

Public Workshop to Discuss Proposed Changes to the Small Off-Road Engine Regulations

Sacramento
May 24, 2016

Diamond Bar
May 25, 2016





Today's Workshop

Background

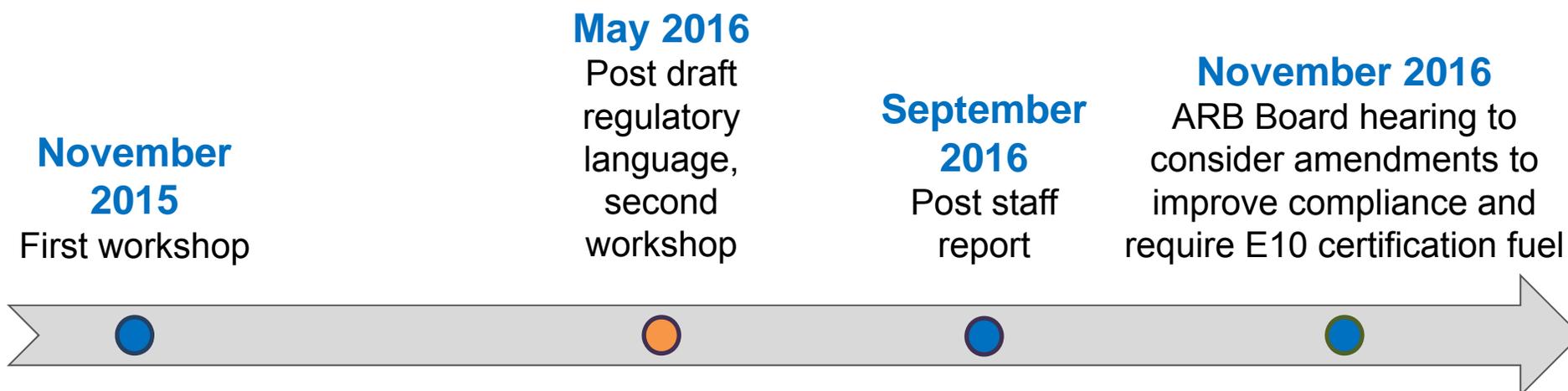
Compliance with the 2003 Evaporative Regulation

Proposed 2016 Regulatory Amendments

Development of 2018 Regulatory Proposal

Next Steps

SORE Evaporative Emissions Amendment Timeline



What Are Small Off-Road Engines?

Lawn and garden equipment



Other utility equipment and specialty vehicles



Federally regulated equipment



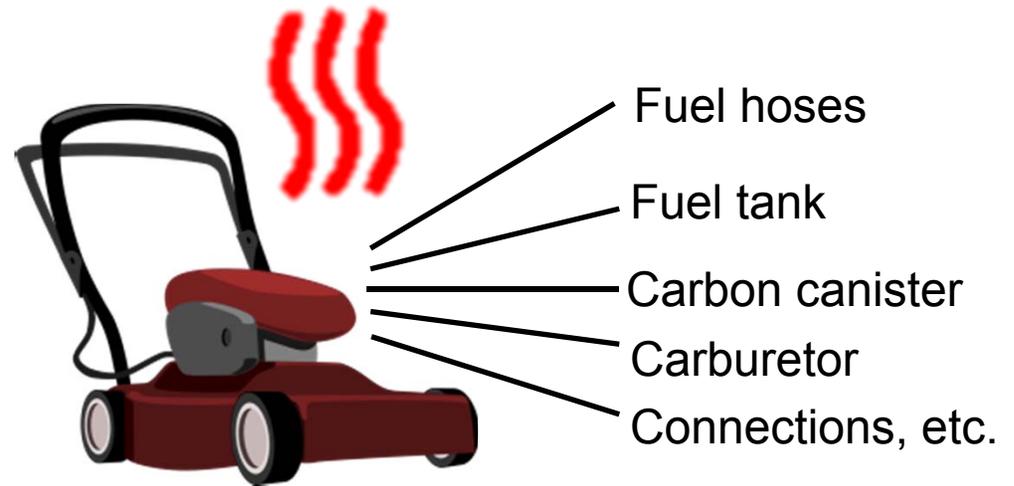
(> 45 cc)



Sources of Emissions



Exhaust and evaporative
running loss
(Operating)



Evaporative
(After operation and
during storage)



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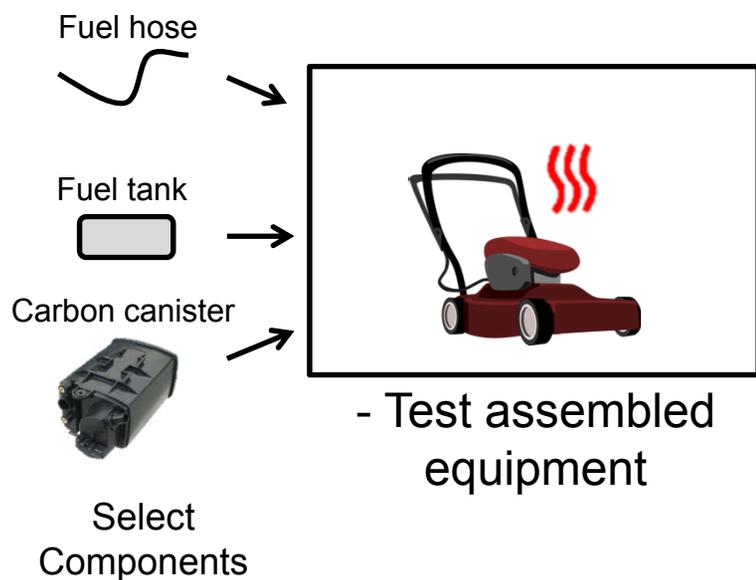
Development of 2018 Regulatory Proposal

Next Steps

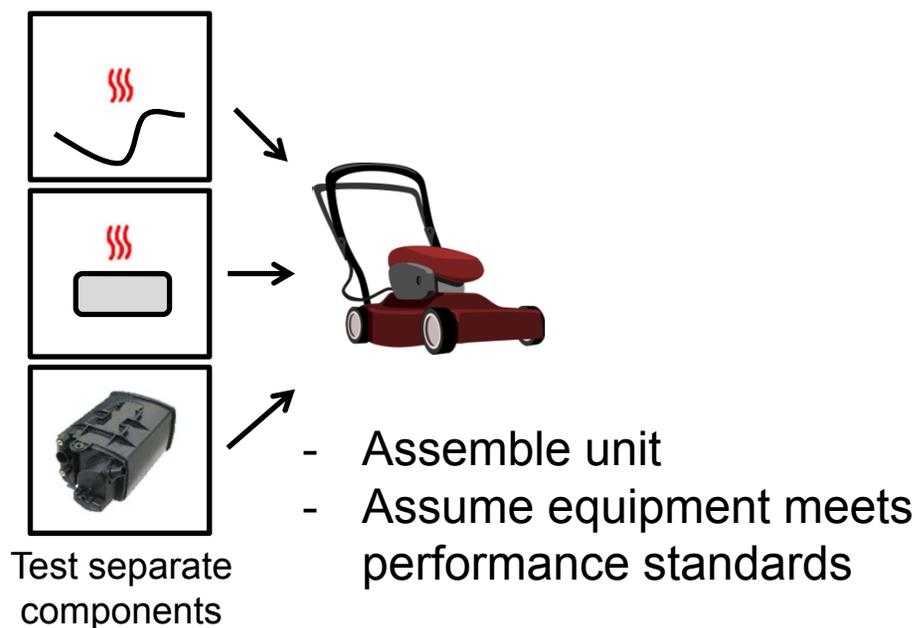
2003 Evaporative Emissions Regulation

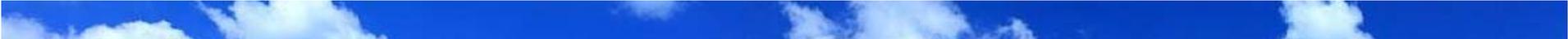
- Established first standards for evaporative emissions
- First ARB regulation to provide design certification pathway

Performance Certification



Design Certification

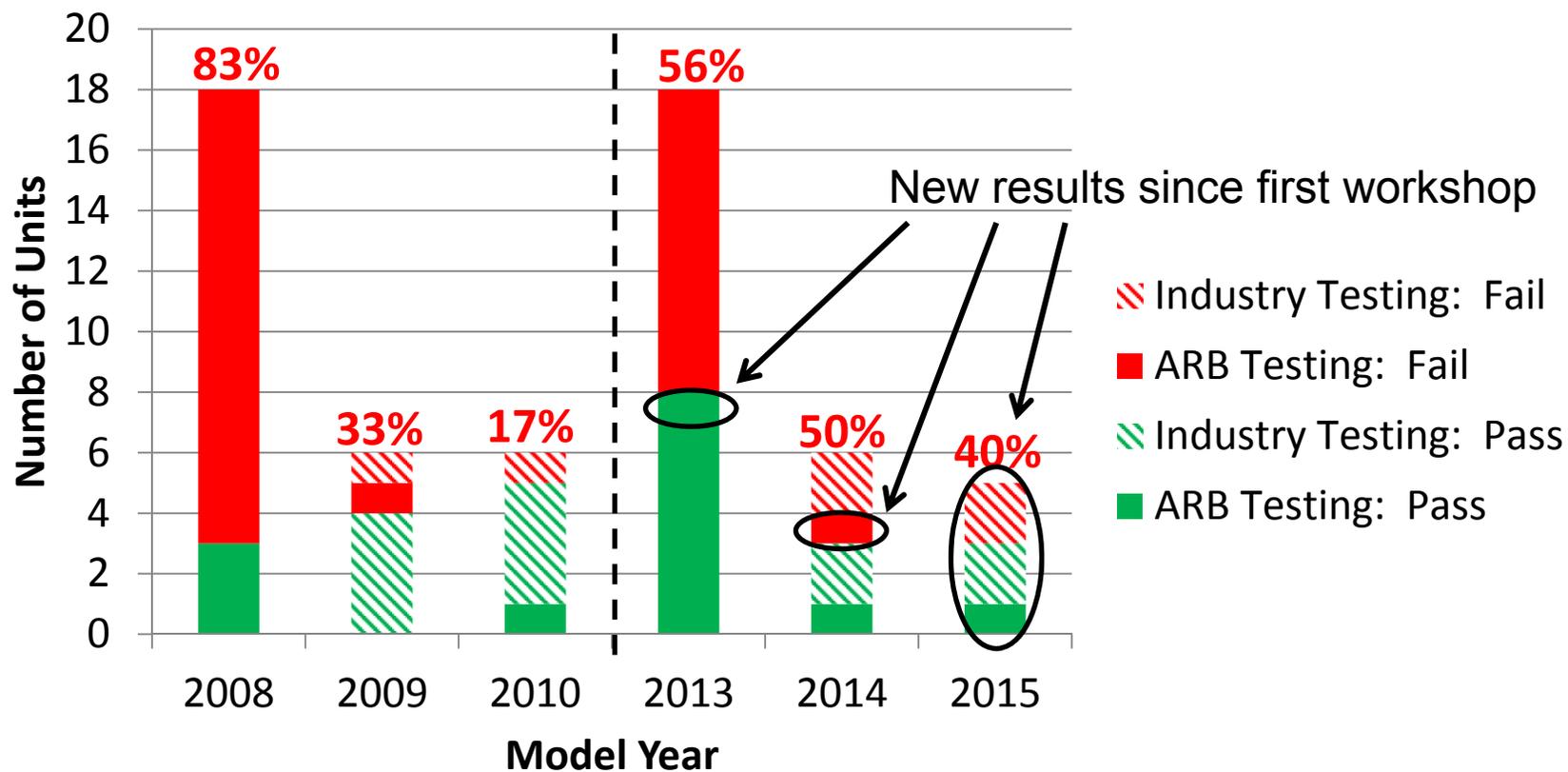




Evaporative Emissions Validation Studies

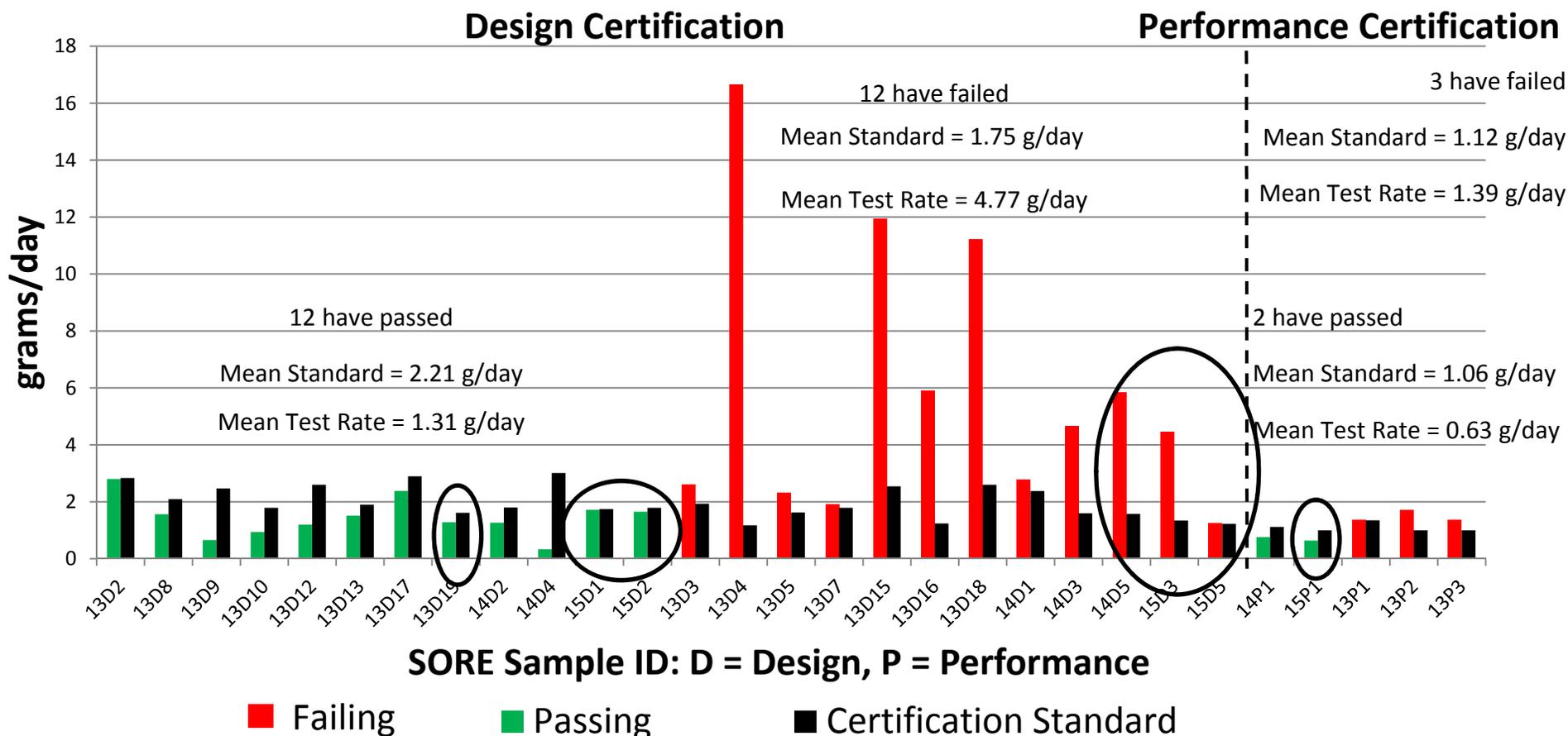
- Required by 13 Cal. Code Regs. 2754.2
 - Model years 2008-2010 and 2013-2015
 - In 2008 and 2013 – 15 design-certified and 3 performance-certified units
 - In other model years – 5 design-certified and 1 performance-certified units
- Three, 24-hour diurnal tests per unit
- Executive Officer determines whether changes to certification options are needed

SORE Validation Study Results

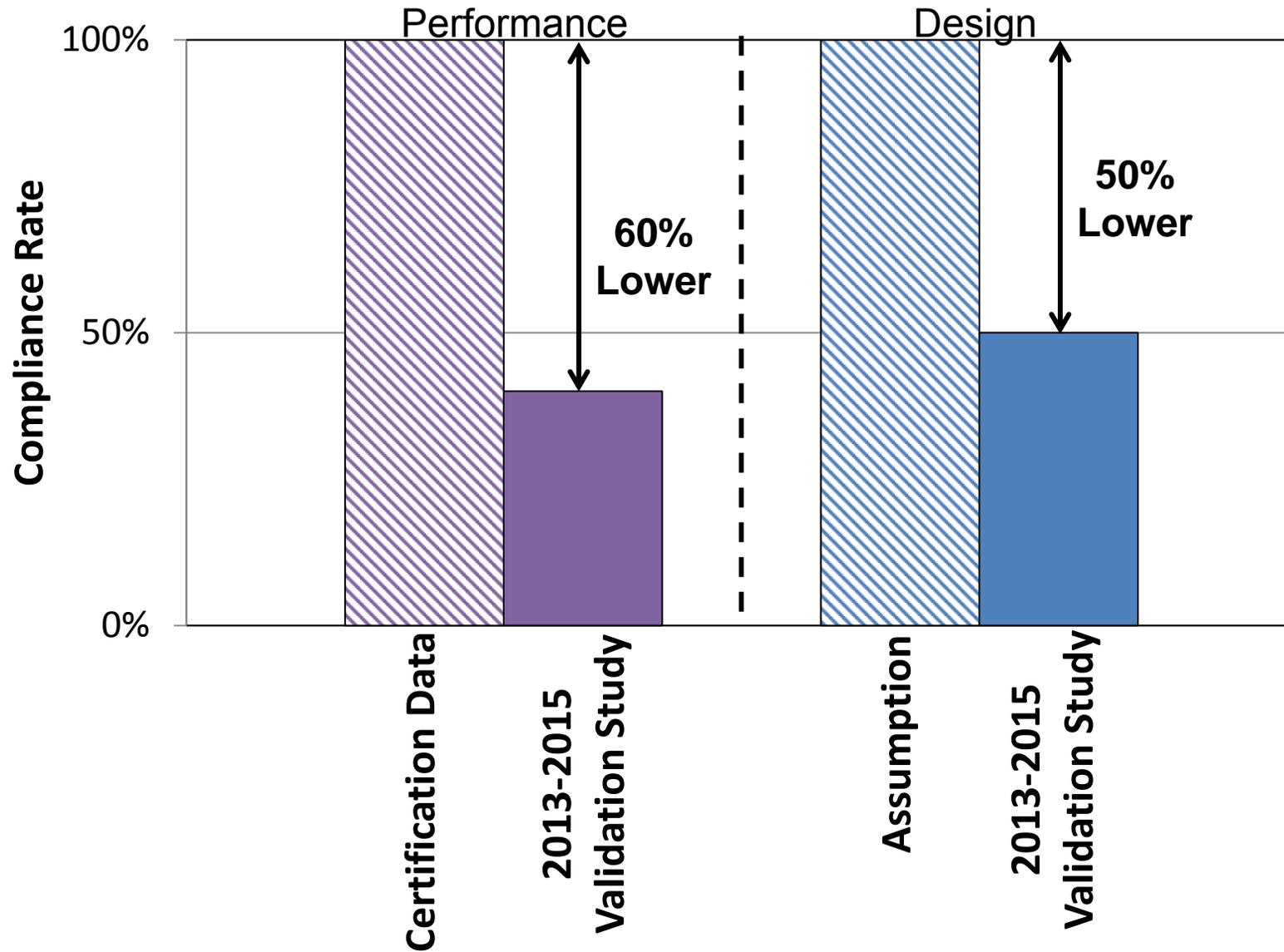


SORE MY 2013-2015 Evaporative Emission Validation Study Results

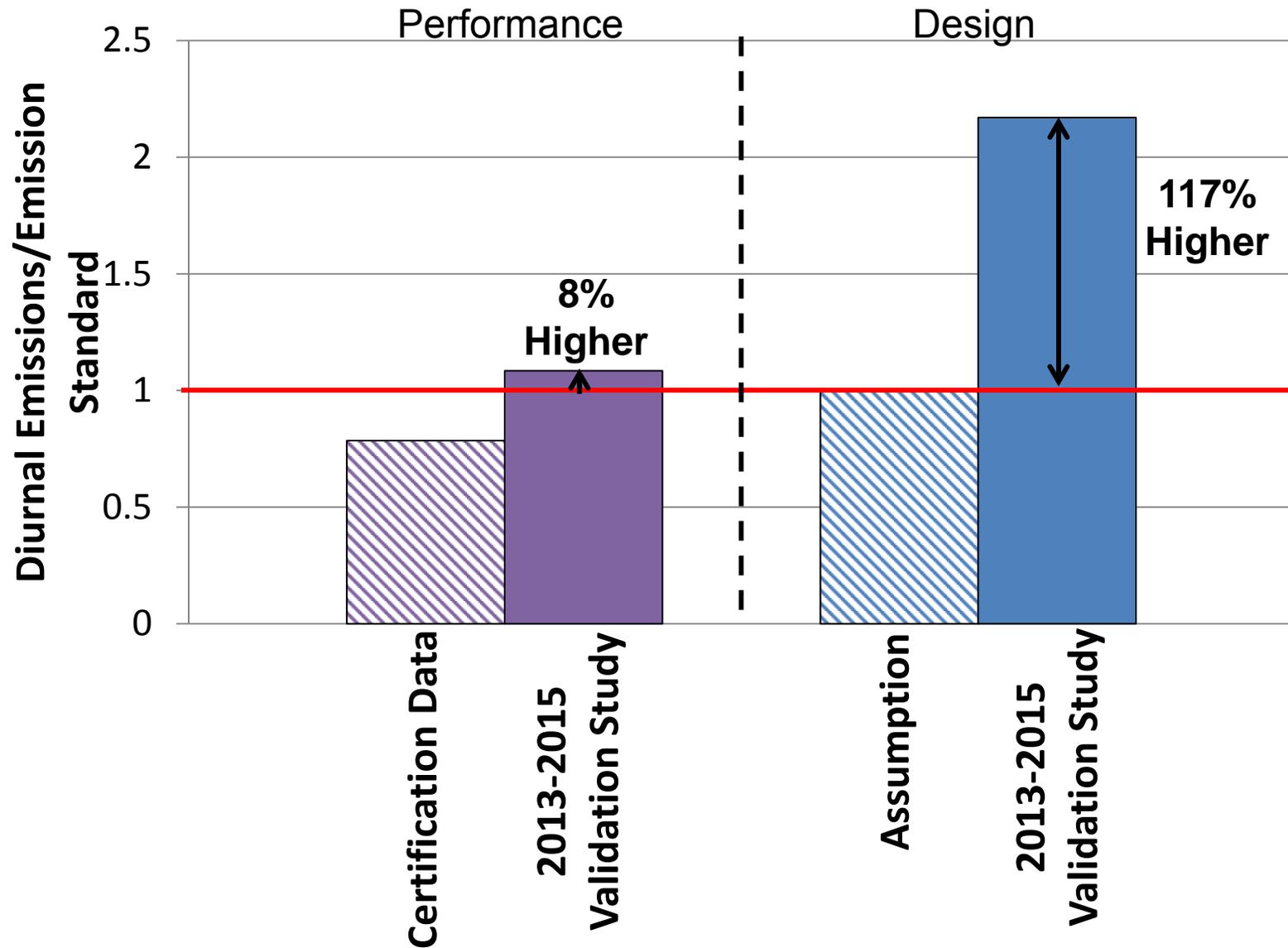
(Maximum Result of 3 Tests)



Low Compliance Rates



Higher Emissions of Design-Certified Equipment



SORE Validation Study Observations

- ARB failure rate is greater than industry failure rate
- Design-certified units fail by a larger margin
- No correlation between fuel tank volume and diurnal emissions
- Need for improvements to design certification process and streamlining SORE compliance testing

Performance Certification SHED Testing



SHED testing
measures total diurnal
emissions from a unit

Fuel hoses

Fuel tank

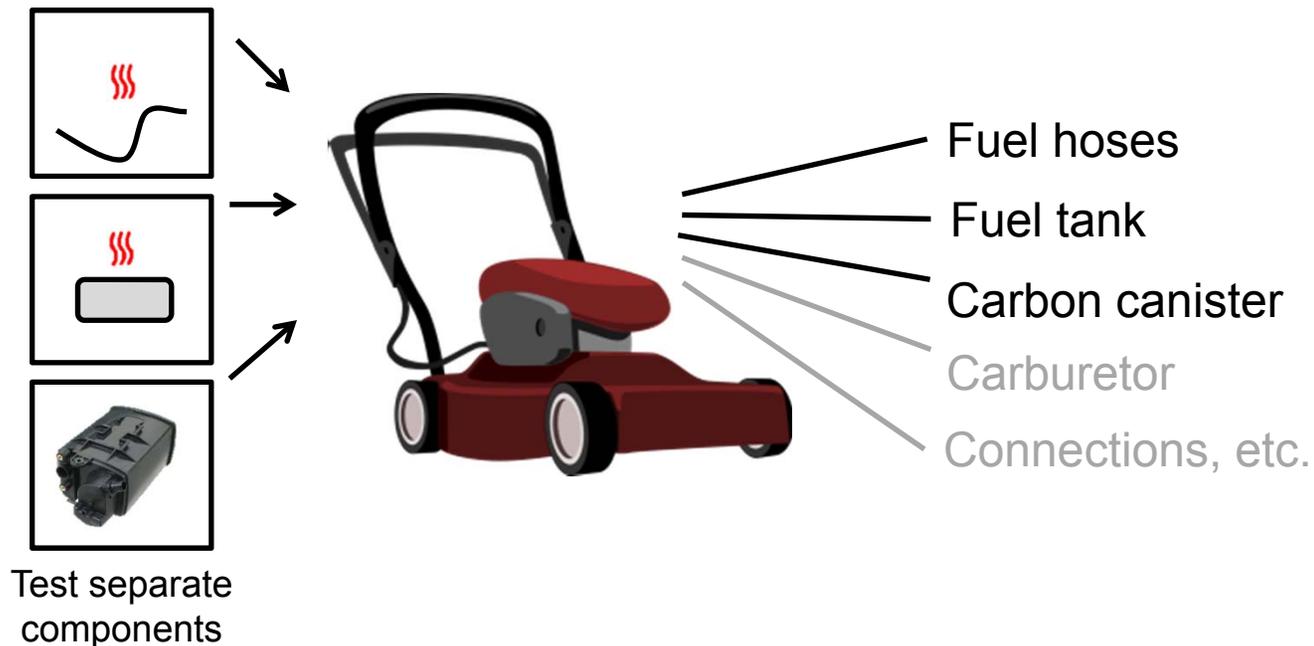
Carbon canister

Carburetor

Connections, etc.

Design Certification Component Testing

Design certification does not account for all sources of emissions, or ensure diurnal emissions less than performance standards





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Elements of 2016 SORE Rulemaking Proposal

- Assessment of certification options
- Changes to improve compliance
- Evaporative emissions certification fuel change
- Changes to certification procedure
- Streamlining test procedures

Assessment of Certification Options

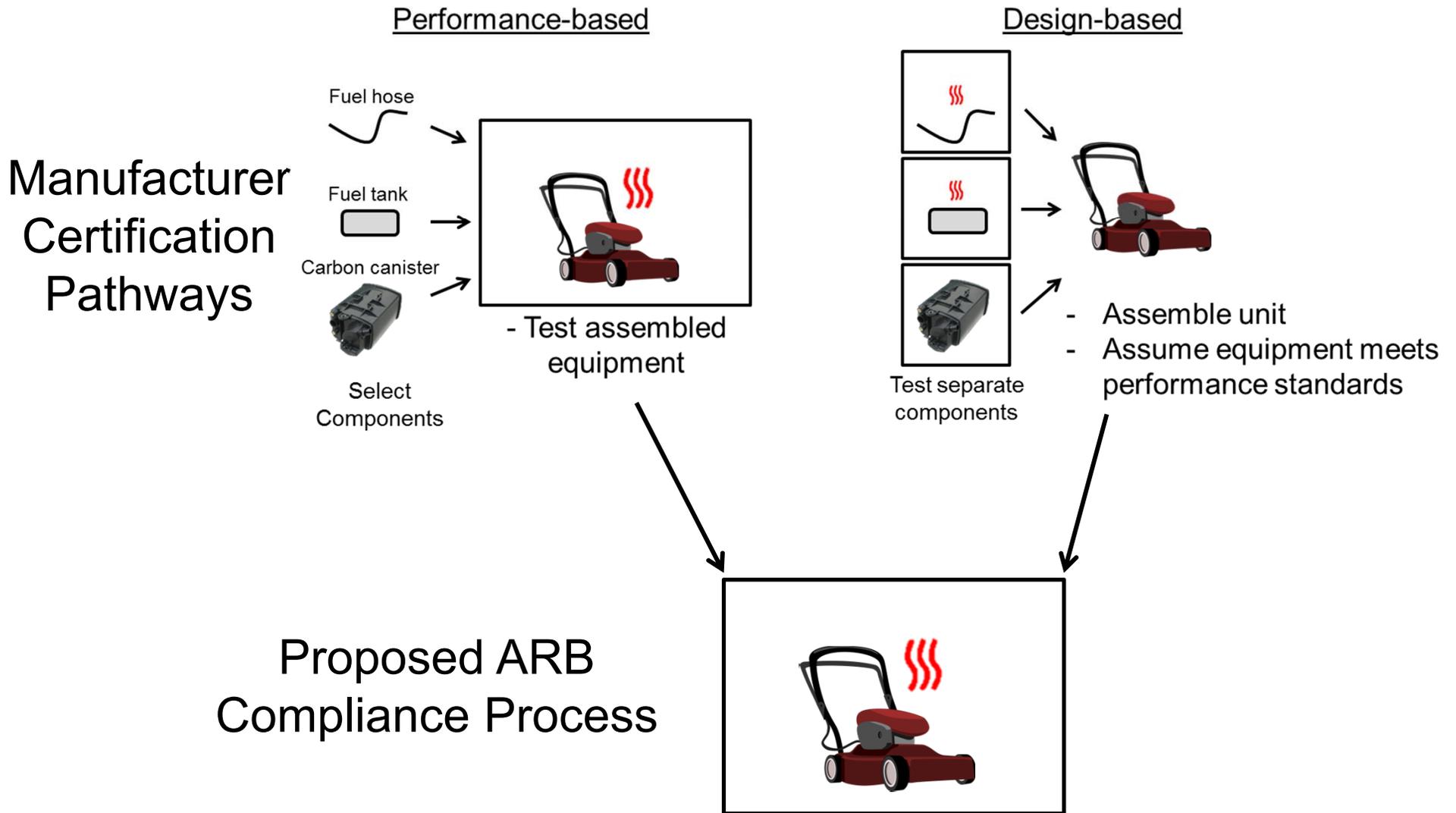
- Retain and improve current options
- Collect additional test data
- Report back to Board
- Potentially recommend eliminating design certification



Improving Compliance

- Test more evaporative families
 - Focus on design-certified equipment
 - One engine per family
- Increase accountability
 - Require bonds for manufacturers
- Require testing for all families
 - Limit exemptions

Compliance Testing Proposal



Evaporative Emissions Certification Fuel Change

- Current ARB certification fuel contains no ethanol (E0)
- E10 fuel required for MY 2020 for exhaust certification
- Require E10 fuel for evaporative emissions certification for MY 2020
 - Provides three year lead time
 - Consistent with exhaust requirement
 - Consistent with current pump fuel (Phase III RFG)
 - Diurnal emissions standards remain the same



Evaporative Emissions Certification Fuel Change – Evaluation w/ E10 Fuel

- Four-stroke lawn and garden equipment, generators
- A total of 29 units will be tested; 15 completed
- Includes some equipment from 2013-2014 validation study
 - Known failing units from validation study were eliminated

Evaluation w/ E10 Fuel – Design-Certified Equipment

Category	Number of units tested ^a	Passing	Inconclusive ^b	Failing ^c
81 – 224 cc Design	1		1	
≥ 225 cc Design	5	2	1	2

^a All equipment units were included in the 2013-2014 validation study.

^b Results without correction for ethanol exceed emission standard. Correction may yield passing result.

^c One unit selected for the E10 evaluation and validation study failed all testing after selection

Evaluation w/ E10 Fuel – Performance-Certified Equipment

Category	Number of units tested	Passing	Inconclusive ^b	Failing
81 – 224 cc Walk-behind mower	3	2	1	
81 – 224 cc Other ^a	1	1		

^a One equipment unit was included in the 2014 validation study.

^b Results without correction for ethanol exceed emission standard.
Correction may yield passing result.

Evaluation w/ E10 Fuel – Handheld Equipment

Category	Number of units tested	Passing ^a	Inconclusive ^b	Failing
≤ 80 cc	5	4	1	

^a There is no diurnal emission standard for engines ≤ 80 cc. Units with preliminary emissions below the standard for 81 – 224 cc engines are labeled passing.

^b Results without correction for ethanol exceed emission standard. Correction may yield passing result.



Proposed Changes to Certification Procedure

- Regrouping evaporative families
- Evaporative emission control system requirements
- Certification application
- Averaging, banking, and trading
- Emission labels and warranty
- 4-Year certification for evaporative components

Regrouping Evaporative Families

- In 2015, up to 29 engine families in one evaporative family
 - Multiple manufacturers and displacements
 - Evaporative emissions could vary widely
 - Certified components account for small portion of emissions
- Require one engine family per evaporative family
 - An engine family could be in multiple evaporative families
 - Submit testing data for every evaporative family

Proposed Evaporative Emission Control System Requirements

- All engines must have complete evaporative emission control systems
- Fuel tank and fuel hose permeation standards for ≤ 80 cc
- All engines > 80 cc certify to diurnal standards
 - Designate model with highest emissions relative to standard
 - Explain choice of model
 - Submit diurnal emission **OR** component test results
 - Must submit diurnal test results first year or after a violation



Certification Application

- Description of all models
 - Engine
 - Fuel hose
 - Fuel cap
 - Carbon canister
 - Fuel tank
 - Warranty parts list
- Submit all test results

Averaging, Banking, and Trading (ABT) Background

- Terms:
 - Evaporative Model Emission Limit (EMEL)
 - Evaporative Family Emission Limit Differential (EFELD)
- EFELD is calculated for “worst case”
- Confusion about “worst case” may yield unrepresentative EFELD

ABT Clarifications and Changes

- Set an EMEL for each fuel tank volume
 - Ensures limits accurately reflect emissions
- Calculate an EFELD for each EMEL
- Use lowest EFELD for credit calculation
- Credits will expire after 5 years
 - Consistent with SORE exhaust

Emission Labels and Warranty

- Equipment labels
 - Other company names can be added
 - Holder's name may not be deleted
- Component labels
 - Holder's name, EO number, model number
 - Readily visible when installed
- Warranty requirements
 - List all parts that affect emissions
 - Holders aren't required to warrant parts if abuse, etc. leads to failure

4-Year Certification for Evaporative Components

- 4-Year certification will ensure
 - Components are periodically evaluated
 - Components meet current emission standards
- Component EOs currently have no expiration
- Current certification valid until component no longer meets standards
- Consistent with other ARB programs

Streamlining Test Procedures

- Different ARB and U.S. EPA fuel tank testing requirements
- Streamlining TP-901
- Optional streamlined fuel tank testing process
- TP-902 changes

Existing ARB and U.S. EPA Fuel Tank Testing Requirements

- Requires separate tests for ARB and U.S. EPA
- Double the cost for manufacturers



- 1-3 fuel tanks
- Precondition at 28 ± 5 °C or 43 ± 5 °C
- 10 percent ethanol and 9 RVP fuel
- 4 Durability tests

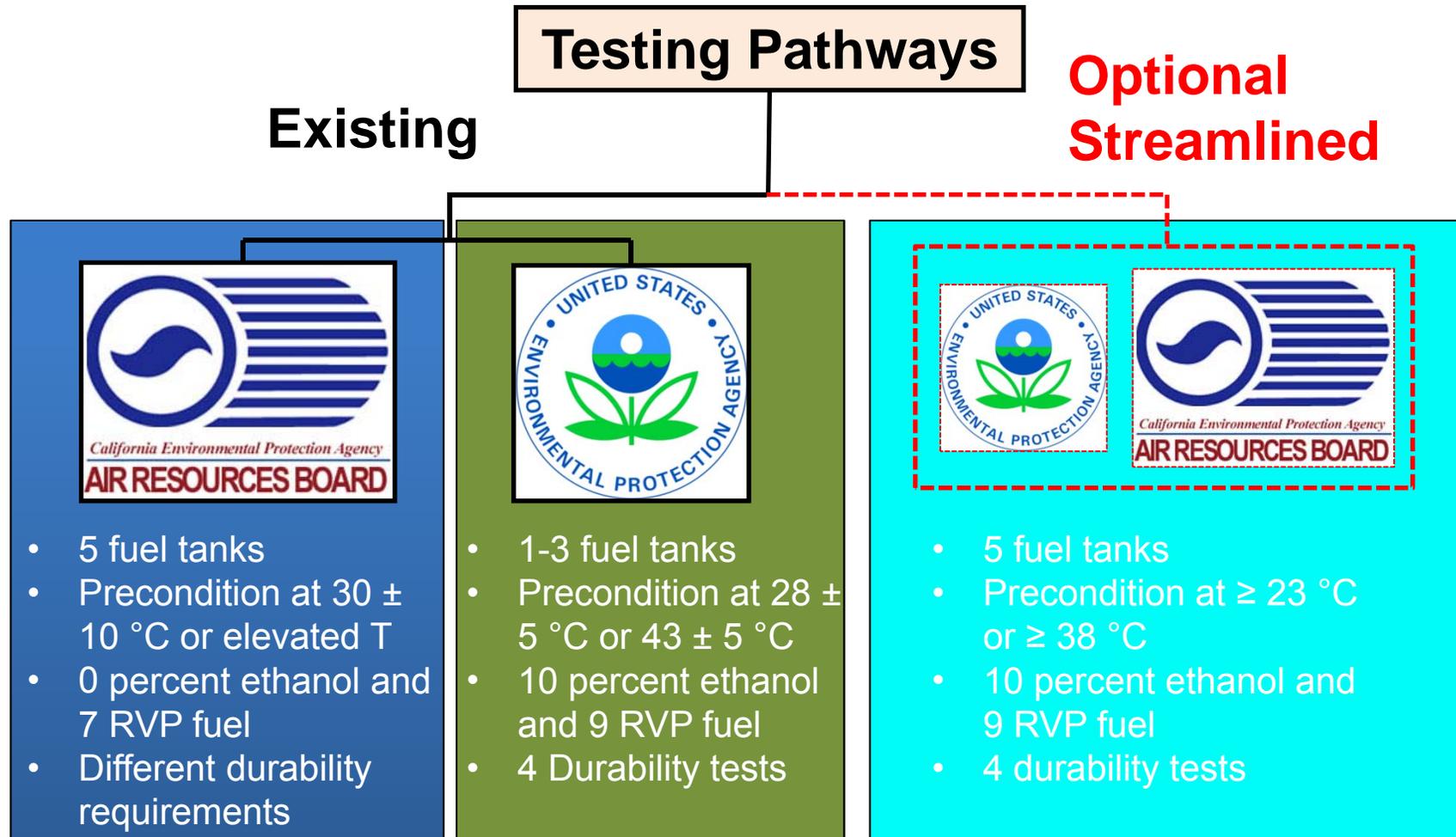


- 5 fuel tanks
- Precondition at 30 ± 10 °C or elevated temp
- 0 percent ethanol and 7 RVP fuel
- Different slosh and pressure test requirements

Streamlining TP-901

- Pressure test similar to Part 1060
- Slosh test, UV exposure, and fuel cap installations same as Part 1060
- Preconditioning requirements equivalent to Part 1060
- Test with non-permeable seal or fuel cap
- Permeation test similar to Part 1060

Proposed Optional Streamlined Fuel Tank Testing Process



TP-902 Changes

- Durability demonstration updates similar to TP-901
- Purge carbon canister by running engine
- Use actual engine or equipment volume for emissions calculations
- Measure ethanol emissions with impingers
- Running loss control determination



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Lower Emission Standards

- Goal: 80% reduction in HC (exhaust and evap) and NO_x emissions inventory by 2031
- Consider separate standards for HC and NO_x in 2022
- Testing will help determine achievable emissions rates
- Zero-emission equipment credits can offset emissions from spark-ignited engines



New Emission Standards

- Greenhouse gases
 - CO₂, CH₄, N₂O
- Particulate matter
- Evaluate near-source risk from toxics



Technology Assessment: Exhaust Testing

- 2-stroke and 4-stroke engines
- Test throughout durability period
- Retrofit with emission controls
- Cold start, hot start, and running emissions

Population and Activity Survey

- Assess SORE population
 - Residential, commercial, unlicensed, public fleets
 - Lawn & garden, industrial, rental
 - Exchange program participants
 - Telephone, personal interview
- Equipment types and usage
 - Fuel type
 - Age of equipment
 - Expected replacement timeframe
 - Weekly and seasonal usage



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Background and Regulatory History

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Next Steps



Opportunities to Provide Input

- Proposed regulatory text revisions
 - Regulation
 - Certification Procedures
 - Test Procedures
- Survey questions
- Working group

Near-Term Timeline

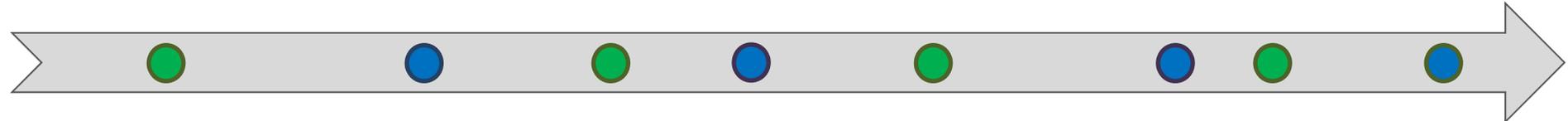
Technical Studies

Jul 2016
Finalize
population and
activity survey
paperwork

Aug 2016
Complete evap.
testing, initiate
exhaust testing
(E-10 fuel)

Nov 2016
Initiate control
technology
assessment

Early 2017
Initiate emissions
inventory update



May 2016
Second workshop,
post draft regulatory
language

Summer 2016
SORE Working
Group Meeting

Sep 2016
Post regulatory
Documents for
public comment

Nov 2016
Board Hearing
(E-10 fuel,
certification and
test procedure
amendments)

Regulatory Process

ARB Staff Contact Information

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