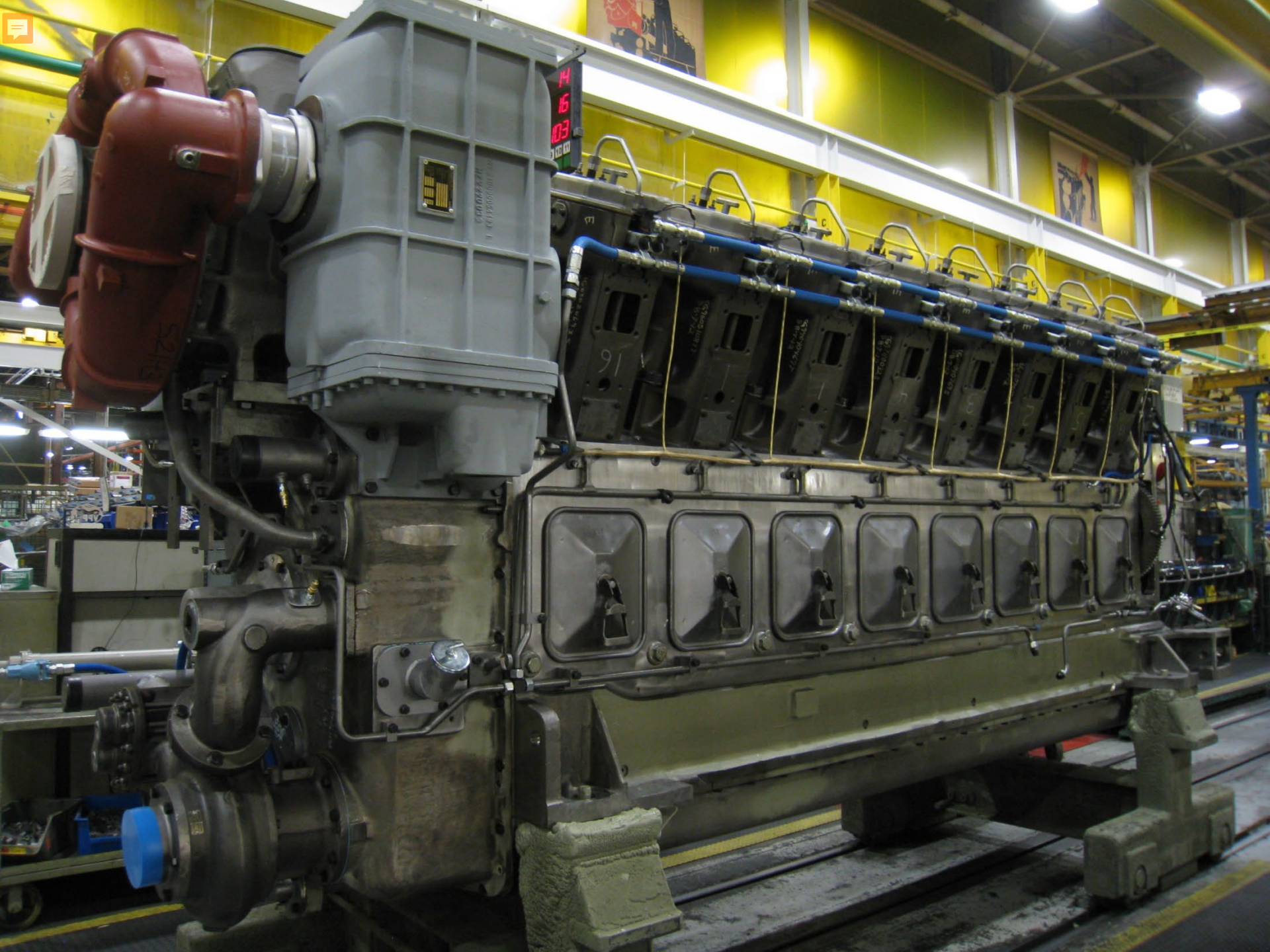
Switch Locomotives

Year of Original Manufacture	Original Locomotive Tier	Minimum Tier for Remanufacture	Minimum Tier for Refurbishment	
			Through 2014	2015 & later
Pre-1973	Unregulated	n/a*	0+	3
1973-2001	Tier 0	0+	0+	3
2002-2004	1	1+	1+	3
2005-2010	2	2+	2+	3
2011-2014	3	3	3	3
2015 & later	4	4	n/a	4

*Don't have to meet any standards for a simple remanufacture, but have to meet Tier 0+ for a repower (new engine).

Engine certification data





ILLUSTRATIONS

Class III RR

- Pre-1973 locomotive, never before refurbished/certified: exempt because owner is small biz, but won't be if sold to larger biz
- Pre-1973 locomotive, already refurbished: same
- 1973+ locomotive, never before certified: same
- 1973+ locomotive, remanufactured/refurbished but not certified: same
- 1973+ locomotive, certified: standards apply

Other RRs

- Pre-1973 locomotive, never before refurbished/certified: standards apply
- Pre-1973 locomotive, already refurbished: standards apply. Should be in compliance if refurb done after July 2008. Otherwise: next time
- 1973+ locomotive, never before certified: standards apply
- 1973+ locomotive, never before remanufactured/refurbished: standards apply
- 1973+ locomotive, reman/refurb: standards apply, and should be in compliance if > July 2008. Otherwise: next time.

FUEL

What fuel can you use?

- Earlier transition to ULSD in Northeast/Mid-Atlantic and AK than in rest of country
- As of 2012, everyone should be using only ULSD in any locomotive
- Transmix?
- Winter mix OK if ≤ 15 ppm sulfur
- 97% cleaner– better for people & engines

Fuel compliance issues

- Keep receipts
- Don’t mix
- Label properly
- Provide spill protection
- EPA inspections: locomotives, yard equipment, storage tanks
  - Contamination
  - Mislabeling


ULTRA-LOW-SULFUR
NON-HIGHWAY DIESEL FUEL
(15 ppm Sulfur Maximum)
Required for use in all model year 2011 and later nonroad diesel engines.
Recommended for use in all other non-highway diesel engines.
WARNING
Federal law prohibits use in highway vehicles or engines.
LOW-SULFUR
LOCOMOTIVE AND MARINE
DIESEL FUEL
(500 ppm Sulfur Maximum)
WARNING
Federal law prohibits use in nonroad engines or in highway vehicles or engines.


1993
3


#20
NO SMOKING
DIESEL
COMBUSTIBLE
2
0
#20
NO SMOKING
DIESEL
COMBUSTIBLE
2
0
1
#13
NO SMOKING
GASOLINE
FLAMMABLE

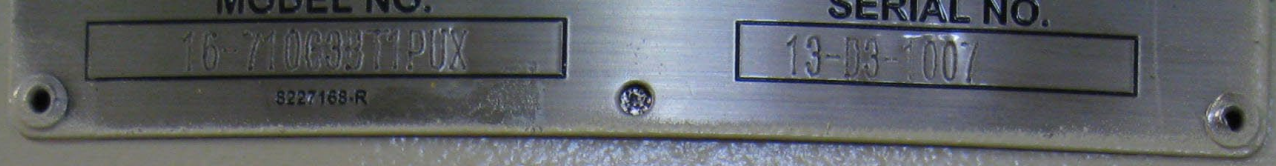

LOCOMOTIVE
ULTRA-LOW SULFUR
NON-HIGHWAY DIESEL FUEL
(15 ppm Sulfur Maximum)
Required for use in all model year 2011 and later non-road diesel engines.
Recommended for use in all other non-highway diesel engines.
WARNING: Federal Law prohibits use in highway vehicles or engines.
EMERGENCY

LOCOMOTIVE RULE: COMPLIANCE & ENFORCEMENT

Ways to stay out of trouble

- Verify proper remanufacture/refurbish
  - Broad liability
  - Idle control
  - Certification
  - Labels
- Maintain engines & equipment


ELECTRO-MOTIVE
MODEL NO.
SERIAL NO.
ELECTRO-MOTIVE
THIS LOCOMOTIVE CONFORMS TO U.S. EPA REGULATIONS APPLICABLE TO TIER 1+ LOCOMOTIVES
ENGINE FAMILY: DEMDK0710TS3



ENGINE EMISSION CONTROL INFORMATION
ELECTRO-MOTIVE DIESEL, INC.

ELECTRO-MOTIVE®

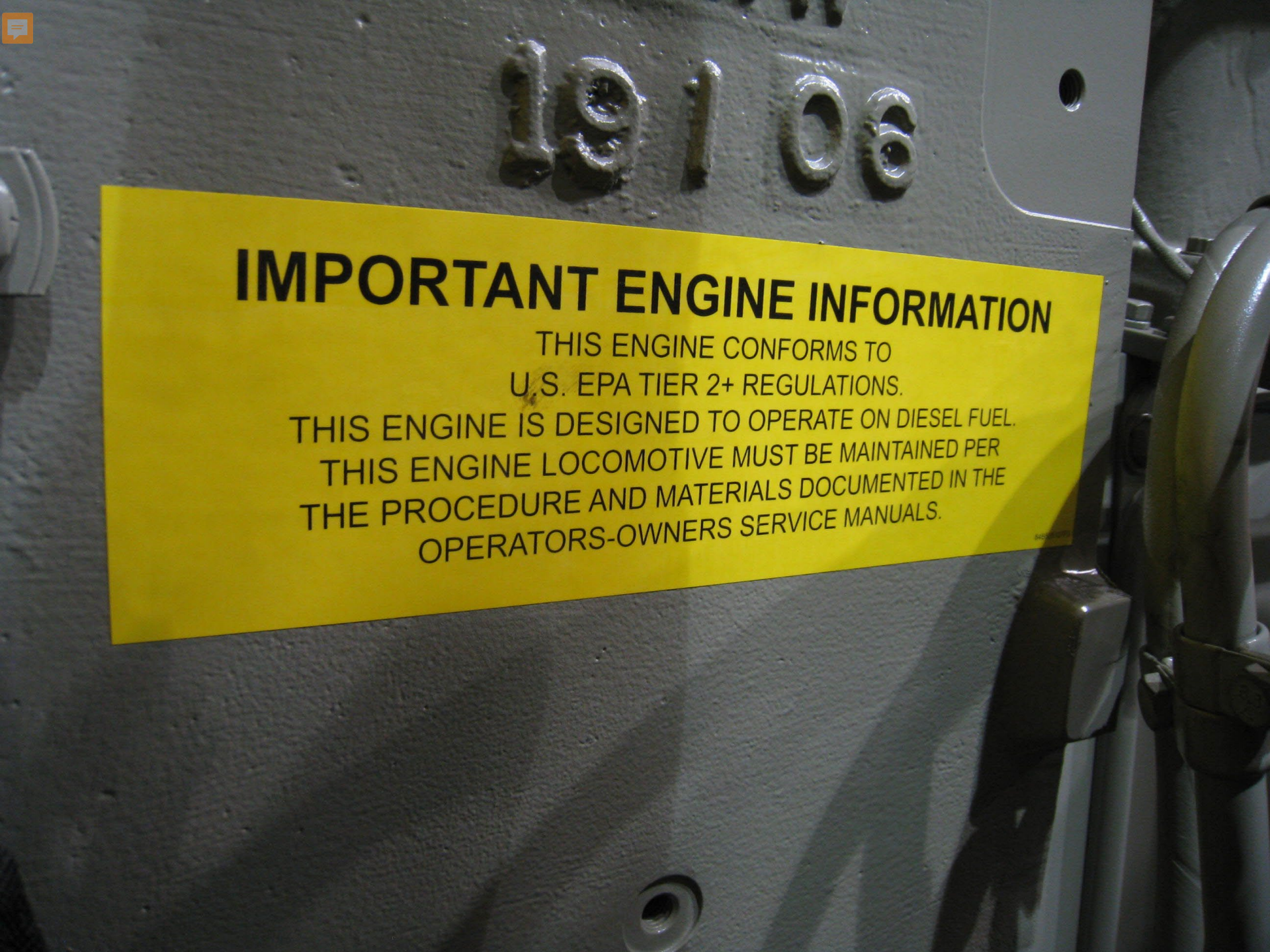
THIS LOCOMOTIVE CONFORMS TO U.S. EPA REGULATIONS APPLICABLE TO TIER 1+ LOCOMOTIVES

ENGINE FAMILY: DEMDK0710TS3

LOCOMOTIVE USEFUL LIFE PER 40 CFR PART 1033 30,000 MWh OR 10 YEARS.
EMISSION STANDARDS: THIS ENGINE FAMILY HAS BEEN CERTIFIED AS CONFORMING TO EPA TIER 1+ STANDARDS

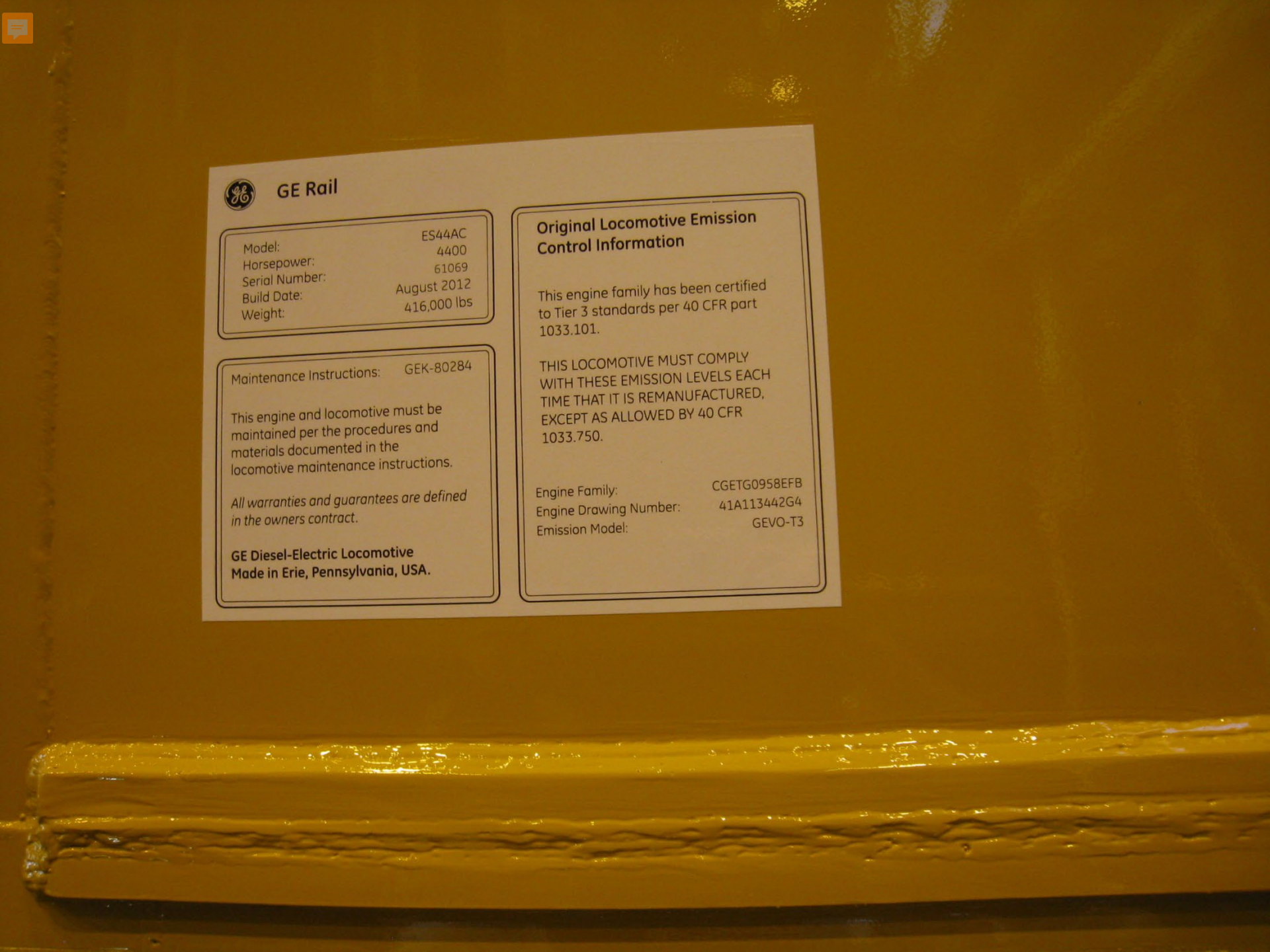
ENGINE MAINTENANCE: SEE MI 1791 AND ENGINE MAINTENANCE MANUAL

40203922-A


IMPORTANT ENGINE INFORMATION
THIS ENGINE CONFORMS TO
U.S. EPA TIER 2+ REGULATIONS.
THIS ENGINE IS DESIGNED TO OPERATE ON DIESEL FUEL.
THIS ENGINE LOCOMOTIVE MUST BE MAINTAINED PER
THE PROCEDURE AND MATERIALS DOCUMENTED IN THE
OPERATORS-OWNERS SERVICE MANUALS.

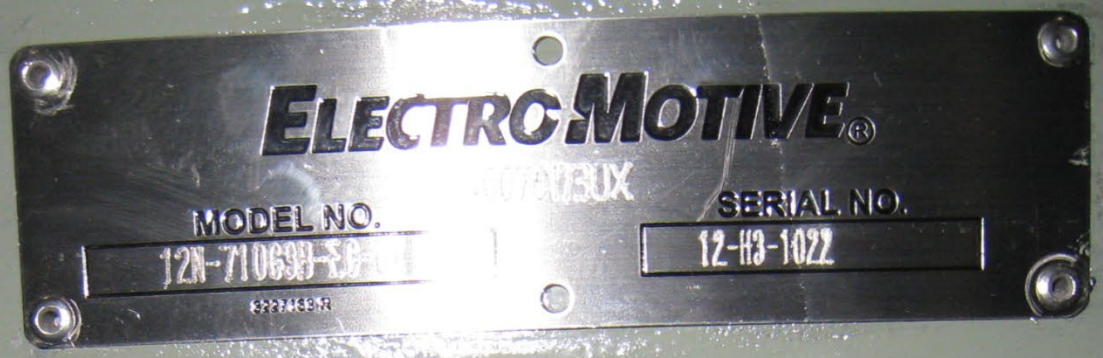

ENGINE EMISSION CONTROL INFORMATION
GENERAL ELECTRIC
THIS LOCOMOTIVE CONFORMS TO U.S. EPA REGULATIONS APPLICABLE
FAMILY: C GETG0958EFB
SERIAL NO: C442120339
DATE OF MANU:
DRAWING NO: 41A113442G3
MODEL NO:
EPA EMISSIONS USEFUL LIFE IS EARLIER OF 33,750 MW-HRS OR 10 YEARS
THIS ENGINE FAMILY HAS BEEN CERTIFIED TO TIER
PER 40CFR PART 1033.101
AND LOCOMOTIVE MUST BE MAINTAINED PER THE PROCEDURE
OWNERS, AND SERVICE MANUALS. ALL WARRANTIES AND

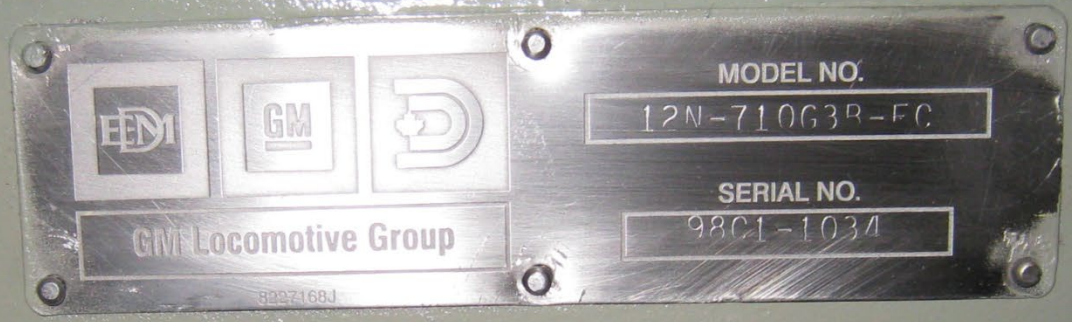

7998
7998
7998


GE Rail
Model: ES44AC
Horsepower: 4400
Serial Number: 61069
Build Date: August 2012
Weight: 416,000 lbs
Maintenance Instructions: GEK-80284
This engine and locomotive must be maintained per the procedures and materials documented in the locomotive maintenance instructions.
All warranties and guarantees are defined in the owners contract.
GE Diesel-Electric Locomotive
Made in Erie, Pennsylvania, USA.
Original Locomotive Emission Control Information
This engine family has been certified to Tier 3 standards per 40 CFR part 1033.101.
THIS LOCOMOTIVE MUST COMPLY WITH THESE EMISSION LEVELS EACH TIME THAT IT IS REMANUFACTURED, EXCEPT AS ALLOWED BY 40 CFR 1033.750.
Engine Family: CGETG0958EFB
Engine Drawing Number: 41A113442G4
Emission Model: GEVO-T3


IMPORTANT ENGINE INFORMATION
THIS LOCOMOTIVE CONFORMS TO U.S. EPA TIER 3 REGULATIONS APPLICABLE TO 2012 AND LATER MODEL YEAR LOCOMOTIVE ENGINES. THIS ENGINE IS DESIGNED TO OPERATE ON DIESEL FUEL. THIS ENGINE & LOCOMOTIVE MUST BE MAINTAINED PER THE PROCEDURE AND MATERIALS DOCUMENTED IN THE OPERATORS-OWNER-SERVICE MANUALS.
CAUTION
AUTO START-STOP (AESS) EQUIPPED LOCOMOTIVE
Manual Shutdown disables AESS and will require a Manual Restart
WARNING
AUTOSTART EQUIPPED
CAUTION
FAILURE TO FOLLOW INSTRUCTIONS BELOW WILL DAMAGE LOCOTROL ELECTRONICS
NOTICE
BATTERY SAVER EQUIPPED LOCOMOTIVE
NOTICE
LOAD SHED EQUIPPED LOCOMOTIVE
OUT OF SERVICE
FORM 1504


CAUTION
PINCH INJURY OR EQUIPMENT DAMAGE
TO OPEN THE HATCH FOLLOW THIS PROCEDURE:
1. RELEASE LATCHES.
2. FOLD UP OUTER SECTION UNTIL PINS/RODS ARE IN LOCKED POSITION.
3. OPEN IT WITH AIR GUN (COUNTERCLOCKWISE).
OILING THE BOTTOM WASHERS FIRST.
4. DO NOT OVER EXTEND THE ROD BEYOND ITS THREADED PORTION.
TO CLOSE:
1. CLOSE IT WITH AIR GUN (CLOCKWISE) ALL THE WAY.
2. DISENGAGE THE LOCKING PINS.
3. SLOWLY LOWER THE OUTER SECTION TO THE CLOSED POSITION.
4. CLOSE THE LATCHES
ATTENTION
EMISSIONS CERTIFIED ENGINE
BEFORE PERFORMING ANY ADJUSTMENTS
OR REPAIRS TO THIS DIESEL ENGINE
CONTACT:
RAIL ROAD DIRECT 8-564-3888
OUTSIDE LINE 541-564-3888
FOR PROPER PARTS & PROCEDURE
IDENTIFICATION
IMPORTANT ENGINE INFORMATION
THIS LOCOMOTIVE CONFORMS TO
U.S. EPA TIER 3 REGULATIONS APPLICABLE TO
2012 AND LATER MODEL YEAR LOCOMOTIVE ENGINES.
THIS ENGINE IS DESIGNED TO OPERATE ON DIESEL FUEL.
THIS ENGINE & LOCOMOTIVE MUST BE MAINTAINED PER
THE PROCEDURE AND MATERIALS DOCUMENTED IN THE
OPERATORS-OWNERS-SERVICE MANUALS.
CAUTION
FUEL SPILL
Manual Fuel Pressure Relief Valve
Located on cylinder L1
To relieve pressure with engine shut
down, open T-handle for 5 seconds,
before engine maintenance or repair.
Close valve before starting engine to
prevent fuel spill.





ENGINE EMISSION CONTROL INFORMATION
ELECTRO-MOTIVE DIESEL, INC.

ELECTRO-MOTIVE® E C O™

THIS LOCOMOTIVE CONFORMS TO U.S. EPA REGULATIONS APPLICABLE TO TIER 0+ LINE HAUL LOCOMOTIVES

ENGINE FAMILY: CEMDK0710TEJ

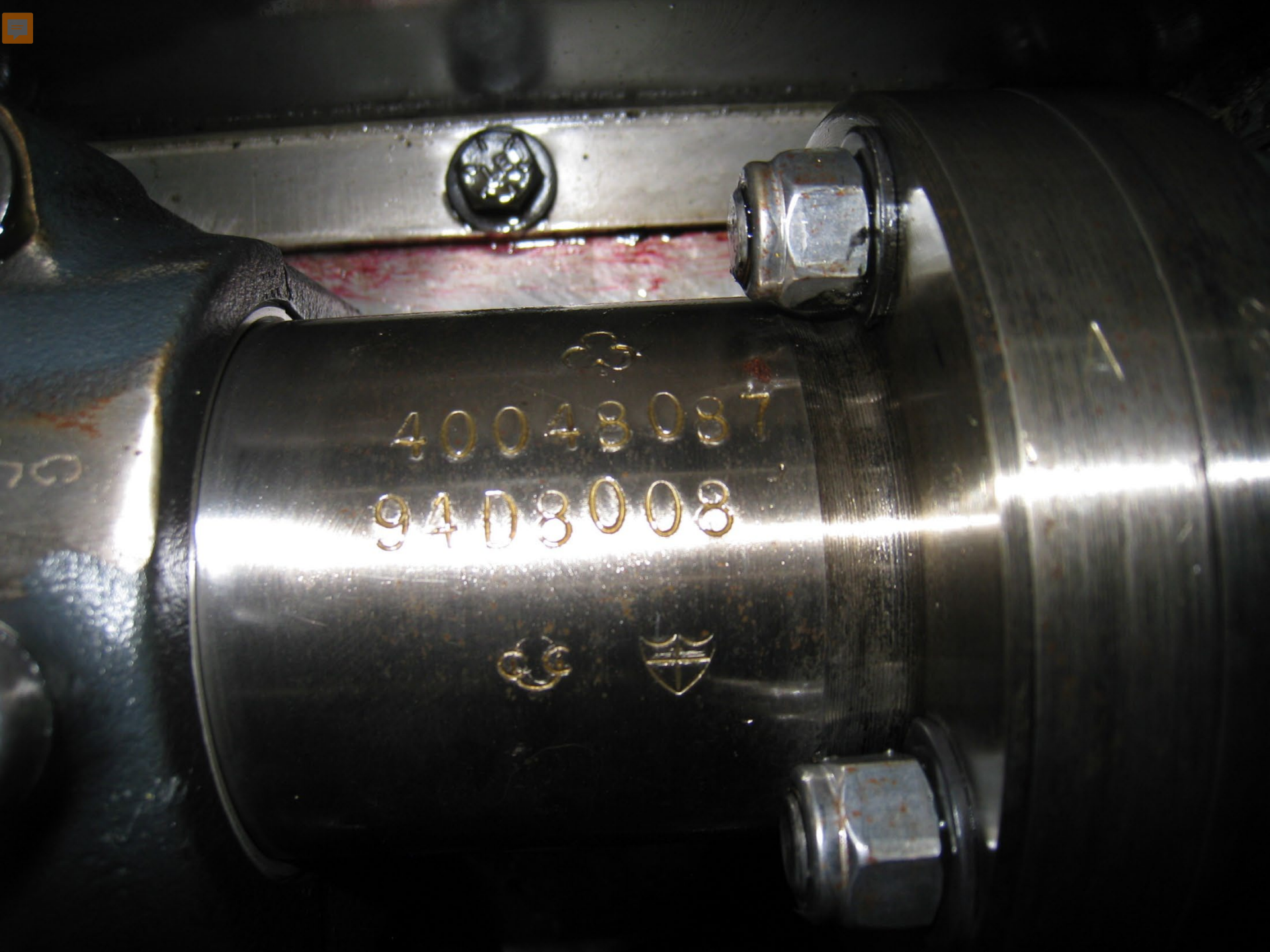
LOCOMOTIVE USEFUL LIFE PER 40 CFR PART 1033 24,000 MWh OR 10 YEARS.
EMISSION STANDARDS: THIS ENGINE FAMILY HAS BEEN CERTIFIED AS CONFORMING TO EPA TIER 0+ STANDARDS

ENGINE MAINTENANCE: SEE MI 1791 AND ENGINE MAINTENANCE MANUAL

40184687

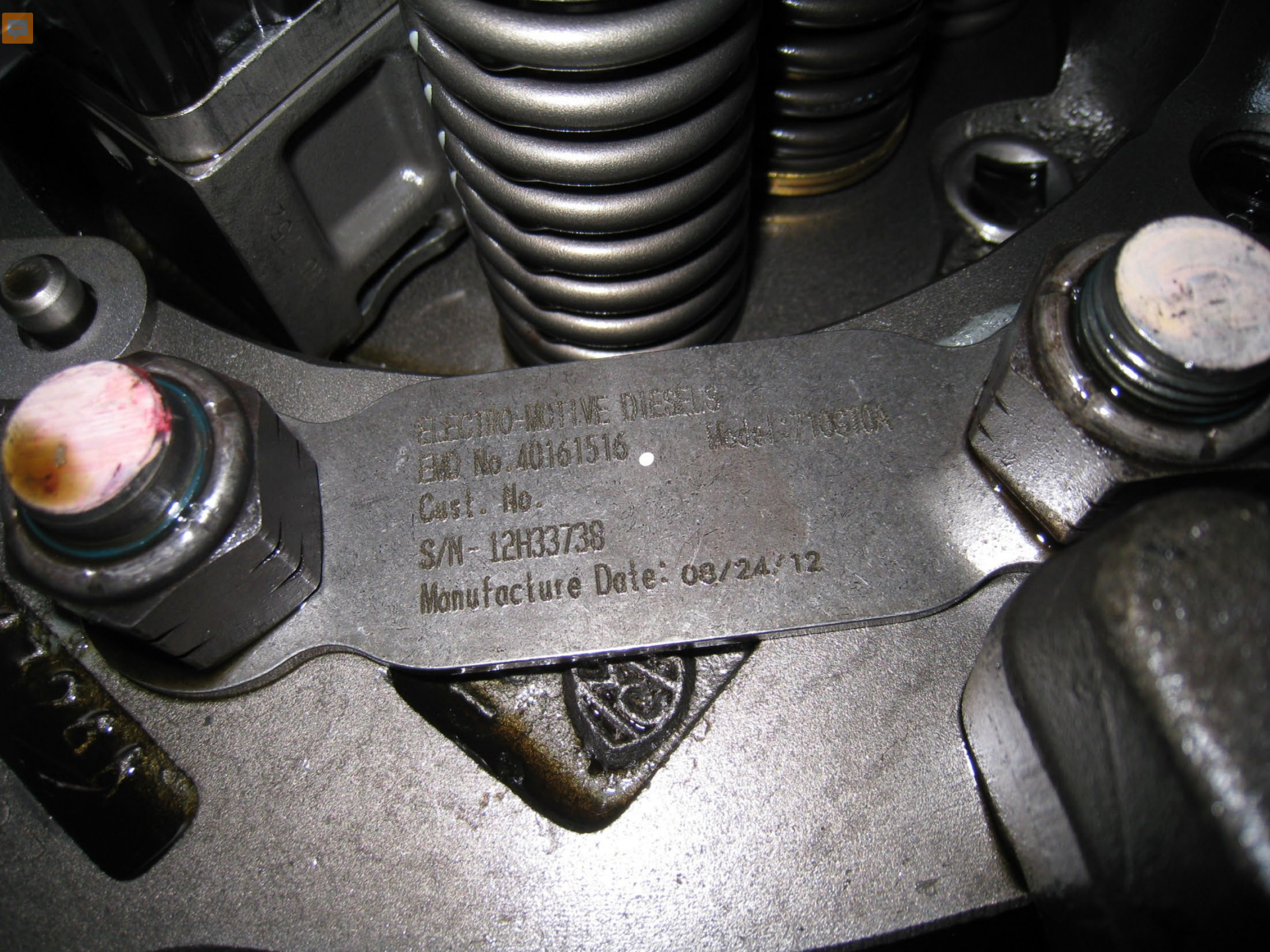
Recordkeeping Roles

- Manufacturers: certificates for engines & kits
- Repair shops:
  - Remanufacture/refurbish:
    - Proper procedures & parts
    - Track all power assembly replacements
  - Maintenance
- Owner/operator:
  - Repair records
  - Maintenance records
  - “Small business” status


40048087
94D3008

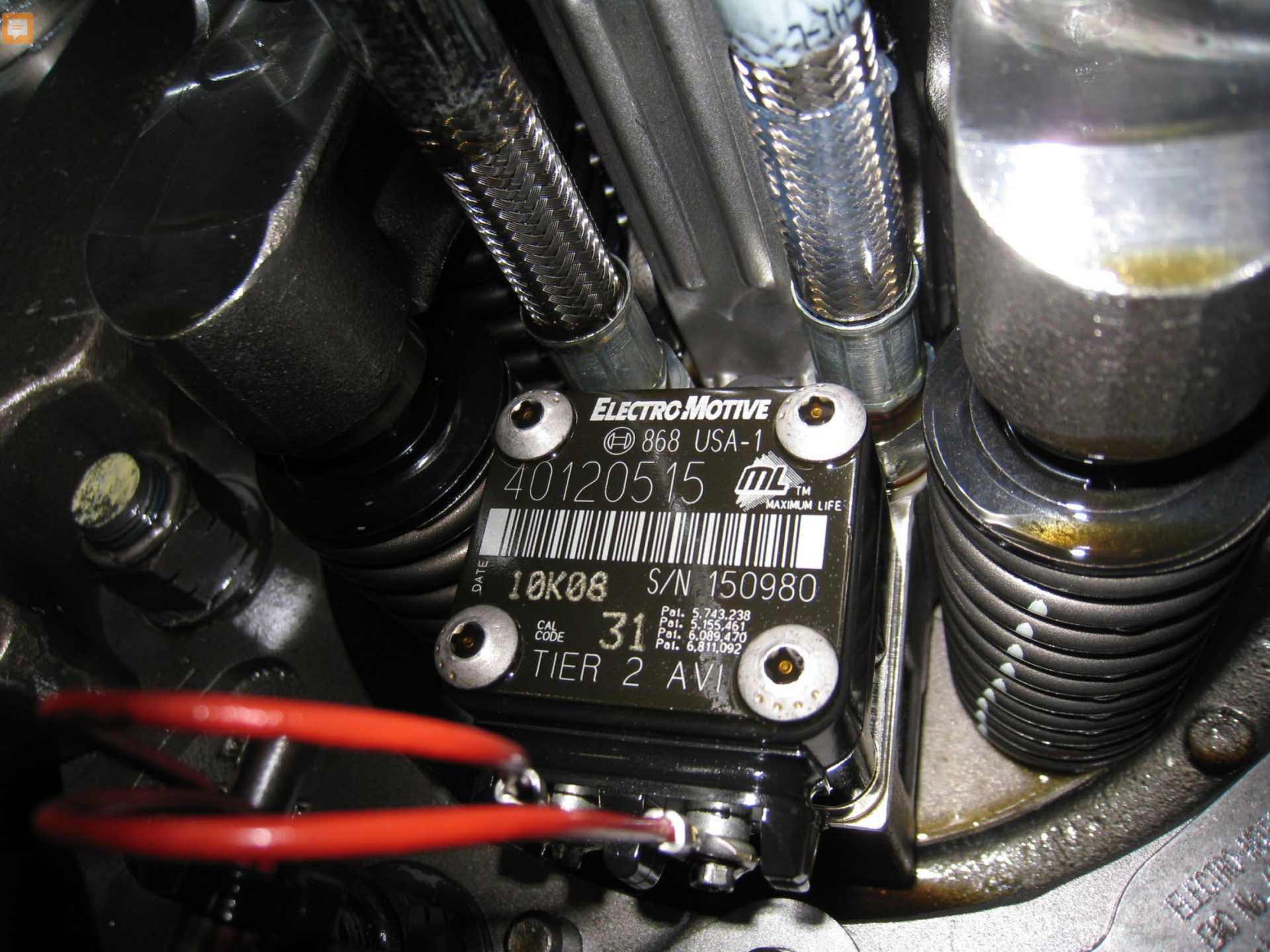

HK Engine Components, LLC.
Item# 40028340-EPA-CSX
CSX SCN# 260.0028340.2
Mfg Date: 11 JUN 2012
War Exp: 11 JUN 2013

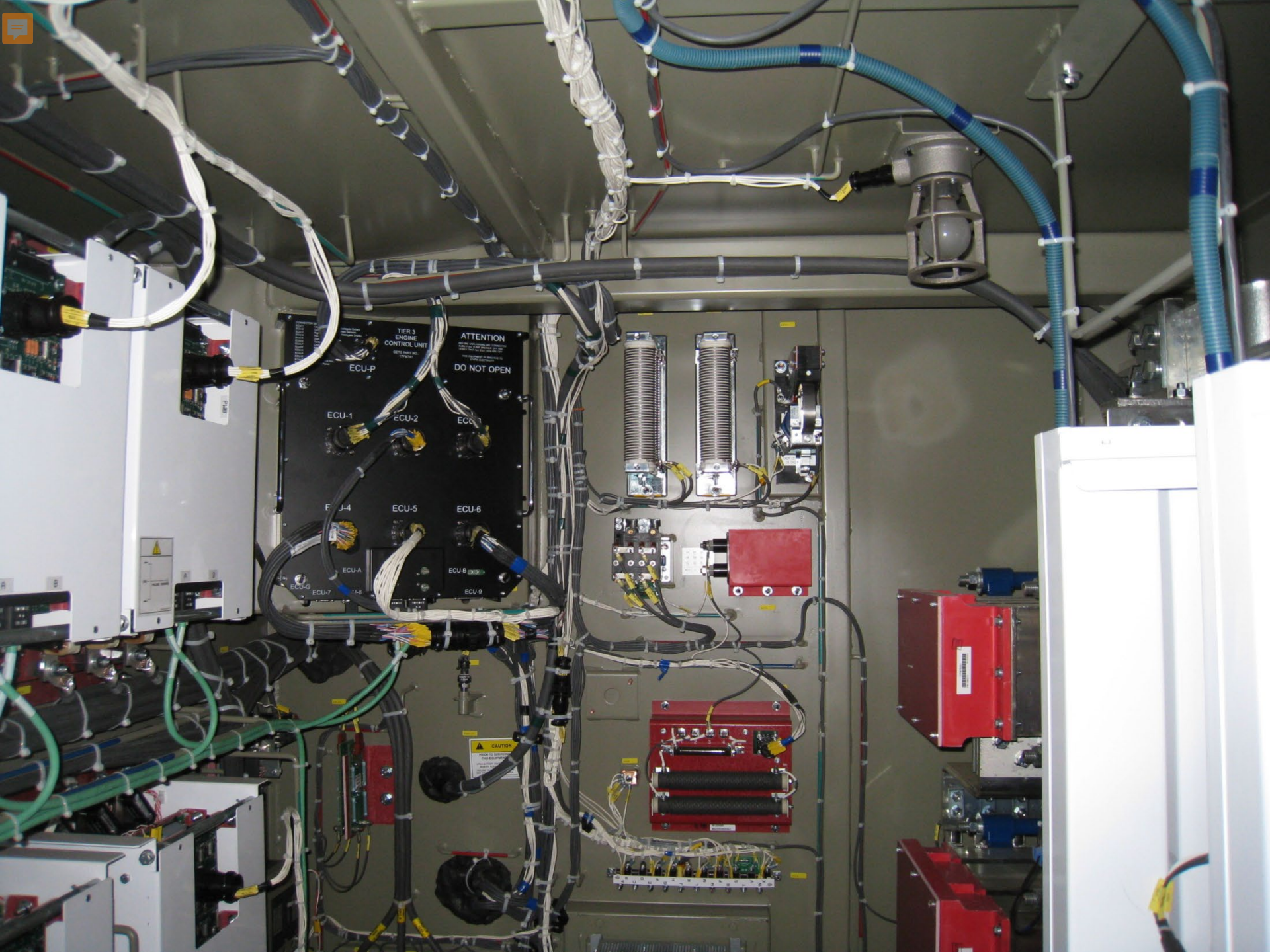

EDM Genuine OEM Parts
PWR AY PART NO. 40041462
PWR AY SERIAL NO. 12-E3-0327
WARRANTY EXP. 08-15
CSX NO. 263.0041462.2


ELECTRO-MOTIVE DIESELS
EMD No. 40161516
Model: 710G3C-A
Cust. No.
S/N - 12H33738
Manufacture Date: 08/24/12


REFER TO SMR X-300-26
PGR GOVERNOR
OEM NO.
ENGINE SPEED
SERIAL NO.
9549692
900
3-12 4-13
CUST. ID.
263-9549691-2 85
V 88
SC ITEM NO.
RACK
THE VISTA CORPORATION
OF VIRGINIA
1764 GRANBY ST. NE
ROANOKE, VA 24012


ISO 9001:2000
MANUFACTURED & EPA/IMO
CERTIFIED BY
PART NO.
40108868
SERIAL NO.
12-H3-1180
17.7G
ELECTRO-MOTIVE
TURBO
PATENT NOS. 4815935, 5163816, 5169242 & 5567056
40112058A


ELECTRO-MOTIVE
868 USA-1
40120515
TM
MAXIMUM LIFE
DATE
10K08
S/N 150980
CAL
CODE
31
Pat. 5,743,238
Pat. 5,155,461
Pat. 6,089,470
Pat. 6,811,092
TIER 2 AVI


TIER 3
ENGINE
CONTROL UNIT
ATTENTION
DO NOT OPEN
ECU-P
ECU-1
ECU-2
ECU-5
ECU-6
ECU-A
ECU-B
CAUTION


ATTENTION
BEFORE UNPLUGGING ANY CONNECTOR
TURN FUEL PUMP BREAKER OFF AND
VERIFY THAT ALL ECU LEDs ARE OFF
THIS EQUIPMENT IS SENSITIVE TO
STATIC ELECTRICITY
DO NOT OPEN
ECU-P
ECU-2
ECU-4
ECU-5
ECU-6
ECU-A
ECU-B
ECU-7
ECU-9
ArcNet B
ECU Ground Screw
24/50V Power

be disconnected again

84B518272ALP21

auto stopped

84B518272ALP22

AUTO ENGINE START/STOP SYSTEM (AESS)

- To de-activate the AESS system, move EC switch to JOG, open Aux Cab door, open the barrier bar or enter self-test. Pressing the Engine Stop button during an automatic shutdown does NOT de-activate the AESS system.
- To Suspend (delay) AESS from auto stopping the engine, press and release the Auto Stop Suspend Switch (SASS). This may be identified as the Auto Stop Override Switch.
- Engaging Distributed Power may cause AESS to be inactive (this is a customer option; check with your railroad operations department).
- The engine must be auto stopped to qualify for an auto start. A manually stopped engine will NOT auto start.
- When testing or troubleshooting the AESS system, cycle BCCB after each Auto Stop.
- Three aborted Auto Stop attempts will temporarily render the AESS system inactive. Motoring the locomotive will set the AESS system back to active.
- Moving the EC switch to JOG, opening the AUX cab door/raising barrier bar or entering Selftest during an auto stop cycle will cancel an auto start and require a manual start of the engine.
- **CAUTION: Locomotive speed is ignored in isolated Trail units for Auto stop/start.**

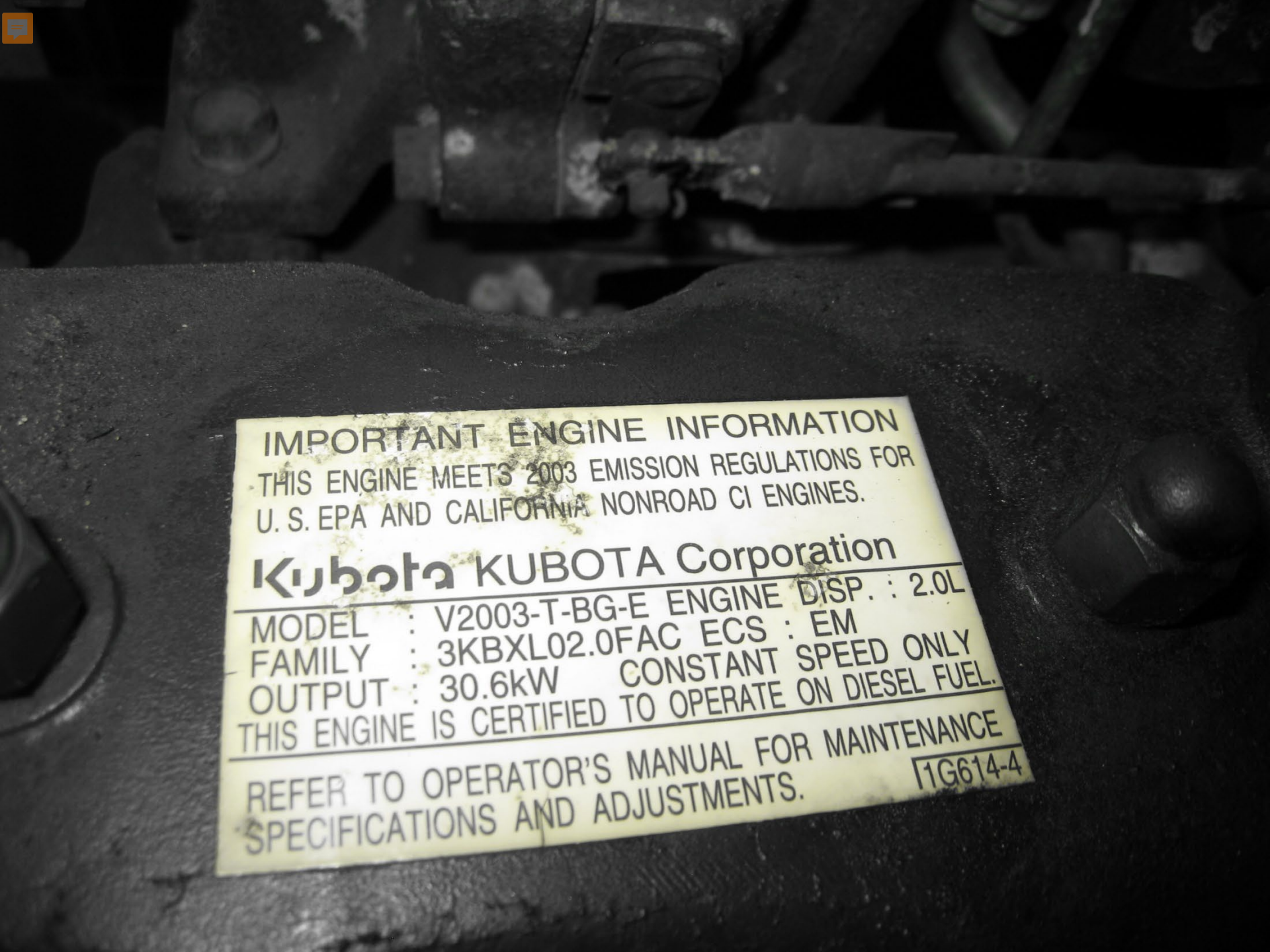
For an Automatic Stop to Occur:		For an Automatic start to occur or to require manual start:	
LOCO SET UP TRIGGERS	AUTO STOP PERMISSIONS	LOCO SET UP TRIGGERS	AUTO START PERMISSIONS
• Reverser in center. • Independent brakes are "ON" (IBS closed).# • Locomotive speed is zero.# • Throttle in idle. • EC switch is not in JOG. • AUX cab door/barrier bar (DIS) is closed. • Battery knife switch is closed. • Not in self-test.	• Oil temperature between 160˚F (71˚C) and 230˚F (110˚C). • Ambient temperature between 38˚F (3.33˚C) and 110˚F (43˚C). • Battery charge panel current between 3 amps and 150 amps. • Battery voltage between 69 volts and 85 volts. • Main reservoir above 130 psi (896 kpa). • No more than 8 Auto Stops within a 24 hour period.	• Reverser in center.* • Independent brakes are "ON" (IBS closed).* • Locomotive speed is zero.* • EC switch is not in JOG.** • AUX cab door/barrier bar (DIS) is closed.** • Battery knife switch is closed.** • Not in self-test.**	• Ambient temperature not between 40˚F (4˚C) and 120˚F (49˚C). • Battery voltage less than 63.5 volts. • Main reservoir less than 15 psi (103 kpa) above brake pipe pressure. • Auto Stop time has expired (90 to 210 minutes).
All the set up Triggers must exist for the indicated time on the DID or LDM. # Ignored in isolated Trail.	All Permission values must be in the ranges given above.	A loss of any one of the set up Triggers will either cause an auto restart (*) or require (force) a manual start (**). (see above)	Any one Permission out of range causes a restart.

AUTO ENGINE START/STOP SUMMARY MESSAGES

Auto Engine Start/Stop in Process	Automatic Engine start / stop is happening now.
Auto Engine Start Control ACTIVE	The AESS system has stopped the engine and is actively monitoring permissions and triggers.
Auto Engine Start Control NOT ACTIVE	The engine is stopped, but the AESS system is not active. At least one Loco Set Up Trigger is FALSE.
READY - Engine Stop Control NOT ACTIVE	The engine is running and the AESS is inactive.
AESS SUSPENDED for MMM:SS: Minutes	Operator successfully suspended shutdown activity. (Time will count down until suspension expires or is terminated)
Auto Stop May Occur: MMM:SS: Minutes	All Loco Set Up Triggers for Auto Stop are TRUE. (Time will count down until auto stop sequence begins or any one Trigger goes FALSE)
LIGHTS H:MM:SS (on yellow back ground)	Load Shed countdown - Time will count down and load shed turns off all lights and prior to Lights Off for 5 seconds.
LIGHTS H:MM:SS (flashing on white background)	Load Shed warning. 10 minutes after engine auto stopped for 5 seconds.

AUTO ENGINE START/STOP BELL WARNINGS

Continuous ringing while engine is running.	An automatic shutdown is about to occur.
Rings for 1 second every 5 minutes when engine is not running.	Engine is in an automatic shutdown period.
Continuous ringing when engine is not running.	An automatic start is about to occur.
AESS bell rings for 30 seconds when a non-AESS action such as a manual start or stop of the engine has occurred.	An automatic start has transitioned from enabled to disabled or vice versa.
Trainline alarm rings for 5 seconds about 10 minutes after the engine is auto stopped	The AESS system has transitioned from disabled and counting down.
Trainline alarm rings for 5 seconds about 30 minutes after the engine is auto stopped	The engine is auto stopped and load shed is active and disconnecting lights.


IMPORTANT ENGINE INFORMATION
THIS ENGINE MEETS 2003 EMISSION REGULATIONS FOR U. S. EPA AND CALIFORNIA NONROAD CI ENGINES.
Kubota KUBOTA Corporation
MODEL : V2003-T-BG-E ENGINE DISP. : 2.0L
FAMILY : 3KBXL02.0FAC ECS : EM
OUTPUT : 30.6kW CONSTANT SPEED ONLY
THIS ENGINE IS CERTIFIED TO OPERATE ON DIESEL FUEL.
REFER TO OPERATOR'S MANUAL FOR MAINTENANCE SPECIFICATIONS AND ADJUSTMENTS.
1G614-4

Inspections & Enforcement

- Inspecting certificate holders
- Complaints
- Announced vs .unannounced
- Penalties based on # locomotives, HP, etc
- HELP!
  - Larry Oeler 202-343-9289 or Michelle Ibarra 202-343-9318 (OTAQ)
- Self-disclosure and tips
  - Mario Jorquera 202-564-1079 (OECA)

THANK YOU –

QUESTIONS / DISCUSSION?

swaine.abby@epa.gov
617-918-1841