

Compression Ignition and Heavy-Duty Certification

2010 EMA Certification Workshop

May 4, 2010

California Environmental Protection Agency

 **Air Resources Board**

2010 EMA Certification Workshop

- 2010 General Certification Topics
- 2011 On-Road Certification Topics
- 2011 Off-Road Certification Topics

2010 General Certification Topics

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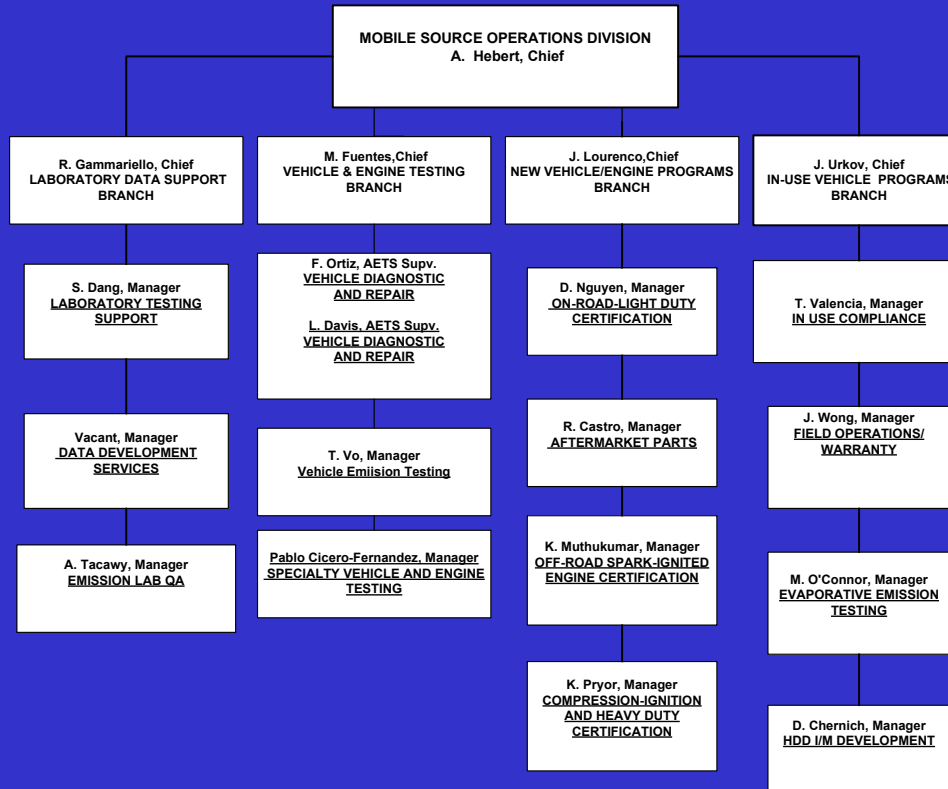
 **Air Resources Board**

2010 Certification

General Topics

- CI-HD Staffing / Responsibilities
- 2010 HD Engine Certification – Lessons Learned
- Certification Application Issues

Mobile Source Operations Division Org



Compression-Ignition and Heavy-Duty Certification

- CA-MDE (engine certified GVWR 8501~14000)
- CA-MDV (using above: exhaust and evaporative)
- On-Road HD Otto Cycle Engines (GVWR>14000)
- On-Road HD Diesel Cycle Engines (GVWR>14000)
- On-Road HD Evaporative Vehicles Certification
- On-Road HD Hybrid Vehicles (GVWR>14000)
- Off-Road Compression-Ignition Engines
- On-Road HD ZEV Approvals
- Fuel-Fired Heaters Approval (GVWR>14000)

CI-HD Staff / E-Mail Address

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On-Road Light-Duty (ONLD)-- Diesel Cert

- ONLD certifies EMA manufacturers' diesel LDT and MDV.
- Diesel SCR and AECD reviews are coordinated between CI-HD and ONLD staff.
- Current ONLD staff certifying diesels:
 - Duc Nguyen, Manager dnguyen@arb.ca.gov
 - Seongyup Kim – GM
 - Yuh Jiun Tan - Ford
 - Lucky Benedict – Chrysler, Cummins
 - Tony Martino – Mercedes
 - Bill McDuffee – VW/Audi

Lessons Learned

From 2010 Heavy-Duty Certification

- Review of Sensors Table
- Sensors Fault vs. ATD Shut-off
- Partial SCR Strategy Approval for 2010 MY
- Toxic Compound Emissions (TAC Emissions)

- ATD = After-treatment Device

Certification Application Issues

- Engine Label Testing (self-tear and durability)
- Delegated Assembly
- DF Program (35% UL w/ opt in-use program)??

Engine Label Testing

- Label self-destruct upon removal
- Durability period = 10 years or compliance period
 - Engine compartment environment
 - Normal solvent for de-greasing engine
- Provide at least TWO samples for ARB testing

Delegated Assembly (DA)

- ARB On-Road HDDE regs do not include DA, OFCI regs are the same as EPA
- On-Road HDDE may accept EPA's procedure
- Must fully describe DA procedures/audit in DMS
- Must identify DA parts

DF Program

- 2010+ ON-HHDD, Tier4i and Tier4 OFCI Engines
- Prefer 50% UL using in-use service cycle
- Optional 35% UL with 2011+ in-use validation program
 - EMA proposal??
 - Other alternatives??

2011 On-Road Certification Topics

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2011 Certification

On-Road Topics

- OBD
- SCR
- Hybrid HD Vehicle Certification
- Sensors Table → All 2010 MY Engines
- Confirmatory Testing → “cut points”
- Service Information

On-Board Diagnostics

- MY2010-2012, one engine family with OBD per non SVM (except alternative fueled engines)
 - Parent rating (highest sales) – full OBD
 - Child ratings (others) – extrapolated OBD (malfunction criteria per engineering evaluation approved by ARB)
- OBD documents to MSCD directly
- OBD approval letter from MSCD to Mfr to DMS

Upcoming SCR Workshop

- June 2010--Workshop Notice
- August 2010—Workshop in El Monte, CA
- 2010 MY SCR Strategies Need to be Improved for 2011 MY
 - Tamper Resistance
 - Emissions Compliance
- Applicable to all Mobile Source Categories

SCR Concerns

- Emission compliance requiring software and / or hardware to assure
 - Minimum SCR system downtime due to DEF maintenance and SCR system tamper
 - Minimum downtime allowed for gaming SCR system

- Cu-based or V-based SCR Catalyst: need early discuss with ARB for possible TAC emissions

Hybrid Certification

- New rulemaking effort underway for 2011CY
- Seeking rulemaking workgroup participation
 - POC = Jessica Dean (jdean@arb.ca.gov)
 - Test cycle development, test protocol development, emissions warranty and useful-life, etc.
- No changes from last year

AECD Sensors Table

- Speeds up review for 2010+ applications
- Identifies in-appropriate shut-off of critical emissions control systems
- Identifies and possibly reduces system tamper

Line Number	Sensor Name / Abbreviation	Sensed Parameter Range: High / Low (Units)	Sensor - Actual Value (unit)	Sensor / Actual Value: Low (unit)	Sensor still working? (yes / no)	Failure Detection	Failure Indication	Default Mode / threshold value	Failure Consequence	Impacts on Emissions	AECD Type	AECD Justification	ARB staff comment

On-Road Heavy-Duty

Confirmatory Test “Cut-Points”

- General policy to request confirmatory testing when result exceeds 85% of standard

On-Road Heavy-Duty Diesel Engine Self-Retest

	<u>xxHC</u>	<u>CO</u>	<u>NOx</u>	<u>PM</u>	<u>HCHO</u>
Standard	0.14	15.5	0.20	0.01	0.050
85% : retest	0.12	13.2	0.17	0.0085	0.043

Heavy-Duty Service Information

Annual Website Reports

- Website reports are mandatory
 - ARB has received few submittals from HDDE Mfrs in the past two years
 - Received submittals from only 25% of EMA members – the remaining 75% have not submitted
 - Possible penalties for non-submittal
- ARB needs Mfrs' reports to create the required annual report to the state legislature on the effectiveness of the service information regulation.

Service Information

Contact Information

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2011 OFCI Certification Topics

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2011 - OFCI

Certification Topics

- Tier-3 ~ Tier-4i / Tier-4 → Transition Topics
- DPF → Manual-only Regeneration Concern
- SCR → Implementation Concerns
- Sensors Table → All 2011 MY OFCI Engines

2011 - OFCI

Tier-3 to Tier-4 Transition Topics

- DFs carryover from Tier-3 to Tier-4(i)
- Two DFs needed for Tier-4(i) → NRTC and SS
- Carry-across of on-road DFs to off-road engines, where applicable

2011 - OFCI

Diesel Particulate Filters

- Manual-only regeneration → Approval NOT likely
 - Frequency vs. Accountability
 - excess emissions vs. control logic
- Operator Commanded Regeneration (OCR) is allowed under safe harbor provisions per ARB letter (CHC-2006-007-1)

2011 - OFCI

Selective Catalytic Reduction (SCR)

- Similar concerns addressed by On-Road SCR
- Application specific approval may be possible
- Recommended early SCR discussion with agency
- Cu and V based SCR catalyst → TAC emissions needs to be quantified (approval is an open issue)

2011-OFCI Confirmatory Test “Cut-Points”

General policy to request confirmatory testing when result exceeds 85% of Std

Category/standard	OFCI Tier - 4i Exhaust				OFCI Tier - 4 Exhaust			
	xxHC	N0x	CO	PM	xxHC	N0x	CO	PM
<8kw	*	*	*	*	7.5	8.0	*	0.40
85% : retest	*	*	*	*	6.4	6.8	*	0.34
8<kw<19	*	*	*	*	7.5	6.6	*	0.40
85% : retest	*	*	*	*	6.4	5.6	*	0.34
19<kw<37	7.5	5.5	*	0.30	4.7	5.5	*	0.03
85% : retest	6.4	4.7	*	0.26	4.0	4.7	*	0.026
37<kw<56	4.7	5.0	*	0.30	4.7	5.0	*	0.03
85% : retest	4.0	4.3	*	0.26	4.0	4.3	*	0.026
56<kw<130	0.19	3.4	5.0	0.02	0.19	0.40	5.0	0.02
85% : retest	0.16	2.9	4.3	0.017	0.16	0.34	4.3	0.017
130<kw<560	0.19	2.0	3.5	0.02	0.19	0.40	3.5	0.02
85% : retest	0.16	1.7	3.0	0.017	0.16	0.34	3.0	0.017
>560kw (MM)	0.4	3.5	3.5	0.10	0.19	3.5	3.5	0.04
85% : retest	0.34	3.0	3.0	0.085	0.16	3.0	3.0	0.034
560<kw<900 gen	0.4	3.5	3.5	0.10	0.19	0.67	3.5	0.03
85% : retest	0.34	3.0	3.0	0.085	0.16	0.57	3.0	0.026
>900kw gen	0.4	0.67	3.5	0.10	0.19	0.67	3.5	0.03
85% : retest	0.34	0.57	3.0	0.085	0.16	0.57	3.0	0.026

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