California Environmental Protection Agency

Air Resources Board

Final Statement of Reasons for Rulemaking

Including Summary of Comments and Agency Responses

PUBLIC HEARING TO CONSIDER THE ADOPTION OF NEW EMISSION STANDARDS, FLEET REQUIREMENTS, AND TEST PROCEDURES FOR FORKLIFTS AND OTHER INDUSTRIAL EQUIPMENT

Public Hearing Date: April 20, 2006
Postponed to: May 25, 2006
Agenda Item No.: 06-5-4

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I. GENERAL

This Final Statement of Reasons (FSOR) provides an update of the *Staff Report: New Emission Standards, Fleet Requirements, and Test Procedures for Forklifts and Other Industrial Equipment* (*Staff Report*), which was released to the public on March 3, 2006, and is incorporated by reference herein.

A. Description of Board Action

In this rulemaking, the Air Resources Board (ARB or Board) has amended sections 2430, 2431, 2433, 2434, and 2438 of title 13, California Code of Regulations (CCR) and several documents incorporated by reference therein. The Board has also adopted sections 2775, 2775.1, 2775.2, 2780, 2781, 2782, 2783, 2784, 2785, 2786, 2787, 2788, and 2789 of title 13, CCR.

The documents incorporated by reference are: 1) the amended "California Exhaust Emission Standards and Test Procedures for New 2001 and Later Off-Road Large Spark-Ignition Engines," Parts I and II; 2) the adopted "California Exhaust Emission Standards and Test Procedures for New 2007 through 2009 Model-Year Off-Road Large Spark-Ignition Engines;" 3) the adopted "California Exhaust Emission Standards and Test Procedures for New 2007 and Later Model-Year Off-Road Large Spark-Ignition Engines;" and 4) the adopted "California Exhaust and Emission Standards and Test Procedures for New 2010 and Later Model-Year Off-Road Large Spark-Ignition Engines."

These regulations meet a commitment made in the 2003 State and Federal Strategy for the State Implementation Plan, and approved by the Board on October 23, 2003, to reduce the public's exposure to hydrocarbon (HC) and oxides of nitrogen (NOx) emissions from forklifts and other industrial equipment powered by large spark-ignition (LSI) engines. The regulations achieve this by establishing: (1) lower emission

standards for manufacturers of new LSI engines, (2) fleet average emission level requirements for in-use LSI fleets, and (3) verification procedures for retrofit emission control systems.

This rulemaking was initiated by the March 3, 2006 publication of a notice for a public hearing on April 20, 2006. That hearing was subsequently postponed to May 25, 2006. The Staff Report was also made available for public review and comment starting on March 3, 2006. The Staff Report, incorporated by reference herein, described the rationale for the proposal. The notice, Staff Report, and the text of the proposed regulations were also posted on the ARB's Internet site for the rulemaking at: http://www.arb.ca.gov/regact/lore2006/lore2006.htm (ARB's Internet site for the rulemaking).

On May 25, 2006, the Board conducted a public hearing to consider adoption of the staff proposal. Written and oral comments were received at the hearing, and several parties suggested changes to the proposed regulation. The Board approved the staff's proposal with modifications that included removal of the airport ground support equipment (GSE) electrification requirement, inclusion of on-road equivalent GSE into the fleet average accounting provisions, removal of a reference to United States Environmental Protection Agency (U.S. EPA) off-highway regulations, exclusion of uncontrolled model year 2003 and 2004 rental equipment from the fleet average accounting provisions for an additional year, clarification of applicability to engines with power greater than 19 kilowatts, clarification of exhaust and evaporative emission standards, and finally, corrections to references – both test procedures and model years. At the conclusion of the hearing on May 25, 2006, the Board adopted Resolution 06-11, in which it approved the adoption of the originally proposed regulation with the modifications identified at the hearing. In accordance with section 11346.8 of the Government Code, the Board directed the Executive Officer to incorporate the identified modifications and other conforming modifications and technical amendments as may be appropriate into the proposed regulatory text and to make such modifications available for a supplemental comment period of at least 15 days. The Executive Officer was then directed either to adopt the regulation with such additional modifications as may be appropriate in light of the comments received, or to present the regulation to the Board for further consideration if warranted in light of the comments.

The text of the modifications to the originally proposed regulation and the supporting documents were made available for a supplemental 15-day comment period by issuance of a "Notice of Public Availability of Modified Text and Supporting Documents and Information" (First 15-Day Notice). The First 15-Day Notice, a copy of Resolution 06-11, and the document entitled "Modifications to the Original Proposal" were mailed on December 1, 2006, to all parties identified in section 44(a), title 1, CCR, and to other persons generally interested in the ARB's rulemaking concerning large spark-ignition engine forklifts and other industrial equipment. These documents were also published on December 1, 2006, on ARB's Internet site.

Staff subsequently discovered an oversight in the "Modifications to the Original Proposal" accompanying the First 15-Day Notice and issued an Errata notice and document on December 18, 2006. In addition to correcting the oversight, the Errata notice extended the 15-day comment deadline through January 12, 2007. The Errata notice and the document entitled "Errata" were mailed on December 18, 2006, to the same recipients as the First 15-Day Notice. These documents were also published on December 18, 2006, on ARB's Internet site.

Five written comments were received during the First 15-Day Notice comment period, and staff proposed additional minor modifications in response to these comments. These modifications were explained in detail in the second Notice of Public Availability of Modified Text that was issued for a 15-day public comment period that began on February 1, 2007, and ended on February 16, 2007 (Second 15-Day Notice, which is incorporated by reference herein). This second notice, along with a copy of the modified text was mailed to all parties identified in section 44(a), title 1, CCR, and to other persons generally interested in the ARB's rulemaking for large spark-ignition engine forklifts and other industrial equipment. These documents were also published on February 1, 2007, on ARB's Internet site.

This FSOR updates the Staff Report by identifying and explaining the modifications that were made to the original proposal as a result of public comment and staff analysis after the Staff Report was issued. The FSOR also summarizes written and oral comments submitted to the Board on the proposed regulatory text during the formal rulemaking process and the ARB's responses to those comments.

Responses to comments made during the 45-day public comment period preceding the May 25, 2006 Board hearing are presented in section IV of this FSOR. Responses to comments made during the First 15-Day Notice comment period for the modifications discussed in section II are presented in section V of this FSOR. Responses to comments made during the Second 15-Day Notice comment period for the modifications discussed in section III are presented in section VI of this FSOR.

B. Additional References Identified

The ARB has identified three additional references that it is relying on in adopting article 2, Large Spark Ignition (LSI) Engine Fleet Requirements, within chapter 15, division 3, title 13, CCR:

> Almond Hullers and Processors Association flowchart of tree nut processing (California Almond Hullers & Processors Association, Huller/Sheller Good Manufacturing Practices and Sanitation Manual; from Almond Hullers and Processors Association website copyrighted 2003)
>
> Discussion of almond processing (United States Environmental Protection Agency, AP 42, Fifth Edition, Volume 1, Chapter 9: Food and Agricultural Industries; January 1995)

United States Census Bureau North American Industry Classification System (NAICS) codes for post harvest crop activities and food processing (2002 NAICS Definitions 115114 and 311423; May 5, 2003)

The NAICS code definition for "Postharvest Crop Activities," Industry 115114 is also incorporated by reference into title 13, CCR, section 2775(d).

In accordance with section 11347.1 of the Government Code, ARB published a supplemental notice of the addition of these references to the rulemaking file and as an incorporated reference within title 13, CCR, section 2775(d).

C. Documents Incorporated by Reference

Seven new and amended test procedures are incorporated by reference in CCR, title 13, section 2434. These test procedure documents in turn incorporate certification test procedures adopted by the U.S. Environmental Protection Agency (U.S. EPA) and contained in 40 Code of federal Regulations (CFR) Parts 1048, 1065, and 1068. Also incorporated by reference directly into section 2434 are provisions from 40 CFR Part 1048. One of the above mentioned seven test procedures is also incorporated by reference in CCR, title 13, section 2783. Section 2783 along with CCR, title 13, sections 2784 and 2789 also directly incorporate by reference test procedures from 40 CFR Parts 1048 and 1065. Lastly a definition from the U.S. Census Bureau's North American Industry Classification System (NAICS) is incorporated by reference into CCR, title 13, section 2775.

Each instance of incorporation identifies the incorporated document by title and date. The ARB documents are readily available from ARB upon request and were made available in the context of this rulemaking in the manner specified in Government Code section 11346.5(b). The CFR is published by the Office of the Federal Register, National Archives and Records Administration, and is therefore reasonably available to the affected public from a commonly known source. The NAICS definition is published in the North American Industry Classification System − United States, 2002, available through the U.S. Census Bureau, and is therefore reasonably available to the affected public from a commonly known source.

The test procedures and the definition are incorporated by reference because it would be cumbersome, unduly expensive, and otherwise impractical to print them in the CCR. Existing ARB administrative practice has been to have the test procedures, guidelines, specifications, and similar documents incorporated by reference rather than printed in the CCR because these procedures, specifications, and guidelines are highly technical and complex. The test procedures include the "nuts and bolts" engineering protocols and laboratory practices required for certification and testing of LSI engines and have a very limited audience. Because ARB has never printed complete test procedures and guidance documents in the CCR, the directly affected public is accustomed to the incorporation format. The ARB's test procedures as a whole are extensive and it would be both cumbersome and expensive to print these lengthy, technically complex

procedures with a limited audience in the CCR. Printing portions of the ARB's test procedures that are incorporated by reference would be unnecessarily confusing to the affected public.

D. Fiscal Impacts

Pursuant to Government Code section 11346.9(a)(2), ARB has determined that the amended and adopted regulations may impose a mandate upon or create costs or savings, as defined in Government Code section 11346.5 (a)(6), to school districts and local agencies. Beginning in 2010, local public entities operating equipment affected by these regulations may incur minor increases in cost ($80 per unit) when purchasing new equipment. The increased statewide cost to local public entities for new equipment is estimated to be $20,500 annually. Also in 2009, local public entities that operate four or more forklifts and/or other pieces of industrial equipment with large spark-ignition engines may incur costs ranging from $0 to $240,000 to comply with the requirements for fleet users, depending on the fleet size. However, reduced operating costs are expected to offset the bulk of the initial costs over the equipment's life.

Similarly, beginning in 2010, state agencies operating equipment under this proposal may incur minor increases in new equipment cost ($80 per unit). The total increased cost to state agencies for new equipment is estimated to be $6,900 annually. In 2009, state agencies that operate four or more forklifts and/or other pieces of industrial equipment with large spark-ignition engines may also incur costs ranging from $0 to $80,000 to comply with the requirement for fleet users, depending on the fleet size. However, reduced operating costs are expected to offset the bulk of the initial costs over a five-year timeframe.

E. Consideration of Alternatives

The regulations considered in this rulemaking were the subject of discussions involving staff and the affected manufacturers, sellers (including rental and lease equipment), owners, and operators of LSI engine-powered forklifts and other industrial equipment in California. A discussion of alternatives to the initial regulatory proposal is found in Chapter 7 of the Staff Report. The alternatives included an electric equipment purchase requirement and accelerated and more extensive in-use retrofit requirements. For the reasons set forth in the Staff Report, the staff's presentation at the hearing, and this FSOR, the Board has determined that none of the alternatives considered by the agency would be more effective in carrying out the purpose for which the regulatory action was proposed or would be as effective and less burdensome to affected private persons than the action taken by the Board.

II. MODIFICATIONS MADE TO THE ORIGINAL PROPOSAL (FIRST 15-DAY NOTICE)

At the May 2006 hearing, the Board approved the regulation and proposed modifications. Furthermore, the Board directed staff to work with stakeholders regarding modifications or clarifications to the approved regulation. The following is a description of the modifications and clarifications, by section number.

A. Article 4.5. Off-Road Large Spark-Ignition Engines

Title 13, California Code of Regulations, § 2430. Applicability
(a)(1) The engine size to which the proposal applies is clarified. The existing California LSI engine regulations define the engine as one that produces a power of 25 horsepower or greater (≥), and the emission standards are stated in terms of grams per brake horsepower-hour (g/bhp-hr). In contrast, the U.S. Environmental Protection Agency (U.S. EPA) uses kilowatt as the unit of power for these same engines, and the federal standards are expressed in terms of grams per kilowatt-hour (g/kW-hr). Additionally, the newly amended California small off-road engine regulations apply to engines that produce a gross power at or below (≤) 19 kW. This results in a temporary overlap in the California regulatory definition of large versus small off-road engines (e.g., engines with displacement equal to 19 kW can either be certified under small off-road engines or LSI regulations). The modifications provide consistency with the federal program definition of engine size and address the overlap by clarifying that engines certifying in California at 19 kW [25 horsepower] would certify as small off-road engines.

(a)(3) The reference to the U.S. EPA's Off-Highway regulations is removed as the reference to U.S. EPA's program could leave gaps in regulatory coverage and uncertainty to interested parties regarding how vehicles are classified. ARB staff's modifications to ARB's Off-Highway Recreational Vehicles regulations presented at the July 20, 2006 Public Hearing provides additional clarification as to how these vehicles are classified.

Title 13, California Code of Regulations, § 2431. Definitions
(a)(19) A definition is added for "family emission level or FEL." This definition prescribes the HC+NOx and CO emission level numbers to be used in the alternative emissions certification formula contained in section 2433 (b)(2).

(a)(28) The definition is amended to address kilowatts as a unit of power as described for the change made in section 2430(a)(1).

Title 13, California Code of Regulations, § 2433 Emission Standards and Test Procedures – Off-Road Large Spark-ignition Engines
(b)(1) For clarification, this section is divided into subparagraphs (b)(1)(A) and (b)(1)(B). Subparagraph (b)(1)(A) contains the required exhaust emission standards while (b)(1)(B) contains the optional exhaust emission standards. Additionally, a correction is

made to the first row of the table in subparagraph (b)(1)(A) to show that the exhaust emission standards in that row are for engines with displacement of equal to or less than one liter. The symbol for "equal to" was inadvertently omitted from the table. Errors in the standards table and the optional standards table for the carbon monoxide standard for model years 2007 through 2009 and for model year 2010 and subsequent are corrected. The carbon monoxide standard has been harmonized with the federal standard and the alternative certification formula contained in subparagraph (b)(2).

(b)(2) An optional certification formula is added to be consistent with U.S. EPA. The term "family emission level" is added to clarify that the HC+NOx and CO numbers used in the formula do not have to be actual test results. This term is more consistent with U.S. EPA's intent to provide engine manufacturers another engine certification element.

(b)(4)(A) A clarification to the evaporative emissions standards is added to apply the requirements to engines over one liter, consistent with the federal program.

(b)(4)(D) An option to use design-based certification for the evaporative emission standards is added to be consistent with the federal program.

(c) The references for the incorporated test procedures for determining certification and compliance with the standards for exhaust emissions are corrected and added.

Title 13, California Code of Regulations, § 2438. In-Use Compliance Program
(e)(7)(A) The term "STD" in the credit calculation is redefined by adding the phrase "or family emission level" after the phrase "the emission standard."

B. Incorporated "California Exhaust Emission Standards and Test Procedures for New 2001 through 2006 Off-Road Large Spark-Ignition Engines, Part I" (40 CFR, Part 86, Subpart A)

A second reference is added to the applicability section to reflect that there is now a second document prescribing exhaust emission standards and test procedures for small off-road engines (2005 and later). The last amended date of the first document (1995-2004) is corrected.

C. Incorporated "California Exhaust and Evaporative Emission Standards and Test Procedures for New 2007 through 2009 Off-Road Large Spark-ignition Engines" (40 CFR, Part 1048)

The caption for the incorporated standards and test procedures for model years 2007 through 2009 is corrected to reference the applicable engine model years and that there is only a single applicable procedure for the 2007 though 2009 model years based on 40 CFR, Part 1048.

§1048.101 What exhaust emission standards must my engines meet?
(a)(2) The portion of the emission standards table presented in Title 13, California Code of Regulations, Article 4.5, section 2433 (b)(1)(A) for 2007 through 2009 model year engines is reiterated here. This reflects ARB practice of including standards in test procedures and identifies these as California standards. The standards for LSI engines with a total displacement of 1000 cc or less are also reiterated.

(e) The subsection numbering scheme is changed for consistency.

(f) Language is changed to clarify that smaller engines within the LSI category (at or less than 1.0 liter displacement) must certify under the standards for LSI engines, and not the standards for small off-road engines. The applicability section states that small off-road engines are those with a brake horsepower of 19 kW or less; those engines must certify to the applicable standards in Title 13, California Code of Regulations, Chapter 9, Article 1.

§1048.140 What are the provisions for certifying Blue Sky Series engines?
The section on Blue Sky Series engines and Blue Sky standards is replaced by a section on optional lower-emission standards (OLES) engines. This conforms to the establishment of OLES engines in the 2007-2009 time frame in Title 13, California Code of Regulations, § 2433 Emission Standards and Test Procedures – Off-Road Large Spark-ignition Engines.

§1048.401 What testing requirements apply to my engines that have gone into service?
(b)(1) The change proposed for this section is deleted. This section was originally replaced in error because the reference to number of engines was believed to be related to the small business definition. In actuality, the number is related to production line testing and should be consistent with the U.S. EPA number.

§1048.615 What are the provisions for exempting engines designed for lawn and garden applications?
This section is deleted. The U.S. EPA provides manufacturers an option to certify engines with a total displacement of 1000 cc or less as small off-road engines in section 1048.101(f) and this section provided associated requirements. However, the ARB has modified section 1048.101(f) to stipulate that small engines are now considered to be LSI engines unless they have a brake horsepower of 19 kW or less. Thus, there is no need for the requirements contained in section 1048.615.

D. Incorporated "California Exhaust and Evaporative Emission Standards and Test Procedures for New 2010 and Later Off-Road Large Spark-ignition Engines (40 CFR, Part 1048)

§1048.101 What exhaust emission standards must my engines meet?
(a)(2) The portion of the emission standards table presented in Title 13, California Code of Regulations, Article 4.5, section 2433 (b)(1)(A) for 2010 and later model year engines

is reiterated here in a format consistent with section 1048.101 (a)(2) in the Incorporated "California Exhaust and Evaporative Emission Standards and Test Procedures for New 2007 through 2009 Off-Road Large Spark-ignition Engines" (40 CFR, Part 1048). The standards for LSI engines with a total displacement of 1000 cc or less are also reiterated.

(e) The subsection numbering scheme is changed for consistency.

(f) Language is changed to clarify that smaller engines within the LSI category (at or less than 1.0 liter displacement) must certify under the standards for LSI engines, and not the standards for small off-road engines. The applicability section states that small off-road engines are those with a brake horsepower of 19 kW or less; those engines must certify to the applicable standards in Title 13, California Code of Regulations, Chapter 9, Article 1.

§1048.120 What emission-related warranty requirements apply to me?
The formula for determining the dollar value of a high-cost part is corrected by subscripting the "n" in "Limitn" and the "n-2" in the term "CPI n-2."

§1048.140 What are the provisions for certifying Blue Sky Series engines?
The section on Blue Sky Series engines and Blue Sky standards is replaced by a section on optional lower-emission standards (OLES) engines. This conforms to the establishment of OLES engines in the 2010 and later time frame in Title 13, California Code of Regulations, § 2433 Emission Standards and Test Procedures – Off-Road Large Spark-ignition Engines.

§1048.401 What testing requirements apply to my engines that have gone into service?
(b)(1) The change proposed for this section is deleted. This section was originally replaced in error because the reference to number of engines was believed to be related to the small business definition. In actuality, the number is related to production line testing and should be consistent with the U.S. EPA number.

§1048.615 What are the provisions for exempting engines designed for lawn and garden applications?
This section is deleted. The U.S. EPA provides manufacturers an option to certify engines with a total displacement of 1000 cc or less as small off-road engines in section 1048.101(f) and this section provided associated requirements. However, the ARB has modified section 1048.101(f) to stipulate that small engines are now considered to be LSI engines unless they have a brake horsepower of 19 kW or less. Thus, there is no need for the requirements contained in section 1048.615.

E. Article 2. Large Spark-Ignition (LSI) Engine Fleet Requirements

Title 13, California Code of Regulations, § 2775(d) Definitions

"Agricultural Crop Preparation Services"
The Agricultural Crop Preparation Services definition is clarified by defining the word "dehydrators" and the phrase "nut hullers and processors," and by modifying the phrase "and other related activities" to read "and other related activities that fall within the United States Census Bureau NAICS definition for Industry 115114 – Postharvest Crop Activities." The definition further clarifies "and other related activities" by excluding manufacturing activities such as the freeze drying of fruits and vegetables, the slicing and dicing of garlic or onions, the flaking of potato products, and the making of bouillon, noodle mixes, rice mixes, soup mixes, sauce mixes, and salad dressing mixes.

These clarifications and modifications respond to inquiries from affected businesses about the intent of the word "processors" in the phrase "nut hullers and processors," the intent of the word "dehydrators," and the intent of the phrase "and other related activities." They also reflect our intent that the "Agricultural Crop Preparation Services" definition follows the United States Census Bureau NAICS (North American Industry Classification System) definition for "Postharvest Crop Activities" as closely as possible.

"Airport Ground Support Equipment"
Language is added to the definition to clarify that some of the categories of equipment to be included in the fleet average calculations are vehicles designed for on-road use, but dedicated to GSE operations and not licensed for on-road use. This definition is based on the 24 categories of equipment included in section B.3. of Appendix 2 of the South Coast Ground Support Equipment (GSE) Memorandum of Understanding, dated November 27, 2002.

"Dehydrators"
A definition is added to clarify the use of the word "dehydrators" in the "Agricultural Crop Preparation Services" definition. The definition closely follows the intent of "sun drying" in the United States Census Bureau NAICS definition for Industry 115114 – Postharvest Crop Activities, but additionally includes the artificially drying and dehydrating portion of the manufacturing processes included in the NAICS definition for Industry 311423 – Food Processing.

"Fleet Average Emission Level"
The phrase "or verification level (absolute emissions)" is appended to the phrase "emissions certification standard" to reflect that the operator's fleet average emission level calculations include in-use equipment with verified retrofit emissions control systems. Verified retrofits are one of the tools for compliance with the fleet average emission level requirements, and definitions for "retrofit," "verification," and "verification level" were all included in section 2775(d). Additionally, section 2772(e)(1)(A) was originally included to provide for extensions to the fleet average compliance dates if retrofit emission control systems are not verified or commercially available.

For on-road equivalent GSE, the definition provides assumed HC+NOx emission levels to provide a uniform basis for calculating the fleet average for this equipment.

The g/kW-hr equivalent emissions are added to the definition. This is consistent with our effort to provide the g/kW-hr conversion in all places where emissions have been listed in g/bhp-hr.

Additional language is added to the definition to clarify that fleet operators may exclude electric-powered equipment from their fleet average emission level calculations. This allows operators the flexibility to apply electric equipment in excess of that needed to comply with the LSI fleet average emission level calculations to be applied to non-LSI fleet average requirements as are being proposed in the off-road compression ignition engine rulemaking.

"Label"
The label definition requires that new engine labels specify the emission standard to which the new engine certified. Modifications to the definition clarify that all engines with retrofit emission control systems are required to have a label specifying the verification level (absolute emissions) to which the engine is verified.

"Military Tactical Support Equipment"
The Military Tactical Support Equipment definition is modified to be consistent with the same definition in other Board regulations, in particular, adding the phrase "or its allies." This modification responds to requests from military representatives to be consistent in our definition.

"Nut Hullers and Processors"
A definition is added to clarify the use of the word "processors" in the "Agricultural Crop Preparation Services" definition. The definition distinguishes the activities that fall within the United States Census Bureau NAICS definition for Industry 115114 – Postharvest Crop Activities from those which do not.

"Verification Level"
The g/kW-hr equivalent absolute emission level has been added to Table 1. This is consistent with our effort to provide the g/kW-hr conversion in all places where emissions have been listed in g/bhp-hr.

"Zero Emission Vehicle" or "ZEV"
The definition is deleted as it is no longer necessary because the requirements in section 2775.1(b) for a specified portion of ground support equipment to be ZEV equipment has been deleted.

Title 13, California Code of Regulations, § 2775.1. Standards

(a) Language has been added to clarify that operators must first establish their fleet size before identifying exceptions and subsequent fleet average emission level

requirements. This language conforms to the intent of the original language but more clearly spells out for operators that they may not exclude equipment before determining fleet size.

(a)(2) The fleet average emission standards are based on the assumption that all equipment procured by dealers or operators in 2004 would have controlled engines. This was not the case as model year 2004 equipment contained in many instances uncontrolled engines produced in 2003. To alleviate the economic burden on dealers who would otherwise be responsible for addressing this equipment, new language has been added to exempt uncontrolled 2004 rental equipment from the operator fleet average calculations for an additional year and equipment leased prior to May 25, 2006.

(b) Requirements related to requiring a specified percentage of ground support equipment at airports in the South Coast Basin to be zero emission equipment has been deleted because air carriers have demonstrated that they have already attained the specified percentage of electric equipment and have assured the Board that factors operating in the south coast air basin will act to increase the electric component over time.

(c)(3) The exclusion for rental and leased forklifts in agricultural crop preparation services fleets now provides an additional year for equipment with uncontrolled 2003-2004 model year engines. The original exclusion required all rental and leased forklifts to be controlled to a 3.0 g/bhp-hr emission standard or better on or after January 1, 2009. The extension of the exclusion takes into account the lifetime of the rental and leased forklifts with uncontrolled 2003-2004 model year engines. These leased forklifts are now excluded from the 3.0 g/bhp-hr emission standard for the life of the lease or until January 1, 2010 as long as the lease agreement was initiated before the Board hearing. These rental forklifts are now excluded from the 3.0 g/bhp-hr emission standard until January 1, 2010.

Title 13, California Code of Regulations, § 2775.2. Compliance Requirements for Fleet Operators

(a) Language is changed in this section to clarify that only medium and large facilities (those subject to the requirements in 2775.1(a)) are required to conduct a baseline inventory.

(b) Language is changed in this section to clarify that only medium and large facilities (those subject to the requirements in 2775.1(a)) are required to keep records. The record keeping requirement is clarified to state that operators are only required to obtain written statements (bills of lading?) from the fuel supplier indicating that the fuel meets state and federal law (i.e., the fuel meets motor vehicle grade), if such statements (product delivery tickets or receipts) are available.

(d) The effective date of the requirements for agricultural crop preparation services fleets is delayed by 18 months to reflect modifications made in the requirements themselves. The reference to section 2775.1(d) is corrected to read 2775.1(c).

F. Article 3, Verification Procedure, Warranty, and In-Use Compliance Requirements for Retrofits to Control Emissions from Off-Road Large Spark-Ignition Engines

Title 13, California Code of Regulations, § 2783. Emissions Reduction Testing Requirements

(e) Modifications are made to the test cycle language to correct: (1) the title of the reference containing the steady-state test procedure, (2) the location of the reference, and (3) the reference adoption date.

(k) Modifications are made to correct the reference.

Title 13, California Code of Regulations, § 2786. Other Requirements
(c)(1) A correction is made to the retrofit emission control group name within the system labeling requirement.

Title 13, California Code of Regulations, § 2789. In-Use Compliance Requirements
(e)(2) A correction is made to the reference adoption date.

III. SUBSEQUENT MODIFICATIONS (SECOND 15-DAY NOTICE)

Based on the comments that were received in response to the First 15-Day Notice, additional modifications to the regulatory text were proposed in a Second Notice of Public Availability of Modified Text (Second 15-Day Notice). The following discussion summarizes the proposed substantive modifications and the rationale for making them. The section numbers and paragraphs are referenced as renumbered in the modified text.

A. Article 4.5. Off-Road Large Spark-Ignition Engines

Title 13, California Code of Regulations, § 2433 Emission Standards and Test Procedures – Off-Road Large Spark-ignition Engines
(b)(1) To better delineate between mandatory and optional standards, this section is reorganized. Subparagraph (b)(1)(A) still contains the required exhaust emission standards, but (b)(1)(B) now contains the United States Environmental Protection Agency (U.S. EPA) alternative certification formula. The optional exhaust emission standards formerly contained in (b)(1)(B) are now in subparagraph (b)(2). And subparagraph (b)(1)(c) has been added containing a reference to the field testing standards contained in 40 CFR Section 1048.101(c).

Additionally, two corrections and an addition are made to the notes section accompanying the mandatory standards table in subparagraph (b)(1)(A). Both corrections to note (1) clarify that emissions are to be reported to the ARB in units of g/kW-hr. Emissions were previously reported in units of g/bhp-hr; however, ARB in harmonizing with the U.S. EPA is now using the kilowatt-hour as the measurement unit

for power. The addition of note (5) provides the HC+NOx and CO standards for model year 2007 and newer severe-duty engines. This information was contained in the incorporated by reference “California Exhaust and Evaporative Emission Standards and Test Procedures for New 2010 and Later Off-Road Large Spark-ignition Engines” (40 CFR, Part 1048), but was inadvertently omitted from this section and from the incorporated by reference “California Exhaust and Evaporative Emission Standards and Test Procedures for New 2007 through 2009 Off-Road Large Spark-ignition Engines” (40 CFR, Part 1048). The original note (5) is renumbered to note (6).

(b)(2) The alternative certification formula originally contained in (b)(2) is now contained in (b)(1)(B). New subparagraph (b)(2)(A) contains the optional exhaust emission standards formerly contained in (b)(1)(B). New subparagraph (b)(2)(B) contains the field testing standards accompanying the optional standards in (b)(2)(A), consistent with U.S. EPA’s Blue Sky standards. These field testing standards were part of the Additionally, a note is added to the optional exhaust emissions table in subparagraph (b)(2)(A) clarifying that emissions are to be reported to the ARB in units of g/kW-hr for the reasons discussed in (b)(1) above.

(b)(4)(B) A date is added to the reference in this subparagraph to specify that the applicable evaporative emission specifications for non-metallic fuel lines is contained in the November 1996, and not the November 2004, SAE J2260.

(b)(4)(D) References to 40 CFR Sections 1048.105 and 1048.245 are added for manufacturers opting to use design-based certification for the evaporative emission standards.

B. Incorporated “California Exhaust and Evaporative Emission Standards and Test Procedures for New 2007 through 2009 Off-Road Large Spark-ignition Engines” (40 CFR, Part 1048)

The title is changed to remove the reference to “PART 1:” as there is only one part of the “California Exhaust and Evaporative Emission Standards and Test Procedures for New 2007 through 2009 Off-Road Large Spark-ignition Engines.”

§1048.101 What exhaust emission standards must my engines meet?
(a)(2) A note is added to the exhaust emission standards table clarifying that emissions are to be reported to the ARB in units of g/kW-hr for the reasons discussed for title 13, CCR, section 2433(b)(1) above. Other requirements are added providing the HC+NOx and CO standards for model year 2007 through 2009 severe-duty engines. Both the note and the severe-duty engine requirements were to have been carried over from the corresponding exhaust emission standards table in the incorporated by reference “California Exhaust and Evaporative Emission Standards and Test Procedures for New 2010 and Later Off-Road Large Spark-ignition Engines,” but were inadvertently omitted.

§1048.120 What emission-related warranty requirements apply to me?
A provision is added referencing the State's warranty requirements. The intent of the additional provision is to clarify that both sets of warranty requirements – title 13, CCR, section 2436 and 40 CFR Section 1048.120 – apply.

§1048.135 How must I label and identify the engines I produce?
A provision is added referencing the State's labeling requirements. The intent of the additional provision is to clarify that both sets of labeling requirements – title 13, CCR, section 2434 and 40 CFR Section 1048.135 – apply.

§1048.140 What are the provisions for certifying optional lower-emission standard engines?
Introductory language is corrected so that the requirements being applied to optional lower-emission standard (OLES) engines are those for model year 2007-2009 engines and not model year 2010 engines. The 2010 reference was carried over in error from the corresponding exhaust emission standards table in the incorporated by reference "California Exhaust and Evaporative Emission Standards and Test Procedures for New 2010 and Later Off-Road Large Spark-ignition Engines."
A note is added to the optional exhaust emission standards table clarifying that emissions are to be reported to the ARB in units of g/kW-hr for the reasons discussed earlier for title 13, CCR, section 2433(b)(1).

C. Incorporated "California Exhaust and Evaporative Emission Standards and Test Procedures for New 2010 and Later Off-Road Large Spark-ignition Engines"

§1048.101 What exhaust emission standards must my engines meet?
(a)(2) The first note accompanying the exhaust emission standards table is modified to reflect that emissions are to be reported to the ARB in units of g/kW-hr for the reasons discussed in title 13, CCR, section 2433(b)(1) earlier. The language providing the HC+NOx and CO standards for model year 2010 and later severe-duty engines is modified to reflect the correct federal HC+NOx standard for these engines.

§1048.120 What emission-related warranty requirements apply to me?
A provision is added referencing the State's warranty requirements. The intent of the additional provision is to clarify that both sets of warranty requirements – title 13, CCR, section 2436 and 40 CFR Section 1048.120 – apply.

§1048.135 How must I label and identify the engines I produce?
A provision is added referencing the State's labeling requirements. The intent of the additional provision is to clarify that both sets of labeling requirements – title 13, CCR, section 2434 and 40 CFR Section 1048.135 – apply.

§1048.140 What are the provisions for certifying optional lower-emission standard engines?
A correction is made to the section title of the section being deleted and replaced to clarify that it is Blue Sky Series engine standards that are being replaced and not optional lower-emission engine standards.

A note is added to the optional exhaust emission standards table requiring emissions to be reported to the ARB in units of g/kW-hr for the reasons discussed for title 13, CCR, section 2433(b)(1).

D. Article 2. Large Spark-Ignition (LSI) Engine Fleet Requirements

Title 13, California Code of Regulations, § 2775(d) Definitions

"Agricultural Crop Preparation Services"
Language excluding manufacturing activities such as the freeze drying of fruits and vegetables, the slicing and dicing of garlic or onions, the flaking of potato products, and the making of bouillon, noodle mixes, rice mixes, soup mixes, sauce mixes, and salad dressing mixes is removed from the definition. This language was included in the First 15-Day Notice to provide examples of the types of dried and dehydrated food manufacturing activities that were not considered to be part of the "dehydrators" definition and thus not part of the "agricultural crop preparation services" definition. Stakeholders expressed a concern that excluding certain activities implied that other related activities might be included. Since the existing "dehydrators" definition already stipulates those dried and dehydrated food manufacturing activities that are "included," the ARB concurs that there is no need to exemplify excluded activities.

"Airport Ground Support Equipment"
Language is added to the definition to clarify that categories of GSE designed for on-road use, but dedicated to GSE operations and not licensed for on-road use may be included in the fleet average calculations. The clarification ensures that on-road equivalent GSE may not contain a license plate from any state, not just California.

"Leased forklift"
A definition is added that clarifies the term as applied to forklifts used in agricultural crop preparation services in title 13, CCR, section 2775.1(c)(3).

"Rental forklift"
A definition is added that clarifies the term as applied to forklifts used in agricultural crop preparation services in title 13, CCR, section 2775.1(c)(3).

"South Coast Air Basin Airports"
This definition has been removed as it only applied to sections that were removed in the first Notice of Availability of Modified Text (sections 2775.1(b), (b)(1), and (b)(2)).

Title 13, California Code of Regulations, § 2775.1. Standards
(c), (c)(1), and (c)(2) The word "owned" is removed from section (c) and placed into sections (c)(1) and (c)(2) to clarify that section (c) provides requirements not only for owned forklifts, but requirements for rental and leased forklifts as well.

Title 13, California Code of Regulations, § 2775.2. Compliance Requirements for Fleet Operators
(a) and (b) Provisions are further modified in these sections to clarify that only medium and large facilities and those with a non-forklift fleet (four or more pieces of equipment by definition) are required to conduct a baseline inventory and keep records.

IV. SUMMARY OF COMMENTS TO THE ORIGINAL PROPOSAL (45-DAY NOTICE) AND AGENCY RESPONSES

The Board received numerous written and oral comments in the formal 45-day rulemaking comment period that began on March 3, 2006 with the publication of the hearing notice and ended with the closing of the record on May 25, 2006 at the May 2006 Board hearing. A list of commenters is set forth below, identifying the date and form of all comments that were timely submitted. Following the list is a summary of each objection or recommendation made regarding the proposed action, together with an explanation of how the proposed action has been changed to accommodate the objection or recommendation or the reasons for making no change. The comments have been grouped by topic whenever possible. Comments not involving objections or recommendations specifically directed towards the rulemaking or to the procedures followed by the ARB in this rulemaking are not summarized below. Additionally, any other referenced documents are not summarized below.

Comments Received during the 45-day Comment Period

Abbreviation	Reference Number	Commenter
ATAA	ATAA 1	Timothy Pohle Air Transport Association of America Written testimony: May 24, 2006
ATAA	ATAA 2	Timothy Pohle Air Transport Association of America Oral testimony: May 25, 2006
CAPCOA	CAPCOA	Barbara Lee California Air Pollution Control Officers Assn. Written testimony: May 23, 2006

CCGGA	CCGGA	Roger Isom California Cotton Ginners and Growers Assn. Oral testimony: May 25, 2006
CLFP	CLFP	Rob Neenan California League of Food Processors Written testimony: May 4, 2006
CTA	CTA	Stephanie Williams California Trucking Association Written testimony: May 24, 2006
ECS	ECS	Kevin Brown Engine Control Systems Oral testimony: May 25, 2006
ED	ED	Kathryn Phillips Environmental Defense et al (Coalition for Clean Air, American Lung Association of California, and Union of Concerned Scientists) Written testimony: May 23, 2006
EMA	EMA 1	Roger Gault Engine Manufacturers Association Written testimony: May 24, 2006
EMA	EMA 2	Roger Gault Engine Manufacturers Association Oral testimony: May 25, 2006
IMPCO	IMPCO 1	Karen Hay IMPCO Technologies Written testimony: May 24, 2006
IMPCO	IMPCO 2	Karen Hay IMPCO Technologies Oral testimony: May 25, 2006
ITA	ITA 1	Gary Cross Industrial Truck Association Written testimony: May 23, 2006
ITA	ITA 2	Gary Cross Industrial Truck Association Oral testimony: May 25, 2006

LW	LW	Robert Wyman Latham and Watkins Written testimony: May 24, 2006
MECA	MECA 1	Joe Kubsh Executive Director Manufacturers of Emission Controls Association Written testimony: May 23, 2006
MECA	MECA 2	Joe Kubsh Executive Director Manufacturers of Emission Controls Association Oral testimony: May 25, 2006
Murphy	Murphy	Mr. Michael Murphy Written testimony: April 23, 2006
Nissan	Nissan	Kazuo Kojima Nissan Motor Company, LTD Written testimony: May 24, 2006
Polaris	Polaris	Lawrence Keller Polaris Industries Inc. Written testimony: May 24, 2006
Powell	Powell	Mr. John Powell Written testimony: April 7, 2006
TMHU	TMHU	Martin Boyd Toyota National Product Planning Manager Toyota Material Handling Unit Written testimony: May 23, 2006
UAL	UAL	Jeff Endsley United Airlines Written testimony: May 24, 2006
USN	USN 1	Rene Trevino Department of Defense, Department of the Navy Written testimony: May 23, 2006
USN	USN 2	Randy Friedman Department of Defense, Department of the Navy Oral testimony: May 25, 2006

A. The 2010 HC+NOx Emission Standard

Limited Data

1. **Comment**: In 2002, the U.S. EPA adopted a transient HC+NOx standard of 2.0 g/bhp-hr for 2007 model year engines based upon the best data available at that time. EPA intentionally did not mandate HC+NOx emissions standards below 2.0 g/bhp-hr because EPA determined that it was inappropriate to do so given the very limited data available. From EPA's Draft Regulatory Support Document dated September 2002: "Considering the need to focus on transient emission measurements, we believe it is not appropriate to adopt more stringent emission standards based on the steady-state duty cycles. Stringent emission standards based on certain discrete modes of operation may inappropriately constrain manufacturers from controlling emissions across the whole range of engine speeds and loads. We therefore intend to rely more heavily on the transient testing to determine the stringency of the emission-control program." (IMPCO 1) (ITA 2)

Agency Response: The ARB disagrees with the commenter's interpretation of the U.S. EPA Draft Regulatory Support Document (RSD). The commenter claims that the U.S. EPA determined that it was inappropriate to establish an HC+NOx emission level below 2.0 g/bhp-hr because of limited data. In actuality, the U.S. EPA only says that it is not appropriate to adopt more stringent emission standards "*based on the steady-state duty cycle"* because that cycle alone is not representative of real world engine operating conditions. Instead, the U.S. EPA established an HC+NOx emission standard of 2.0 g/bhp-hr to be met under both steady-state and transient duty cycle testing because it was consistent with the upper range of measured HC+NOx emission values from engines that the U.S. EPA tested with optimized emission controls under both of those duty cycles.

In the RSD, the U.S. EPA states that they did not adopt lower standards because they believed that the further reductions might only be possible with a very extensive development effort to adapt advanced highway engine technologies to nonroad applications. And in 2002, the U.S. EPA believed that it was not appropriate to propose standards at these more stringent levels due to the relatively low sales volumes of Large SI engines.

But elsewhere in the RSD, the U.S. EPA states that they are adopting provisions (the alternative certification formula contained in 40 CFR, Part 1048.101(a)(3)) that will encourage manufacturers to reduce HC+NOx [levels] even further by allowing higher CO levels where a manufacturer certifies to lower HC+NOx levels.

Additionally, the U.S. EPA established optional Blue Sky standards that are more stringent than the ARB's 2010 standard in recognition of the potential to achieve extremely low emission levels. In discussing the Blue Sky standards in the September 2002 Program Update that accompanied the RSD, the U.S. EPA states "manufacturers

may be able to use technologies such as advanced fuel injection, electronic controls, and catalytic converters that automotive manufacturers have already developed to achieve extremely low emission levels. They further state that even though some manufacturers are close to being able to produce Blue Sky engines, as of the Program Update, no manufacturer has certified one. They postulate that this is mostly caused by the fact that isolated requests for especially clean-burning engines don't justify the expense of developing them.

ARB believes that advances in the application of automotive emission control technology to LSI engines over the last five years now make the 2010 standards both technically feasible and cost-effective. By establishing the fleet average requirements contained in title 13, CCR, section 2775.1, the ARB has created sufficient demand for engines meeting the 2010 standard. And under the existing U.S. EPA provisions, manufacturers may currently certify to an HC+NOx versus CO standard equivalent to that established by the ARB as their 2010 emission standard and as a 2007 through 2009 optional lower emission standard. Indeed, within six months of our May 2006 Board hearing, one of the three largest forklift manufacturers had certified to a 1.0 g/bhp-hr HC+NOx level, and the two others were in the process of certifying to the 2010 0.6 g/bhp-hr standard. These certifications demonstrate that the technology exists to meet the 2010 standard and attain critical emission reductions.

Alternative to the 2010 standard

2. **Comment**: IMPCO respectfully proposes that ARB allow manufacturers to comply either by meeting the 0.6 g/bhp-hr HC+NOx standard in MY2010 over the transient test cycle as currently proposed by ARB (MY2010 Transient Test Option) or in addition to meeting all applicable EPA emissions standards, by meeting a 0.6 g/bhp-hr HC+NOx standard over the steady-state test cycle during the 2007-2015 model years with no additional reduction in transient HC+NOx emissions taking place during this time (MY2007 Steady-State Test Option). Those manufacturers who are able to meet the proposed MY2010 Transient Test Option with either calibration-only or minimal hardware changes can wait until MY2010 to meet the lower standard. Those manufacturers who are able and willing to meet the standard over the steady-state test cycle in MY2007 may do so. This will provide manufacturers with much-needed flexibility and ARB will achieve substantial emissions reductions from MY2007-2009. The second option provides ARB with three additional years of emissions reductions. (IMPCO 1)

Agency Response: In the preceding comment, IMPCO quotes from the U.S. EPA draft regulatory support document. Within that quote, the U.S. EPA states that they "need to focus on transient emission measurements" because "Stringent emission standards based on certain discrete modes of operation [as prescribed by the steady state test cycle] may inappropriately constrain manufacturers from controlling emissions across the whole range of engine speeds and loads." The ARB concurs with the U.S. EPA assessment that the steady state test cycle may not be an appropriate indicator of emissions under real world operating conditions. The commenter requests that we

retain a less stringent test procedure as a trade off for the potential of attaining early and extended emissions reductions. However, the ARB does not believe that doing so would provide the same level of emission benefits as the approved regulation.

Feasibility of the standard

3. **Comment:** Using this same data, ARB somehow determined that it was appropriate to reduce the EPA standard by an additional 70 percent to 0.6 g/bhp-hr HC+NOx. Note that ARB used only EPA's data as a basis for determining the proposed 0.6 g/bhp-hr HC+NOx standard; no new data was generated or introduced for ARB to consider the appropriateness of a tighter emission standard. (IMPCO 1)

4. **Comment:** CARB's proposed HC+NOx emissions standard of 0.6 g/hp-hr in 2010 represents a reduction of 70 percent from the 2007 federal standard of 2.0 g/bhp-hr. EPA, which conducted all of the testing and engineering evaluation for the 2007 standard, and which had a legal obligation to set a standard at the limits of technological feasibility, determined that 2.0 g/hp-hr HC+NOx reached the limits of technological feasibility. CARB, which has performed no testing and no engineering evaluation, has no basis for disagreeing with EPA's assessment. (ITA 1) (ITA 2)

5. **Comment:** The technology to reduce emissions from spark-ignited, off-road engines, in applications included in the proposed ARB regulations, is based on automotive-type three-way catalyst closed-loop technology. This technology has been used on well over 300,000,000 automobiles with outstanding results. Three-way catalysts have also been used effectively on thousands of large, natural gas-fueled, reciprocating engines (so-called rich burn or stoichiometric natural gas engines) used for power production or pumping applications. These same catalyst technologies can be adapted to spark-ignited engines used in off-road mobile sources such as forklift trucks, airport ground support equipment, and portable generators. Closed-loop, three-way catalyst-based systems are already being used on these large, spark-ignited, off-road engines to meet ARB's and EPA's 2004 3.0 g/bhp-hr HC+NOx standard. Closed-loop, three-way catalyst systems will also be the primary technology pathway for meeting EPA's and the proposed ARB 2007 exhaust emission standard of 2.0 g/bhp-hr HC+NOx. Retrofit kits that include air/fuel control systems along with three-way catalysts have been sold into the LPG-fueled fork lift industry for installation on uncontrolled engines (an LSI application) for nearly 10 years. In both new engine and retrofit applications, these closed-loop three-way catalyst systems have shown durable performance in LSI applications, consistent with the excellent durability record of closed-loop three-way catalyst systems used in automotive applications for more than twenty-five years.

MECA agrees with the ARB assessment that significant improvements in three-way catalyst system performance can be achieved in these LSI

applications by readily available catalyst design changes and optimizations that more closely approach the catalyst designs used in modern light-duty automobiles. These design changes include the use of high performance catalyst formulations with layered catalyst architectures and the latest oxygen storage promoters, larger catalyst volumes relative to the engine displacement, and the use of higher cell density metallic or ceramic substrates. These advanced catalysts coupled with improved engine control strategies are already beginning to find use on some new LSI engines as evidenced by some of the very low emission levels reported to ARB in recent LSI engine certifications (as reported in the ARB staff report for these proposed rules). Advanced catalysts and advanced engine controls will also provide the technical solutions needed to achieve ARB's proposed 2010 0.6 g/bhp-hr HC+NOx exhaust emission standards for off-road LSI engines included in the proposal. Advanced catalyst systems can be used to certify off-road LSI engines to some of the optional low emission certification standards included in this proposal ahead of the 2007 or 2010 requirements for new engines.

In closing, MECA believes that advanced three-way catalyst technology based on automotive applications can provide a cost-effective, durable, high performance solution for controlling HC and NOx emissions from new and existing large spark-ignited engines used in off-road applications. MECA believes that ARB's proposed 2007 and 2010 exhaust emission regulations for new engines are technically feasible. (MECA 1) (MECA 2)

6. **Comment:** We believe the 2010 standards really are attainable. I think it's an incredible opportunity with those manufacturers of LSI engines. I would point out the non-road emission standards in 2011, 2014 -- if I was in that industry I would be looking how I could increase my market share by offering an even cleaner alternative to other diesel engines. I think the LSI engine's going to offer some packaging advantages and cost advantages after 2010. So I would be looking at ensuring I had the lowest emission standards going. And I think those standards are attainable. (ECS)

7. **Comment:** I would tell you that I think staff has got this one right. I think they've addressed most of what can be addressed and they're going to continue to focus on the remaining issues that are left to be addressed. I do think it is important just to stress once more that the transient test cycle -- we've always been a big advocate of transient test cycles. We think they are needed to more accurately address the emissions characteristics of engines. (ECS)

Agency Response: As mentioned in the agency response to Comment A.1, the U.S. EPA established an HC+NOx emission level of 2.0 g/bhp-hr HC+NOx to be met under the more stringent transient test cycle. But their testing led them to believe that much lower HC+NOx emission levels were technically feasible. These beliefs manifested themselves in the alternative certification formula contained in 40 CFR, Part 1048.101(a)(3) and the Blue Sky standards contained in 40 CFR, Part 1048.140.

The ARB's 2010 standard represents harmonization with the low HC+NOx end of the alternative certification formula. Manufacturers oppose the ARB's use of this formula as evidence for a more stringent emission standard because they said there was limited data supporting it. However, as demonstrated in the ISOR, engines in similar applications already vastly exceed the 2010 standard, and in the almost four years between when the EPA promulgated their rule and when the ARB went to the Board in May 2006, the following additional supporting data were generated.

First, Jeff J. White of the Southwest Research Institute presented the results of transient tests performed for the Propane Education and Research Council to the Industrial Truck Association spring meeting on March 23, 2004 and subsequently to the Texas Propane Technology Forum on September 23, 2004. This testing program, of which the Industrial Truck Association was a part, concluded in the fall of 2004 and showed that 10 of 11 engine and catalyst combinations had emission levels below the proposed 2010 HC+NOx emission standard. Even with known or expected deterioration factors incorporated (see the agency response to Comments A.8 and A.9), several combinations would have still met the proposed 2010 emission standard more than five years early. This testing program painted a positive picture of future emission capabilities and one manufacturer requested that we not use it because they believed it was proprietary information. However, as the presentation had been posted to the Texas Railroad Commission website for almost four months at the time ARB staff downloaded it, ARB deemed it was in the public domain and has included the presentation as a reference in the Staff Report.

Second, an engine supplier to one of the top three forklift manufacturers provided confidential certification data demonstrating that their new engine would achieve emission levels well below the proposed 2010 standard. That engine is now certified to the 0.6 g/bhp-hr HC+NOx standard.

And third, several manufacturers provided certification data demonstrating that their engines had emission levels well below 1.0 g/bhp-hr under the steady state test cycle. Even when incorporating the expected increase in emissions under the transient test cycle, these engines were still expected to meet or be close to meeting the proposed 2010 emission standards. And yet even these engines did not have the catalyst volumes per liter of engine displacement, precious metal loadings, or catalyst cell densities approaching those observed in automotive applications using the same or similar engine blocks.

As mentioned in the agency response to Comment A.1, the U.S. EPA identified limited demand (isolated requests for especially clean-burning engines) and not technical feasibility as the reason they did not establish even lower HC+NOx emission standards. ARB believes that the switch to more robust automotive-style emission control equipment, especially catalysts with greater precious metal loading and cell densities, as has begun to occur in the intervening years between promulgation of the U.S. EPA regulation and development of the 2006 ARB regulation, virtually guarantees the feasibility of the ARB's 2010 HC+NOx emission standard.

And MECA, whose members have developed emission control systems for hundreds of millions of on-road vehicles over the last thirty years, and more significantly, systems for tens of housands of off-road engines including LSI engines over the last 10 years, concurs that the 2010 standards are technically feasible. Manufacturer activities to date bear this out. Manufacturers of retrofit emission control systems verified retrofit kits at 1.0 and 1.5 g/bhp-hr, well below the level expected for retrofit verifications – 3.0 g/bhp-hr – in advance of the Board hearing. And within six months of the Board hearing, two large forklift engine manufacturers were certifying to the 2010 emission level of 0.6 g/bhp-hr, and a third large manufacturer that had previously certified at 1.0 g/bhp-hr was considering recertifying to the 2010 standard.

In summary, some commenters expressed concern with the 2010 standard. But other commenters, both in the emission control and engine manufacturing industries believed the 2010 standard was technically feasible. With major equipment manufacturers certifying engines to the 2010 standard, we believe the concerns expressed about its stringency are no longer warranted.

Emission Penalty going from Steady State to Transient Cycle Testing

8. **Comment:** Very little is known about transient testing and its effect on HC+NOx emissions over an LSI engine's useful life. ARB has stated that there is approximately a 15 percent increase in HC+NOx emissions when measured over the transient test cycle as compared to the steady-state test cycle. The ARB Staff Report released May 6, 2005 states: "Some manufacturers have expressed concerns about the impact of the 2007 transient test cycle on these numbers [HC+NOx]. To date, information provided by the Southwest Research Institute indicates that, under the transient test cycle, hydrocarbon emissions from an LPG engine increased by about 30 percent, but NOx emissions remained relatively constant. … At 50 percent HC, the new test cycle could lead to a potential emissions increase of 15 percent over those under the steady state test cycle. … To date, transient cycle test data has been limited."

After repeated requests by IMPCO and industry, ARB has not been able to provide the data used to make this assertion. Given the lack of data available to determine the feasibility of the proposed 0.6 g/bhp-hr transient HC+NOx standard, it is reasonable for ARB to either specify that the HC+NOx standard be met over the steady-state test cycle, or postpone finalizing a radical reduction in transient emissions until the technological feasibility can be ascertained. (IMPCO 1)

9. **Comment:** CARB cannot legitimately rely on steady-state certification data to justify lowering the standard because compliance with the 2010 standard requires transient testing, there is insufficient data to correlate steady-state and transient test results over the useful life of the regulated engines, and CARB's claim of only a 15 percent HC+NOx "penalty" for transient testing is unsupported.

All of the certification data that CARB relies upon to support the 2010 standard is based upon emissions testing under the steady-state cycle, known as the C-2 cycle, which has been in use for many years. Beginning with model year 2007, however, certification must be made under both the C-2 cycle and the new, extremely rigorous transient cycle developed by EPA. ITA long ago raised the issue of the effect of the new transient cycle on emissions, but ITA members have only recently gained experience in running the cycle and observing its sometimes startling effect impact on emissions results. Some of the data, which is highly confidential, have recently been shared with CARB staff and should be given far greater weight than the data and analysis that appears in the ISOR. In both the withdrawn and the current ISOR, CARB states that the transient test cycle could account for an increase in emissions of 15 percent. This conclusion is based on three critical subconclusions: (1) that HC emissions will increase 30 percent, (2) that NOx emissions will not increase, and (3) that HC and NOx emissions each represent 50 percent of the HC+NOx total. Following is the current ISOR's explanation:

> Some manufacturers have expressed concerns about the impact of the 2007 transient test cycle on the feasibility of achieving the proposed new engine standards. To date, information provided by the Southwest Research Institute indicates that, under the transient test cycle, hydrocarbon emissions from an LPG engine increased by about 30 percent, but NOx emissions remained relatively constant. In a review of 13 forklift engine families (of 19 total) in our 2004 certification test database, NOx constituted approximately 50 percent of the HC+NOx emissions. At 50 percent HC, the new test cycle could lead to a potential emissions increase of 15 percent over emissions from the steady state test cycle. However, all but 1 of the 13 engine families would still have an HC+NOx certification level of less than 1.0 g/bhp-hr because in instances where the HC emissions were high, the corresponding NOx emissions were low. Clearly, the new test cycle does not prevent compliance with the proposed 2007 standard.

At ITA's request, staff provided the data underlying the claim that NOx and HC each constituted about 50 percent of the HC+NOx combination, which is critical to the conclusion that there is a 15percent HC+NOx penalty associated with the transient test. This data, which came from emissions testing of thirteen engine families, simply does not support this 50-50 split between HC and NOx. While the average and median percentages of NOx in the data were approximately 50 percent, the data were so meager and scattered that the average and median figures are useless to any conclusion about the typical HC/NOx split. While only one of the 13 engine families had anything near the claimed 50-50 split, HC and

NOx otherwise varied wildly: NOx was only 3 percent on two of the engine families, but was between 90 percent and 100 percent on three others. The following chart[1] depicts the data:

Engine	A	B	C	D	E	F	G	H	I	J	K	L	M
HC%	4	97	78	67	14	0	97	24	10	76	44	38	87
NOx%	96	3	22	33	86	100	3	76	90	24	56	62	13

If staff were correct in its conclusion that the expected HC/NOx split is 50 percent, then the HC+NOx penalty is almost 30 percent for engines B and G, but is zero or almost zero for engines A and F. All of these calculations and conclusions, however, are a misuse of the data. In ITA's opinion, the only conclusion that can be drawn from this data is that the data do not reveal any "typical" HC+NOx split, much less a 50-50 split. Accordingly, the test results say nothing about the "penalty" associated with the transient test.

The other critical subconclusions underlying the claim of a 15 percent HC+NOx penalty are that, under the transient test, HC will increase by 30 percent and NOx will not increase. Despite requesting the information weeks ago, ITA has so far not received CARB's explanation for these conclusions. However, these levels of test-procedure "penalty" for the individual pollutants match the levels that EPA used for inventory purposes in its 2002 Regulatory Support Document. Stating that"[e]missions during transient operation can be significantly higher than during steady-state operation," EPA applied a Transient Adjustment Factor ("TAF") of 1.3-- i.e., a 30 percent penalty--to an uncontrolled LSI engine's hydrocarbon emissions to account for transient operation. No TAF, meaning a penalty of 0 percent, was applied to the uncontrolled engine's NOx emissions. It may be that this EPA inventory analysis forms the basis for CARB's statement that "under the transient test cycle, hydrocarbon emissions from an LPG engine increased by about 30 percent, but NOx emissions remained relatively constant."

If so, however, this would be a fundamental misreading of EPA's analysis, because this 30 percent HC penalty and 0 percent NOx penalty are EPA's estimates for *uncontrolled* engines. EPA's TAF (penalty) for a *controlled* engine, which is the only engine relevant to this rulemaking, is 2.9 for hydrocarbons and 1.5 for NOx. Thus, if HC and NOx are equal, the combined TAF for a controlled engine is 220 percent [(290% + 150%) ÷2 = 220%], not 15 percent. Consulting the chart showing the HC/NOx split for 13 engines shows that the *minimum* penalty, where NOx represents 100 percent of the HC+NOx total, is 150 percent, which is 10 times greater than staff's claim of 15 percent. For the two engines where HC represented 97 percent, the HC+NOx penalty is over 280 percent, nearly 20 times greater than staff claims.

[1] The HC and NOx values from which the chart was created were provided by staff to ITA. Where a range of values was provided for an engine, ITA used the average of the high and low emissions.

ITA questions the relevance of these broad inventory assumptions to the issue of the actual HC+NOx penalty associated with this particular test procedure. Nevertheless, since CARB has apparently chosen to rely upon this EPA analysis, CARB must read the analysis correctly. Having failed to do so, CARB cannot support its conclusion of a 30 percent HC penalty and no NOx penalty. Adding this error to the errors made in determining the typical HC/NOx split leaves CARB with no rationale whatsoever for the overall conclusion that the transient test procedure imposes a penalty of only 30 percent. Without knowing the extent of the test-procedure penalty, CARB is not in a position to maintain that the standard is technologically feasible.

As ITA pointed out in its earlier comments, test results from the two forklift engines that EPA analyzed in actually developing the transient test revealed that "transient HC+NOx emissions compared to the steady state emissions were more than double for one engine and more than three times higher for the other." These data points were generated after the data that staff is relying upon, yet the latest ISOR makes no mention of them. In addition, staff has now seen confidential company information that contradicts the ISOR's discussion of technological feasibility.

Based on this new understanding of the relevant issues, it is incumbent upon staff to rethink the combination of (1) the .6g/hp-hr standard for HC+NOx; (2) the transient test procedure for demonstrating compliance with that standard; and (3) the 2010 effective date of that standard. (ITA 1) (ITA 2)

Agency Response: In 2004, the U.S. EPA adopted a new test procedure for certifying engine emissions beginning with the 2007 model-year. The new procedure, referred to as a "transient" test, more accurately reflects real-world use and emissions. The approved regulations align the ARB's testing with the federal transient test procedure. The comments above relate to the discussion within the ISOR that quantifies the differences between the two procedures. The uncertainty associated with the relationship between the two test procedures is part of the commenter's overall argument on the feasibility of the proposed standard.

The ISOR discussion was intended to give a general sense of the differences from each test procedure. Specifically, the mean of 13 engine families from the ARB certification database was used to estimate the average penalty for a hypothetical engine family. Engines with an HC component greater than 50 percent would have a greater penalty; those with an HC component less than 50 percent would have a lesser penalty.

The ARB also considered test data from a reputable engine testing facility, Southwest Research Institute, in estimating the difference in emission levels attributable to the two different test cycles. With that said, the ARB acknowledges the uncertainty in assessing the differences in emissions between the steady-state and transient test procedures, both in a general sense and in specific applications. The ARB does not agree with

certain aspects of the comment[2]; however, even if the emissions penalties intended to be suggested by the commenter are accurate, the emission standards would still be technically feasible as discussed in the responses to comments 3 to 7.

Timing of the 2010 standard

10. **Comment:** The emission system designed specifically to meet the upcoming 2007 EPA-ARB emission standards, will not be applicable for use in meeting the proposed ARB 2010 emission standard requirements. To achieve such a drastic reduction over the 2007 EPA-ARB emission standards, Toyota would be required to assign significant resources not only in the development of a new fuel system, but potentially a new engine as well. The ARB 2010 proposal provides manufacturers approximately 3 years to develop technology to meet the regulation, however typical timing for complete development of new engine and emission system is at the very least, 6 years. (TMHU 1)

11. **Comment:** Staff raised the possibility of a technology review in 2008. This might seem like a reasonable gesture, however, it will take at least three years to develop a new, robust technology to meet the proposed transient HC+NOx standards. Development includes design concept, technology assessment, vehicle integration, engine durability, certification, and production. This means that development must begin today to make the MY2010 timeframe. With a minimum three-year design cycle, a technology review in 2008 is far too late to assess the feasibility of a radical reduction in emissions effective MY2010. (IMPCO 1)

Agency Response: From the time of ARB's first LSI Board hearing in September 1998 until manufacturers had to begin phasing in controlled engines in the 2001 model year was less than three years. In September 2002, the U.S. EPA gave manufacturers just over four years to begin certifying LSI engines to the 2.0 g/bhp-hr standard under the transient test cycle. ARB is now proposing to give manufacturers slightly over three and one half years (from May 25, 2006 to January 1, 2010) to produce LSI engines meeting the 2010 standard. As we expect that manufacturers will not have to make extensive design changes to the engine hardware, but will instead enhance the performance of the emission control systems required to meet the 2007 U.S. EPA emission standards through increases in catalyst volume, cell density or precious metal loading, we believe the lead time is appropriate. The provider of Comment A.10 appears to bear this out as they are currently in the process of certifying to the 2010 standard almost three years early in spite of their comment that typical timing for the complete development of a new engine and emission system is at the very least six years.

[2] For example, the commenter identifies penalties of 150 percent for NOx and 280 percent for HC when in actuality, TAFs of 1.5 and 2.9 represent penalties of 50 percent for NOx and 190 percent for HC respectively.

B. U.S. EPA Alternative Certification Formula

1. **Comment:** Title 13, CCR, section 2433 does not provide the alternative certification formula allowed by 40 CFR, Part 1048.101(c). (Nissan)

Agency Response: The ARB modified title 13, CCR, section 2433(b)(1) to incorporate the U.S. EPA alternative certification formula in the First 15-Day Notice.

2. **Comment:** Capping HC+NOx emissions at 0.6 g/bhp-hr is not consistent with the U.S. EPA standards because permitting certification to only one point on the U.S. EPA curve is not the same as permitting certification to any point on the curve. The curve has no known application to gasoline engines. (ITA)

3. **Comment:** The flexibility of the curve is important: (a) because the curve is at best a rough approximation of the relationship between HC+NOx and CO; (b) to permit manufacturers and users to account for equipment performance demands and individual workers' exposure to CO; (c) because the effects of the 2007 transient test procedure will remain unknown for several years; and (d) because of the uncertainty caused by inconsistent LPG fuel quality. (ITA)

Agency Response: The U.S. EPA established the alternative certification formula (curve) to provide flexibility to manufacturers interested in reducing emissions beyond the 2007 2.0 g/bhp-hr HC+NOx exhaust emission standard. The ARB has included the same flexibility for the 2007-2009 model years; however, beginning in 2010, the ARB specifies that manufacturers must meet an HC+NOx emission level corresponding to the lowest HC+NOx level on the U.S. EPA alternative certification curve. ARB has established a more protective 2010 standard that takes advantage of readily available emission control technologies and provides the state the necessary HC+NOx emission reductions.

Manufacturer certification data and the Southwest Research Institute data clearly demonstrate that the same emission control technologies that allow these engines to achieve low HC+NOx levels allow them to achieve low CO emissions as well, so there is no longer a need to accept elevated HC+NOx levels just so CO can be lowered to safe exposure levels.

ARB acknowledges the uncertainties described in B.3(c) and (d). However, for the reasons provided in the agency responses to comments A.1 and A.7 above, and C.1 through C.5 below, the ARB believes the standards for 2010 are appropriate.

C. LPG Fuel Quality

1. **Comment:** Although Toyota Industries Corporation may refer to automotive technology, industrial lift truck technology and applications is considerably different than the automobile. Unlike gasoline powered automobiles, for which fuel quality standards exist, approximately 90 percent of industrial forklifts

operate on Liquefied Petroleum Gas (LPG), for which no quality standards exist. Since no quality standards exist for LPG, the high sulfur content, which is known to negatively influence catalyst performance, combined with heavy contaminants commonly found in LPG fuels will impact the performance of these very sophisticated emission control systems. Without measures in place to limit sulfur content and contaminants in LPG, the ability for a manufacturer to guarantee proper operation of their emission system becomes a major challenge. (TMHU 1)

2. **Comment:** Improve LPG fuel quality – reduce sulfur content which is very influential on catalyst performance and tar contamination to reduce impact on control devices (Nissan)

3. **Comment:** ARB has drastically reduced on-road emissions standards over the last ten years. However, ARB has also developed and rigorously enforced reformulated gasoline and low-sulfur diesel fuel quality standards to help manufacturers meet these emissions standards. Although LPG fuel specifications exist on the books, they are not nor have they ever been enforced. ARB recognizes the importance that clean fuels play when developing new emissions standards and technologies. From a 2005 Off-Road LSI workshop presentation, ARB stated that “Clean fuel is important”, “Heavy ends are detrimental to control technologies”, and “Strive to ensure high quality fuel throughout distribution chain”. New technologies designed to meet lower emissions standards are far more sensitive to LPG fuel contaminants such as oily residues, paraffins, and propene as compared to older technologies. Such contaminants may reduce the effectiveness of the emission control system and increase emissions. In many cases, this reduced effectiveness is not reversible and components must be replaced to operate as designed. Before more stringent emissions standards can be implemented, ARB must first enforce fuel quality standards. (IMPCO 1) (IMPCO 2)

4. **Comment:** The original ISOR acknowledged that LPG that does not meet adequate specifications “can prevent an engine from complying with existing and future emissions standards” and promised that “ARB will take the necessary steps to ensure that quality fuel is available to support existing and future LPG-fueled vehicles including developing appropriate specifications, if necessary.” ITA’s initial comments pointed out the many aspects of the fuel-quality issue and stated our concern “that CARB will not be able to keep the promise because the problem . . . is multi-faceted and has not yet been fully defined.” ITA concluded: “ITA does not believe it is realistic to predict that the fuel problem will be solved in time for compliance with such low HC+NOx standards and does not believe it is appropriate to impose such standards in the face of this known problem.” In the nearly one-year period since the initial ISOR, the only progress that CARB has made on the fuels problem is the issuance of a request for proposals to analyze 150 LPG samples that CARB staff intends to collect. The analytical work itself will not be completed for at least another year. Although the analysis presumably will confirm the fuel-quality problem and will

perhaps shed some light on its scope, it will do nothing to solve it. Solving it will likely require a rulemaking proceeding and/or a major enforcement effort in order to change the long-standing business behavior of the myriad participants in the propane production, transmission, storage and distribution sectors. This is a long-term prospect. Rather than offering a plan for meeting the commitment made in the original ISOR, however, the current ISOR simply deleted the commitment. Without explanation, staff has removed from the ISOR the statement that "ARB will take the necessary steps to ensure that quality fuel is available to support existing and future LPG-fueled vehicles ...." Since the current ISOR is a verbatim version of the initial ISOR in most respects, the pointed elimination of this earlier statement of commitment concerning the fuel problem is hardly encouraging. The omission of the commitment may be a tacit acknowledgement that it cannot be met in the necessary time frame, but the requirements of technological feasibility cannot be so easily avoided. The fact remains that dependable fuel quality is necessary to support such low emissions levels, but dependable fuel quality is not on the near horizon. (ITA 1) (ITA 2)

5. **Comment:** Fuel quality will play an important role in the successful use of advanced three-way catalyst systems to achieve ARB's proposed 2007 and 2010 emission standards for new LSI engines, optional lower certification emission standards for new engines, and retrofit applications verified at some of the lower absolute emission levels (or highest conversion efficiencies) included in this ARB proposal. The importance of fuel quality in an overall systems approach to reducing exhaust emissions has clearly been demonstrated in the automotive industry for both gasoline and diesel fuel. The same attention to fuel quality is necessary with LPG fuel used by off-road LSI engines. MECA asks ARB to continue its efforts to work with industry to determine if existing LPG specifications for off-road engines are adequate to support the more stringent emission standards included in this proposal. (MECA 1)

Agency Response: There are three separate concerns about LPG motor vehicle fuel quality - fuel contamination, high olefin content, and high sulfur content.

Contaminated fuel can have an immediate and sometimes damaging impact on the fuel delivery system and the emissions control system. Contamination typically occurs downstream of production during storage and distribution. For example, contamination can occur from fuel-hose degradation.

There is information to suggest that LPG containing high olefins, such as propene, can accumulate on fueling components and can adversely affect the fuel-delivery and emission-control systems. This accumulation is often the result of using commercial grade fuel in motor vehicles. Commercial grade fuel is intended primarily for heating and has a higher olefin content than motor vehicle grade LPG. Olefins react to create a plastic-like coating in the vaporizers, carburetors, and injectors. This coating gums up these engine components, reducing the effectiveness of heat transfer and ultimately

causing poor delivery of the fuel and inaccurate fuel-to-air ratios. Heavy hydrocarbon residue may also cause similar problems.

In 1992, ARB established motor vehicle fuel specifications for LPG limiting the propene content to 10 percent by volume. Other heavier hydrocarbons are also limited. Not all LPG produced meets the LPG motor vehicle specifications. The LPG not meeting the motor vehicle specification is considered commercial grade propane and is used mostly for space heating and recreational purposes.

The motor vehicle fuel specifications also limit sulfur content to 80 parts per million by weight. Sulfur is added to LPG fuel as an odorant, and the 80 parts per million by weight maximum concentration was derived in consultation with engine makers. In excess of the specification, sulfur can be detrimental to catalysts and can cause an increase in HC+NOx emissions.

The ARB is committed to working with industry to determine if the existing LPG fuel specifications are adequate to support more stringent emission standards. The ARB is executing a contract to analyze 150 LPG samples from various sites statewide and will determine if regulatory action is required either in the form of more stringent LPG fuel quality standards or more stringent enforcement of existing standards. The ARB is also working with engine and emission control device manufacturers, refiners, and LPG distributors to make advanced fuel filters, low olefin LPG fuel, and fuel additives available to fleets, leading to reduced emissions and vehicle maintenance and improved fuel efficiency. In addition to efforts taken by the ARB, it will be incumbent upon equipment users to obtain readily available clean motor vehicle grade fuel.

6. **Comment:** Test fuel should be harmonized. Generally, California gasoline is cleaner. So, CARB should approve federal certification gasoline without any demonstration. (Nissan)

Agency Response: The ARB already allows manufacturers to use fuel other than federal indolene as a test fuel. The manufacturer just has to inform the ARB of their choice. Regardless of whether the test fuel may be dirtier or cleaner, the ARB does not require additional testing, just disclosure for the purposes of certification.

D. Treatment of LSI engines with a Displacement of One Liter or Less

1. **Comment**: The U.S. EPA LSI regulations allow manufacturers of LSI engines with a displacement of one liter or less to certify those engines either as small spark-ignition engines (also referred to as small off-road engines or SORE under ARB) or LSI engines. The EMA supports retaining language proposed in the 45-day public hearing notice that would allow harmonization with the U.S. EPA provisions because there are a lot of manufacturers that produce engines that are greater than 25 horsepower but less than one liter that are derived from small spark-ignition engines, and these manufacturers have special circumstances: distinct technology, application, cost, and market differences, and because of the benefits associated with harmonization with U.S. EPA. ARB staff has done this

in the proposed 45-day notice package. Additionally, the proposal provides for reduced exhaust emission levels if the manufacturer certifies to the standards for small spark-ignition engines (title 13, Chapter 9) (EMA)

Agency Response: EMA points out in this comment that the regulatory language for CCR, title 13, section 2430 in the 45-day notice would have allowed manufacturers of engines with displacement of one liter or less an opportunity to certify to either the LSI or the SORE regulations. In reviewing this language, ARB determined that a new regulation specifically intended for engines with a displacement of one liter or less is a better way to address the emissions from this category of engines. A separate, new regulation that prescribes emission standards that are significantly lower than the 6.0 g/bhp-hr SORE standard would be more health-protective and would address reductions that may be possible from these small engines that are very different from LSI engines in both their engineering and application. For this reason at the hearing, the Board directed that the existing controls for these engines remain in place until a new assessment specifically addressing cost-effective emission control technologies could be completed. See FSOR section II. Modifications to the Original Proposal, part A. Off-Road Large Spark-Ignition Engines for a further description of the final regulation.

2. **Comment**: The proposed evaporative emission requirements harmonize with U.S. EPA requirements for greater than one liter engines; however they do not harmonize for engines of one liter or less since there are no U.S. EPA evaporative emission requirements for engines with a displacement of one liter or less. The proposal does allow for engines of one liter or less to be certified to ARB SORE evaporative emission requirements per title 13, Chapter 15, but these provisions are scheduled to take effect in the 2008 model year, providing only a little over a year. This is important because there has been no product development yet, and no product is available based on lead time. As the ARB has not considered the cost or technical feasibility of compliance with evaporative emission requirements for LSI engines with a displacement of one liter or less and the lead time is inadequate, EMA recommends that implementation of evaporative emission controls for engines with a displacement of one liter or less be pushed back to the 2010 model year. (EMA)

Agency Response: As discussed in the agency response to Comment D.1, the ARB removed LSI engines with a displacement of one liter or less from consideration in this rulemaking. There are no longer any evaporative emission requirements for LSI engines with a displacement of one liter or less; however, the Board will be pursuing a new rulemaking in the future to address these engines. That rulemaking will consider cost and technical feasibility and will establish effective dates and a reasonable development lead time based on consultation with the affected industry.

3. **Comment**: To minimize confusion between requirements of the proposed regulatory language, EMA recommends: section 2433(b)(1) reflect the provisions in 1048.101(f) and 1048.615(a) and (d) of the following two documents - "California Exhaust Emission Standards and Test Procedures for New 2007

through 2009 Model-Year Off-Road Large Spark-Ignition Engines" and "California Exhaust and Emission Standards and Test Procedures for New 2010 and Later Model-Year Off-Road Large Spark-Ignition Engines." (EMA)

Agency Response: As discussed in the response to Comment D.1, the ARB removed LSI engines with a displacement of one liter or less from consideration in this rulemaking. Part of that effort included modifying the provisions of section 1048.101(f) so that it only addresses LSI engines with a displacement greater than one liter, and deleting the provisions of sections 1048.615(a) and (d) in the following two documents - "California Exhaust Emission Standards and Test Procedures for New 2007 through 2009 Model-Year Off-Road Large Spark-Ignition Engines" and "California Exhaust and Emission Standards and Test Procedures for New 2010 and Later Model-Year Off-Road Large Spark-Ignition Engines."

4. **Comment:** I have concerns about engines less than one liter. I've noticed an increasing number of them coming in less than one liter with higher and higher power ratings. And it needs further consideration as to what emission standards and test cycles should apply to those engines. (ECS)

Agency Response: As discussed in the response to Comment D.1, ARB staff will return to the Board with regulatory modifications for LSI engines with a displacement of one liter or less at a later date. At that time, the Board will address all issues relative to these engines, including higher power rating engines.

E. Modifications to the Airport Ground Support Equipment Provisions

1. **Comment:** ATAA and its members believe that ARB is preempted from regulating airport ground support equipment (GSE) in the manner proposed by the LSI rule by the Federal Aviation Act, Airline Deregulation Act, and Clean Air Act, which reflect Congress' judgment that GSE – which is critical to the safe and efficient functioning of the National Airspace System – can only be regulated in a consistent and uniform manner at the federal level. (ATAA 1) (ATAA 2)

Agency Response: ARB disagrees with the commenter's view that the LSI regulations' requirements for airport ground support equipment are preempted by the federal statutes mentioned. The federal Clean Air Act (CAA) establishes a partnership between the state and federal governments in the addressing the health-based regulation of air pollution. While the CAA preempts state regulation of emissions from aircraft and their engines, California notably is granted independent authority under CAA section 209(e)(2) to adopt and enforce standards and other requirements for off-road vehicles and engines, such as LSI off-road vehicles and engines. Likewise, preemption is not plenary under either the Federal Aviation Act (FAA) or the Airline Deregulation Act (ADA). The scope of preemption under the FAA relates to aircraft operations and airspace management, while the scope of preemption under the ADA relates to economic regulations that affect the rates, routes or services of an air carrier.

Since the LSI fleet requirements are health-based and do not affect these areas, they are not federally preempted.

2. **Comment:** Section 2775.2(e)(2)(C) unnecessarily provides that compliance extensions (the so-called "off-ramp provision") shall not be issued by the executive officer beyond January 1, 2013. Given the necessity that such extensions be available for GSE and the nature of the showing required under section 2775.2(e)(2)(B), it is not necessary to place an arbitrary date limit on the executive officer's ability to grant compliance extensions. Instead, the EO should be empowered to grant such extensions at the outset. At a minimum, for determinations involving extensions beyond 2013, the EO should be empowered to make the initial determination, subject to Board review, with the EO's determination standing absent Board action to the contrary. While ATAA would prefer that the off-ramp provisions extend beyond 2013, we trust the Board will approve such an extension should future circumstances support that. (ATAA 1) (ATAA 2)

Agency Response: As noted by the commenter, the compliance extensions specific to GSE are limited. However, the general regulatory language for compliance extensions provides the Executive Officer enough flexibility to make such adjustments if conditions warrant an extension beyond 2013.

3. **Comment:** Allow on-road equivalent GSE into fleet average calculations. ATAA supports modifications to the rule clarifying that on-road equivalent vehicles can be included in fleet average calculations, and that their emission factors be: 1.1 g/bhp-hr in 2009, 0.8 g/bhp-hr in 2011, and 0.7 g/bhp-hr in 2013. (ATAA 1) (ATAA 2)

Agency Response: The Board agreed with this recommendation and has incorporated the cited emission factors for on-road equivalent airport ground support equipment into the "Airport Ground Support Equipment" and "Fleet Average Emission Level" definitions of the fleet average emission level requirements. See FSOR section II. Modifications Made to the Original Proposal, part E. Large Spark-Ignition (LSI) Engine Fleet Requirements for a description of the final regulations.

4. **Comment:** ATAA is pleased that ARB staff has recommended the removal of the proposed 30 percent electrification mandate from the rule and urges the Board in the strongest possible terms to accept that recommendation. As staff pointed out, airlines in the aggregate already meet the proposed electrification target today. And record keeping requirements provide staff ample ability to monitor airline electrification levels going forward, rendering the mandate unnecessary. We strongly urge the Board to accept staff's recommendation and remove the provision from the LSI rule. (ATAA 1) (ATAA 2)

United is pleased to learn that ARB staff has recommended the removal of the electrification mandate from the rule. The electrification mandate is

unnecessary, as the environmental benefits from the rule are already captured by the fleet average emission requirements. In addition, the mandate unfairly targets most, but not all, domestic air carriers and creates a competitive advantage for foreign airlines that would not be impacted by it. (UAL 2)

Agency Response: The Board agreed with the staff recommendation and removed the mandatory electrification component for airport ground support equipment from the requirements.

5. **Comment:** United supports allowing less than 25hp electric equivalent equipment into the GSE fleet average. These "low horsepower electric-powered units perform the same work as LSI engine-powered units with higher horsepower, but on a far more efficient basis. United requests that ARB confirm that electric carts and other less than 25 hp electric-powered equipment can be allowed to be incorporated into the GSE fleet for the purpose of fleet average calculations. (UAL 1)

Agency Response: The "Fleet Average Emission Level" definition specifically states that electric-powered equipment of less than 19kW (25hp) "shall be allowed to be included in the fleet average calculation provided that the operator can demonstrate that the equipment performs the work equivalent of an LSI engine-powered piece of equipment." If the operator can demonstrate that their electric carts and other electric-powered equipment of less than 25 hp perform the work equivalent of an LSI engine-powered piece of equipment, then those pieces of equipment can be allowed to be incorporated into the GSE fleet for the purpose of fleet average calculations.

6. **Comment:** United strongly supports the fleet-average compliance approach. As anyone who has sat in an airplane and watched the ground crew prepare for a flight probably knows, airport ground support equipment are often atypical vehicles. Ground support equipment, or GSE, are highly specialized, built for durability and operated to ensure safe and on-time commercial air travel. A fleet average approach provides GSE operators with the operational flexibility to select the most appropriate and technologically feasible control option for each unit. (UAL 2)

Agency Response: ARB worked closely with air carriers to understand the unique environment and operating requirements associated with GSE, and to ensure that the fleet average approach is appropriate for GSE. We appreciate the support for the regulation.

F. Off-Highway Recreational Vehicles (OHRV)

1. **Comment**: The ARB should revise the applicability of the LSI rule to reflect that ATV engines and applications are not similar to true LSI engine applications. The certification of these products best fits within the OHRV regulations. (L&W) (Polaris)

Agency Response: ARB agrees with the comment and has considered the classification of these engines at the Board's July 2006 hearing on Off-Highway Recreational Vehicles. The final regulation clarifies that engines used in all-terrain vehicles and applications are now subject to the Off-Highway Recreational Vehicles regulations. See FSOR section II. Modifications Made to the Original Proposal, part A. Off-Road Large Spark-Ignition Engines for a description of the final regulation.

2. **Comment:** The LSI regulations should not apply to engines in vehicles subject to the U.S. EPA's OHRV regulations (40 CFR, Part 1051). It would be better if vehicles and engines covered by 40 CFR, Part 1051 were covered by ARB's OHRV rules for certifying off-highway recreational vehicles and engines; i.e., ARB should harmonize their OHRV rules with the EPA rules to ensure that engines that are similar in design and function can be certified under the OHRV regulations. (L&W) (Polaris)

Agency Response: See the response to Comment F.1 above.

G. Modifications to Definitions

1. **Comment**: We request clarification of the term "processors" and suggest that it include "all canneries, freezer plants, juice manufacturers, and dryers" because the operations involve basic processing of fruits and vegetables analogous to the nut hullers, packinghouses, and cotton gins that are also included in the proposed rule as agricultural operations. (CLFP)

Agency Response: In response to this comment, ARB has clarified the definition of "agricultural crop preparation services" and has added clarifying definitions for "nut hullers and processors" and "dehydrators." To reflect ARB's intent that the definition of "agricultural crop preparation services" follow the definition of "postharvest crop activities" as defined in the United States Census Bureau North American Industry Classification System (NAICS), a cross reference to the NAICS definition for "Industry 115114 − Postharvert Crop Activities" has been added to the definition of "agricultural crop preparation services."

Canneries, freezer plants, juice manufacturers, and dryers fall within a separate NAICS definition for Industry 311423 − Food Processing. These facilities are manufacturing facilities where, unlike in postharvest crop activities, the form of the agricultural crop is changed, typically through slicing, dicing, chopping, flaking, juicing, or freeze-drying. The operations at canneries, freezer plants, and juice manufacturers are not analogous to those intended for inclusion of ARB's definition for "agricultural crop preparation services."

ARB's has also added definitions of "nut hullers and processors" and "dehydrators" that are consistent with the scope of the NAICS definition for "Industry 115114 − Postharvert Crop Activities." The definition of "dehydrators" includes both artificial and sun drying as

within the scope of “agricultural crop preparation services” for those crops that falls within the NAICS definition for “Industry 115114 − Postharvert Crop Activities.”

For descriptions of the definitions, see FSOR section II. Modifications Made to the Original Proposal, part E. Large Spark-Ignition (LSI) Fleet Requirements.

2. **Comment**: Our concern with this rule is in the fleet definition. And we feel that as defined it would conceivably lump as one fleet the entire Department of Defense in California and certainly by each branch of the Services. We understand what you're trying to do with this rule in terms of private businesses or warehouse stores that basically all do -- are cookie cutters of one another and all have very common management. But we'd ask you to consider something like the naval station in San Diego, which is really a city unto itself, with a daytime population of 50,000 people, with a span of activities from ship loading, ship maintenance, warehousing, even a major recycling facility.

We would like to see the fleet definition allow us to define the fleet as an individual military installation and not run the risk of having them defined as the entire military establishment in California. (USN 1) (USN 2)

Agency Response: The “Aggregated Operations” definition requires fleets to be aggregated (fleet size determinations made) at the same government or corporate headquarters organizational level as purchasing decisions are made. ARB believes that the definition provides the flexibility for the commenter to aggregate equipment at an “installation” level.

3. **Comment:** We would also like to see the definition of tactical support equipment include the phrase “or its allies” after the phrase “U.S. military services (USN 1) (USN 2)

Agency Response: ARB has modified the definition of “military tactical vehicles or equipment” as requested. See FSOR section II. Modifications Made to the Original Proposal, part E. Large Spark-Ignition (LSI) Engine Fleet Requirements for a description of the final modification.

H. Financial Impact on Businesses and Consumers

1. **Comment:** Along with the significant resources (manpower and money) required to develop such an engine/emission system to meet the ARB 2010 proposal, comes the financial impact on society. Manufacturers developing engine/emission systems to meet this proposal would pass on the considerably high development expense directly to California customers. From a California customer perspective, the combination of ARB’s proposal for end user fleet averaging, along with this significant capital cost increase, could drive business out of the state, thereby impacting the economy and society as a whole. (TMHU 1)

2. **Comment:** I think the state is trying to go too far, small companies can not afford to change update or modify their equipment for emissions. I think you should stay out these small use areas and concentrate your efforts on the high volume fuel users and maintain sufficient staff to do so, lay off remaining staff and save the tax payers the money. (Powell)

3. **Comment:** To certify an LSI engine, a manufacturer such as IMPCO must demonstrate 5,000 hours of engine, fuel system and catalyst durability. This is achieved by accumulating hours on the engine and periodically performing emissions tests to demonstrate compliance with the standards. Durability programs typically run 24 hours a day, 7 days a week, and cost in the area of half a million dollars per engine. Any time that there's a change in the engine fuel system or catalyst, ARB generally requires that the manufacturer perform a new durability demonstration program. ARB has stated many times that 2010 new engine standard can be met through minor calibration changes and minor catalyst changes at a small incremental cost per engine. Assuming that the 0.6 g/bhp-hr standard can be met through the minor calibration and catalyst changes alone, under the current regulation IMPCO would still be required to perform four additional durability demonstration programs, which would cost an additional $2 million with no real benefit to Californians or to clean air. Assuming that a new generation technology must also be developed, the total cost could be $3 million.

   This $2 to $3 million is purely for engines to be imported into the State of California as EPA does not intend to create more stringent 49-state emission standards any time in the near future. As a result, ARB has, in effect, created a $3 million dollar barrier to entry into the California market. IMPCO is a California business headquartered in Santa Ana, California. California Code 11346.3 requires that ARB assess the potential for adverse economic impacts on California business. ARB's ISOR states: "Engine manufacturers are located mostly outside of California." And the Notice of Public Hearing states: "In accordance with Government Code section 11346.3, the Executive Officer has determined that the proposed regulatory action will not affect the creation or elimination of jobs within the State of California, the creation of new businesses or elimination of existing businesses within the State of California, or the expansion of businesses currently doing business within the State of California."

   IMPCO will incur significant costs to meet ARB's proposed transient HC+NOx standards. The statements above seriously misrepresent and undermine the financial impact to IMPCO, a California company that will represent almost 50 percent of the total LSI forklift market in California. In addition, IMPCO is a public company; any additional cost incurred will directly impact the bottom line and affect thousands of shareholders.

I'd like to propose that ARB allow manufacturers to consolidate their durability programs to meet the 2010 0.6 g/bhp-hr standards. For example, in 2007, IMPCO performs four durability programs. To meet the new standard in 2010, assuming that hardware is similar to that of 2007, but upgrades are made to the calibration and catalyst, as a result IMPCO proposes to perform a maximum of one durability program on the expected worst case engine to fulfill this durability demonstration requirement for these 2010 engines rather than performing four separate durability demonstration program. (IMPCO 2)

Agency Response: Manufacturers are already in the process of certifying engines to the new 2007 EPA standards under the transient test cycle. Some manufacturers have indicated that they will make the changes necessary to attain ARB's 2010 standards – either calibration or engineering – now so that they only have to go through the certification process once. The ARB estimates that the LSI regulations will increase the cost of new engines by less than $100 per engine and that this cost would be passed along to the consumer.

The Board acknowledged IMPCO's concern with performing expensive durability programs and directed that staff work with industry to build flexibility into the durability demonstrations, thereby reducing the cost of compliance. ARB certification staff has already expressed agreement in concept with the proposal by IMPCO that the number of durability programs be minimized in cases where only calibration or catalyst are changing. And contrary to IMPCO's assertion, the cost of performing durability programs for 0.6 g/bhp-hr engines is not likely to be for just a one-state engine. Toyota has already indicated that their new 8 Series forklift, certified to the 2010 standard, will be made available nationwide. We expect other manufacturers will do the same. And we expect other states, if not the federal government, may adopt our 2010 HC+NOx standard.

I. Equipment Replacement using Incentive Funding

1. **Comment**: Please confirm that food processors with owned fleets of LSI forklifts will be eligible for Carl Moyer Program incentive funding for off-road equipment retrofits. (CLFP)

Agency Response: Carl Moyer Incentive Program grant funds are available for forklifts to the extent that cost-effective emissions reductions from the retrofit of these forklifts are in excess of, or in advance of, emissions reductions attributable to the LSI regulation.

2. **Comment:** While we are not completely satisfied with this version of the rule, we are choosing not to oppose this regulation today. However, we are going to take this opportunity to point out -- or make one comment, and that's to strongly encourage this Board and the staff to go back and revisit the one issue that has been left off the table, and that's replacements of this older equipment. We would strongly encourage the ARB to revisit Carl Moyer, look at that and address

the emissions from those engines and the opportunity that we have to do together. (CCGGA)

Agency Response: It is not clear that this comment is specific to the regulation, but for the sake of thoroughness, ARB would like to respond. The ARB recognizes that many forklifts used in agricultural businesses are used fewer hours than those in other industries and are therefore older on average. Since no retrofit kits were certified for pre-1990 forklifts, and since wholesale replacement of these older pieces of equipment is not economically feasible, the ARB developed an alternative set of requirements for forklifts used in agricultural crop preparation services to reduce the economic burden on agricultural businesses. Specifically, rather than requiring the replacement of all uncontrolled forklifts, which could have entailed the purchase of new equipment, the fleet requirement for agricultural crop preparation services addresses 1990 and newer uncontrolled forklifts. While the ARB assumes that most pre-1990 forklifts would be retired before 2015, addressing the emissions from these older units is still important. The ARB does not have a specific incentive program to assist with replacement of these units, and the Carl Moyer Program precludes this kind of assistance; however, other entities, including the San Joaquin Valley Air Pollution Control District, do have programs for replacing equipment when demonstrated to be cost-effective, and we encourage agricultural businesses to take advantage of these programs.

3. **Comment:** A lot of agricultural LSI engines will run at peak periods of the year, peak periods that will correlate with poor air quality. And although they may not do a huge number of years to, quote, be cost effective under Moyer, I think if one took a look at their operational periods at peak times of the year, you'd find out that further considering grants or incentives to retrofit those equipment would not only give you reductions at severe air quality periods, but it'd also really go a long way to protect the health of people working in the industry with that equipment. (ECS)

Agency Response: It is not clear that this comment is specific to the regulation, but the ARB would like to address it anyway. Those pieces of equipment not subject to the requirements of the regulation may be eligible for Carl Moyer Program grants or other incentives. ARB works with air districts and industry to provide funding for equipment in these applications providing that cost effective emission reductions can be obtained as required by the incentive programs.

J. Miscellaneous Comments

1. **Comment:** CTA opposes in-use fleet requirements that are based on an assertion that normal fleet turnover would not bring about sufficient emission improvements by the prescribed dates. ARB staff has not evaluated the impact on turnover of leased forklifts. The proportion of leased equipment used in California will have a significant impact on the average emission improvement that can be expected from normal equipment turnover. Forklift leases run five years while the ARB analysis assumed a seven-year fleet turnover.

Different size fleets are not differentiated from each other regarding their relative age or proportion of leased equipment, but are assumed to have the same average age of equipment and turnover.

The ARB forklift inventory is not up to date, but is projected from a 1990 baseline. If staff had used the four 5-year turnover cycles by 2010 versus slightly less than three 7-year turnover cycles, the result would be a substantially different fleet emission profile in 2009.

Details of calculations that have been performed by ARB have not been made public or provided in sufficiently documented form to allow them to be analyzed and critiqued.

The decision by ARB management to not provide details of the forklift analysis raises concerns about the Board's commitment to transparency. In an age of essentially cost-less electronic publication, there is no reasonable justification for withholding any detail of staff analyses that is essential to an outside review. That detail should include working copies of the actual spreadsheets that were used to make calculations as well as documentation of assumptions used and the basis for those assumptions.

CTA requests that the Board delay its decision until a consideration of the impact of leasing on fleet turnover is conducted and all details of staff calculations are made public with sufficient time allowed for their analysis. (CTA)

Agency Response: Fleet turnover is the foundation upon which the fleet average emission level requirements were built. Based on the most detailed studies of the forklift industry (for example, the CNG report referenced in our ISOR (GRI, 1995, "Industrial Truck Market Analysis," Final Report (GRI-95/0422), Gas Research Institute, October 1995), our own statewide equipment inventory, and information gleaned from equipment providers and users, seven years is the typical turnover rate for user fleets. That turnover rate is based upon small, medium, and large fleets comprised of a mix of rental, leased, and owned equipment. As would be expected, larger facilities have shorter turnover rates and smaller facilities have longer turnover rates.

While some facility fleets may be comprised exclusively of leased equipment, most are comprised of a mix of rental, leased, and owned equipment. And often, the rental or owned equipment is former leased equipment. As such, leased pieces of equipment do not disappear after five years, but instead become used pieces of equipment in rental or secondary fleets and remain in the fleet for several more years.

The ARB disagrees with the comment that details of the calculations behind the fleet average emission levels were not made public. The California Trucking Association was represented at both the August 2004 and March 2005 workshops for the LSI rulemaking. Development of the fleet average was discussed at both workshops. CTA never inquired about the seven-year turnover until April 2006 – within the 45-day public

hearing notice comment period. In recognition of the time constraints that their new consultant was under to review data supporting the fleet average emission level requirements, ARB staff dedicated several calls and meetings to educating the consultant on the development of the requirements. That included providing him with the Microsoft Excel spreadsheet containing the calculations and meeting with him to discuss the spreadsheet in detail. The spreadsheet was included in the ISOR as a reference (ARB, 2006a Criteria Pollutant Emission Benefit Spreadsheet). ARB staff previously discussed the spreadsheet with the LSI working group and committed to making it available upon request as we did with CTA.

2. **Comment:** Format of certification documents should be harmonized. The [power measurement] unit is not consistent with that of the U.S. EPA. While the U.S. EPA uses g/kW-hr, CARB uses g/bhp-hr. Emission standards are written in an engine label. So this inconsistency may cause customer confusion. CARB should harmonize with the U.S. EPA. (Nissan)

Agency Response: All of the ARB's certification documents follow similar formatting, and modifying the LSI certification documents to more closely harmonize with U.S. EPA certification documents would create difficulties for ARB certification staff. However, the ARB has committed to the same unit of power (kilowatt-hour) as the U.S. EPA. All future executive orders will list emissions in units of g/kW-hr.

3. **Comment:** CARB should approve the alternative test procedure written in 40 CFR 1065.10 without any demonstration, if U.S. EPA approves it. (Nissan)

Agency Response: The ARB works closely with the U.S. EPA on these procedures and achieves common approvals when possible. At the same time, situations may arise where the U.S. EPA determines something is appropriate without giving full consideration for California's specific needs and responsibilities under the Clean Air Act. In those instances, it is most appropriate for the ARB to reserve the right to maintain its own test procedure, and consider alternatives as they are proposed, rather than giving blanket approval to any alternative approved by U.S. EPA.

4. **Comment:** The exhaust emission standards table in title 13, CCR, section 2433(b)(1) lists 20.8 g/kW-hr for CO as corresponding to the 2.7 g/kW-hr for HC+NOx in the 2007 through 2009 timeframe. The U.S. EPA standard during this same time frame lists 4.4 g/kW-hr CO as corresponding to 2.7 g/kW-hr HC+NOx, and the maximum U.S. EPA standard for CO is 20.6 g/kW-hr. (Nissan)

Agency Response: The ARB corrected the exhaust emission standards table in title 13, CCR, section 2433(b)(1) to reflect the U.S. EPA CO standard of 4.4 g/kW-hr. See FSOR section II. Modifications to the Original Proposal, part A. Off-Road Large Spark-Ignition Engines for a further description of the final regulation.

5. **Comment:** Title 13, CCR, section 2433(b)(1) does not contain field test requirements. Nissan believes there is no field test requirement. CARB should clarify this. (Nissan)

Agency Response: The ARB modified title 13, CCR, section 2433(b)(1) to incorporate the U.S. EPA alternative certification formula. See FSOR section II. Modifications to the Original Proposal, part A. Off-Road Large Spark-Ignition Engines for a further description of the final regulation.

6. **Comment:** CARB's optional lower emission standards and the U.S. EPA's Blue Sky standards should be harmonized. If different, it will be very difficult for manufacturers to develop systems for both standards. (Nissan)

Agency Response: ARB disagrees with this comment. The intention of the ARB optional lower emission standards (OLES) is to get HC+NOx emissions reductions sooner than we would expect to under the U.S. EPA Blue Sky standards. Manufacturers choosing to certify to the OLES standard will be able to be certified to either the corresponding or less stringent Blue Sky standard and vice versa.

7. **Comment:** Title 13, CCR, section 2433(b)(4) does not indicate whether design standard application is allowed. CARB should allow manufacturer's design standard application. (Nissan)

Agency Response: A design-based certification option has been added to title 13, CCR, section 2433(b)(4) for manufacturers opting to use it. See FSOR section II. Modifications to the Original Proposal, part A. Off-Road Large Spark-Ignition Engines for a further description of the final regulation.

8. In title 13, CCR, section 2433, OBD requirements do not appear. Nissan thinks OBD requirements should be just the same as the U.S. EPA. CARB should clarify this. (Nissan)

Agency Response: The preamble to the adopted "California Exhaust Emission Standards and Test Procedures for New 2007 through 2009 Model-Year Off-Road Large Spark-Ignition Engines" and the adopted "California Exhaust and Emission Standards and Test Procedures for New 2010 and Later Model-Year Off-Road Large Spark-Ignition Engines" specifies that sections of the code of federal regulations that have been included in their entirety are set forth with the section number and title. That is the case for 40 CFR Part 1048.110 regarding engine diagnostics. Thus, the ARB's OBD requirements are the same as those of the U.S. EPA.

9. **Comment:** Toyota would be required to assign significant resources not only in the development of a new fuel system, but possibly a new engine. As part of its commitment towards a "greener" environment, Toyota has invested, and continues to invest an enormous amount of resources (manpower and money) in the development of alternative fuel systems to operate industrial lift trucks. (TMHU 1)

Agency Response: The ARB appreciates Toyota's commitment to a greener fleet and the Board has determined that the emission reductions attributable to this regulation are cost-effective. The ARB's 2007 through 2009 standards harmonize with those of the U.S. EPA; therefore, there are little or no additional costs to Toyota for complying with

that portion of the California regulation. The ARB 2010 standard is expected to be met through minor catalyst and calibration changes to those engines designed to meet the existing 2007 standard. The ARB estimates these costs represent less than one percent of the overall purchase price of a typical forklift and expects that the costs will be passed along to the consumer.

10. **Comment:** Carbon dioxide (CO2) is a major cause of global warming. Fuel cell vehicles that use reformulated gasoline produce large amounts of CO2. Fuel cells are likely to be used in future models of forklifts and other industrial equipment. I urge CARB to include restrictions on CO2 emissions in this rulemaking, and to implement CO2 restrictions on passenger vehicles and trucks. (Murphy)

Agency Response: As noted in the Staff Report, the LSI rulemaking has been undertaken to reduce emissions of HC+NOx from LSI engines. These LSI emissions contribute significantly to the formation of smog or ground level ozone in California. The rulemaking fulfills commitments made in the 2003 State Implementation Plan to adopt two measures that address respectively the emissions of new and in-use LSI engines.

Although fuel cells using gasoline reformers may have higher CO2 emissions, fuel cells, especially those used in off-road equipment, are expected to use hydrogen directly (without a reformer). And a number of methods of producing hydrogen have inherently low CO2 emissions.

Finally, as authorized by Assembly Bill 32 (Chapter 488, Statutes of 2006), the ARB will be addressing emissions of greenhouse gases, including carbon dioxide, in future rulemakings.

11. **Comment:** CLFP urges the ARB to work with the agricultural industry to identify the methods that will be used to establish baseline inventory and compliance. (CLFP)

Agency Response: The ARB will work with all affected businesses and industries to assist with implementation.

12. **Comment:** MECA supports ARB's proposal to include verified retrofit systems as an option for fleet users to comply with proposed fleet emission requirements for off-road LSI engines. Retrofit systems based on closed-loop control with three-way catalysts have already proven to be a robust solution for reducing emissions from uncontrolled, in-use LSI engines. As detailed in the March 3, 2006 staff report, one manufacturer has already verified a retrofit system for a range of uncontrolled, off-road LSI engines. This verified retrofit system brings uncontrolled, 12 g/bhp-hr HC+NOx equipment down to 1.0 g/bhp-hr HC+NOx emission levels, an emissions level well below the 2004 3.0 g/bhp-hr HC+NOx certification requirements for new equipment. MECA fully expects additional manufacturers to verify cost-effective, durable retrofit options

for these LSI applications using the available interim and proposed final verification protocols. ARB's proposed verification protocols provides end-users and ARB with needed assurances that retrofit options will deliver real emission reductions over the required warranty period. MECA would ask ARB to ensure that adequate resources are available to manage ARB's retrofit verification program to minimize delays in approving valid retrofit verification applications. (MECA 1)

Agency Response: The ARB has committed staff to assist retrofit emission control system manufacturers in validating their control systems.

13. **Comment:** Staff should provide annual implementation status reports to the Board with recommendations to further strengthen new and in-use emission requirements where feasible (CAPCOA)

Agency Response: The regulatory standards for LSI engines include optional lower-emission standards that are numerically lower than the 2007 and 2010 mandatory standards. As engines are certified to these optional standards, ARB staff will have an opportunity to reassess the mandatory standards. Similarly, as retrofit emission control systems are verified, ARB staff will have an opportunity to reassess in-use emission and retrofit requirements.

14. **Comment:** In-use proposal won't ultimately achieve the emissions reductions that the state needs. The agricultural portion permanently exempts pre-1990 equipment from the regulation with a loss of 1.5 tons per day in air quality benefits. (ED)

Agency Response: The Board determined that the emission reductions attributable to the LSI regulation were the maximum achievable in consideration of technical and economic feasibility. In general, agricultural businesses have older forklifts than other businesses. Since there are no retrofit emission control systems available for these older forklifts, replacement would have been the only option. But the Board determined that it was not economically feasible for agricultural businesses to replace forklifts because the equipment is only used seasonally and does not accrue hours as rapidly, and because agricultural businesses are price takers and cannot easily pass along the cost of new equipment.

15. **Comment:** Special Treatment for Small Volume Engines. Harmonization is a good concept to concentrate manufacturers' development resources on environmentally friendly equipment. But by this standard, harmonization ends in the 2009 model year. So, manufacturers will need measures to recover their resources. One of them, Nissan thinks, is special treatment for an engine family with small volume sales. In response to customers' demand, manufacturers sometimes add an engine family with very small volume. In that case, it is very difficult for manufacturers to recover their development cost by equipment

price-up. CARB should consider special treatment for an engine family with small volume sales. (Nissan)

Agency Response: ARB disagrees with this comment and believes that the commenter's proposal would give manufacturers an incentive to place engines in smaller compartmentalized engine families. Special treatment for compartmentalized engine families would endanger emission reductions from LSI engines as a category. The ARB already provides flexibility to engine manufacturers through other means such as limits on production line testing or assigned deterioration factors that reduce the burden on manufacturers.

16. Comment: Exactly one liter engines are not addressed (EMA)

Agency Response: ARB has modified the table contained in title 13, CCR, section 2433(b)(1)(A) to reflect that exactly one liter engines are excluded from the provisions of the LSI regulation for the reasons discussed in the agency response to Comment D.1. See FSOR section II. Modifications Made to the Original Proposal, part A. Off-Road Large Spark-Ignition Engines for a description of the final modification.

V. SUMMARY OF COMMENTS TO THE FIRST 15-DAY NOTICE OF MODIFIED TEXT AND AGENCY RESPONSES

The Board received five written comments during the First 15-Day Notice comment period that began on December 1, 2006 and ended on January 12, 2007 (the First 15-Day Notice comment period was extended to provide commenters additional time to respond). A list of commenters is set forth below, identifying the date and form of all comments that were timely submitted. Following the list is a summary of each objection or recommendation made regarding the proposed action, together with an explanation of how the proposed action has been changed to accommodate the objection or recommendation or the reasons for making no change. The comments have been grouped by topic whenever possible. Comments not involving objections or recommendations specifically directed towards the rulemaking or to the procedures followed by the ARB in this rulemaking are not summarized below. Additionally, any other referenced documents are not summarized below.

Comment Received during the First 15-day Comment Period

Abbreviation	Reference Number	Commenter
CLFP	CLFP	Rob Neenan California League of Food Processors Written testimony: December 5, 2006
EMA	EMA 1	Roger Gault Engine Manufacturers Association Written testimony: December 18, 2006
IMPCO	IMPCO	Karen Hay IMPCO Technologies Written testimony: January 12, 2007
ITA	ITA	Gary Cross Industrial Truck Association Written testimony: January 11, 2007
Nissan	Nissan	Harada Hidemi Nissan Motor Company, LTD Written testimony: January 10, 2007

A. Agricultural Crop Preparation Service Definition

1. **Comment:** ARB, in using NAICS code 115114 to determine which types of businesses will be eligible for the agricultural alternative compliance option, has drawn an arbitrary distinction as to what types of firms will qualify for the agricultural compliance provisions. CLFP urges the board not to adopt the NAICS usage because it draws an entirely unfair and inconsistent administrative distinction. (CLFP)

2. **Comment:** We asked ARB to clarify the status of food processors as "agricultural operations" and contended that the definition of the term "processor" should include fruit and vegetable canners, freezer plants, dehydrators, dryers, and juice operations. (CLFP)

Agency Response: See the Agency Response to Comment G.1, in FSOR Part IV. Summary of Comments to the Original Proposal (45-Day Notice) and Agency Responses.

3. **Comment:** Fruit and vegetable processors are highly seasonal operations with a number of older forklifts that cannot be retrofitted to meet emission standards. Food processors, like most agricultural firms, are largely price-takers and operate on relatively small financial margins. Therefore, there is no appreciable difference between the types of agricultural operations that will be included in the special compliance provisions, and some of the types that will be excluded.

Instead, ARB should develop a new proposal that will include fruit and vegetable canning and freezing operations. (CLFP)

Agency Response: See the Agency Response to Comment G.1, in FSOR Part IV. Summary of Comments to the Original Proposal (45-Day Notice) and Agency Responses.

4. **Comment:** It is unclear why CARB doesn't simply define "Agricultural Crop Preparation Services" as activities that fall within the scope of NAICS 115114 plus the activity of artificially drying and dehydrating fruits and vegetables, since it appears that the result would be the same. The attempt to clarify matters by excluding certain activities actually confuses matters by creating an implication that similar activities that are not specifically excluded are intended to be *included.* It seems that CARB could accomplish its entire purpose simply by defining "Agricultural Crop Preparation Services" as those activities that fall within the scope of NAICS 115114 plus the activity of artificially drying and dehydrating fruits and vegetables, eliminating the need to define "nut hullers and processors," and "dehydrators." (ITA)

Agency Response: ARB disagrees with the assertion that the results would be the same. "Artificially drying and dehydrating" is a superset of activities of which our definition only allows those activities stipulated under the "dehydrating" definition. See also the responses to Comments 1 to 3 above.

5. **Comment:** Perhaps more significant is the issue of how to handle businesses that are engaged in both "Agricultural Crop Preparation Services" as defined and other activities that fall outside the definition. For example, if a business is engaged in shelling nuts as well as roasting nuts and uses the same LSI equipment in both activities, it is unclear whether it will be considered to be engaged in "Agricultural Crop Preparation Services." CARB should address this issue, perhaps through a simple "primary activity" test. (ITA)

Agency Response: The exemption for equipment used in agricultural crop preparation services is intended to be narrow and limited. The equipment that is engaged in uses outside the scope of the exemption is not intended to qualify for the exemption.

B. Treatment of LSI engines with a Displacement of One Liter or Less

1. **Comment:** LSI engines of one liter or less displacement are most appropriately regulated through the Small Spark Ignition Exhaust and Evaporative emission requirements in title 13, Chapter 9 of the California Code of Regulations. ARB staff appears to grasp the special circumstance of this narrow engine segment and the need to exclude it from the LSI rule, but has failed to properly do so. The modifications proposed in the December 1, 2006 modifications specifically preclude engine manufacturers from considering these engines as small spark ignition engines for purposes of certification and compliance. This is not in

accordance with the direction approved by the Board in Resolution 06-11, which states that the LSI rule must: (i) harmonize with federal programs; (ii) provide simplified certification procedures through alignment with U.S. EPA's program; and (iii) have no adverse impact on the environment. (EMA)

2. **Comment:** The staff proposal requires these engines to be certified as LSI engines, but exempts them from the LSI evaporative emission standards. As such, the LSI rule does not harmonize with the federal program and does not provide for simplified certification procedures through alignment with the federal program. Worse, these engines are subject to a less stringent LSI standard instead of the SORE standard. (EMA)

3. **Comment:** It appears that CARB has reversed its written position, as set forth in the 45-day notice, concerning the treatment of engines 1 liter or less. The 45-day notice stated as follows: Small engines. Engines with total displacement at or below 1000 cc may comply with the requirements of Title 13, California Code of Regulations, Chapter 9, Article 1, Small Off-Road Engines and Chapter 15, Article 1, Evaporative Emission Requirements for Off-Road Equipment instead of complying with the requirements of this part, as described in §1048.615. The new proposal says that LSI engines one liter or less must comply with the LSI regulations. This substantive change would not appear to be appropriate for a 15-day notice. The fact that CARB proposes in the 15-day notice that these engines meet separate higher emissions standards than larger engines and that they not be required to meet the evaporative emissions standards does not alter the fact that this is a significant change in the regulatory scheme to which the engines are subject. The proposal destroys the alignment with EPA standards for these engines, imposes different certification and labeling requirements, and has potentially negative implications for California's control of exhaust and evaporative emissions. (ITA)

Agency Response: As mentioned in the Agency Response to Comment D.1 to the Original Proposal, the ARB's initial efforts in this rulemaking were directed at engines with a displacement of greater than one liter. The Board subsequently evaluated two options regarding the treatment of LSI engines with a displacement of one liter or less. The first was to allow manufacturers to continue to certify to the existing LSI standard of 9.0 g/bhp-hr – in the near term – until the ARB could complete its assessment of the feasibility of new emission control technologies for these engines and, if appropriate, recommend new emission standards to the Board. The second was to modify the LSI regulation to allow manufacturers to indefinitely certify these engines to a SORE standard that is three times greater than the existing LSI engine standard.

The ARB believes it is more appropriate to maintain the original agency direction and follow up at a later date with a rule that specifically assesses the best available cost-effective emission control technology for use on these small engines because:

- the Board's original focus was on engines with a displacement of greater than one liter;
- the first of the two options described above for obtaining emissions reductions from LSI engines with a displacement of one liter or less has a potential for greater emission reductions over the long term, and
- it would be difficult to adopt a separate more stringent regulation for these small engines if the Board had already accepted modifications to the LSI regulation allowing manufacturers to choose to certify engines to the SORE standard.

The ARB has already begun the process of identifying this category of engines as an emission reduction measure in the next State Implementation Plan or SIP, a document demonstrating to the U.S. EPA the Board's plan for attaining federal ambient air quality standards. For this reason, the ARB modified the regulatory language to remove the option allowing manufacturers of LSI engines with a displacement of one liter or less to choose to comply with either the requirements of the LSI regulation or those of the SORE regulation.

EMA points out that the regulatory language proposed in 45-day public hearing notice would have allowed manufacturers an opportunity to certify to the SORE standard of 6.0 g/bhp-hr instead of the existing LSI standard of 9.0 g/bhp-hr. As mentioned previously, the ARB believes that a new regulation developed specifically for LSI engines with a displacement of one liter or less will include emission standards that are significantly lower than the 6.0 g/bhp-hr SORE standard (and more closely aligned to the LSI standards), and will be more health-protective, providing a greater benefit to the breathers of the State over the long term.

In summary, the ARB believes that allowing manufacturers to certify an LSI engine with a displacement of one liter or less to the SORE standard as the commenter suggests provides manufacturers a convenient way to circumvent the more stringent existing standards promulgated for LSI engines with a displacement greater than one liter and the expected more stringent standards for LSI engines with a displacement of one liter or less.

C. New Engine Standards

1. **Comment:** The new definition of Family Emission Level is confusing. In other nonroad regulations, it is used for certification averaging programs, but this regulation does not have such a program. It appears that the use of FEL in this regulation relates only to the alternative emissions standards represented by the formula, but the concept of FEL is not needed for that purpose as shown by the fact that EPA uses the same formula without using the concept of FEL. If CARB intended consistency with EPA, then the FEL concept should be removed. Otherwise, the regulation should be amended. (ITA)

Agency Response: The ARB does not agree that the use of the established term FEL, consistent in its use, would be confusing to any significant degree. On the contrary, it

will make certification and compliance consistent with other ARB engine certification programs and ensure easier tracking of manufacturers' obligations for both staff and industry. In the context of this regulation, the term FEL has the same meaning as the manufacturer chosen standard.

2. **Comment:** The provision for optional standards is out of place, appearing between two alternatives for mandatory compliance, and should follow the alternative certification formula. (ITA)

Agency Response: To better delineate between mandatory and optional standards, section 2433(b) has been reorganized. Subparagraph (b)(1)(A) still contains the required exhaust emission standards, but (b)(1)(B) now contains the United States Environmental Protection Agency (U.S. EPA) alternative certification formula. The optional exhaust emission standards formerly contained in (b)(1)(B) are now in subparagraph (b)(2). See FSOR, Part III. Subsequent Modifications (Second 15-Day Notice) section A, for further discussion of the regulation's final organization.

3. **Comment:** All of the adopted EPA standards, as for field testing and severe-duty engines, should be set forth in section 2433. They appear in the "Proposed California Exhaust and Evaporative Emission Standards and Test Procedures for 2007 Through 2009 Off-Road Large Spark-Ignition Engines Part 1: 2007-2009 Emission Standards" and into the "Proposed California Exhaust and Evaporative Emission Standards and Test Procedures for New 2010 and Later Off-Road Large Spark-Ignition Engines," but they do not appear in §2433. Without them, §2433 is incomplete, misleading, and of no particular use. (ITA)

Agency Response: ARB concurs that field testing and severe-duty engine standards should be included in Section 2433. Subparagraph (b)(1)(c) has been added containing a reference to the field testing standards contained in 40 CFR Section 1048.101(c), and note (5) of the exhaust emission standards table in subparagraph (b)(1)(a), has been added containing a reference to the HC+NOx and CO standards for model year 2007 and newer severe-duty engines. See FSOR, Part III. Subsequent Modifications (Second 15-Day Notice) section A, for further discussion of the regulation's final organization.

4. **Comment:** There are various unexplained, substantive changes to the optional CO standards attributed to the correction of errors. CARB's optional standards are not intended to be the same as EPA's Blue Sky standards, so the "correction," cannot be attributed to harmonization. Instead, these appear to be unexplained substantive changes that make the optional CO standards far more stringent, going from 15.5 g/hp-hr to 4.8 and 8.3 g/hp-hr, respectively, for HC+NOx levels of 1.5 and 1.0 g//hp-hr. Changes of this sort are not candidates for a 15-day notice. (ITA)

Agency Response: The intent of ARB's optional lower-emission standards (OLES) is to achieve HC+NOx reductions in excess of those attributable to the U.S. EPA's Blue Sky standards by allowing the CO emission level to float. However, the original structure of the optional lower-emission standards inadvertently made them less stringent than those of the U.S. EPA in certain cases. The ARB modified the CO standards because it is not appropriate for ARB OLES engines to have emissions that exceed the emissions level of engines certified under the U.S. EPA's alternative certification formula.

Government Code section 11346.8(c) permits ARB to make changes to the originally proposed regulatory action if the change is significantly related and the text of the change is made available to the public for at least 15 days. In ARB's original proposal, the optional certification standards were set forth in the incorporated "California Exhaust and Evaporative Emission Standard and Test Procedures for New 2010 and Later Off-Road Large Spark-Ignition Engines," Subpart B section 1048.140. In the ARB's first notice of modifications to the original proposal, the ARB added these optional standards to the incorporated "California Exhaust and Evaporative Emission Standard and Test Procedures for New 2007 through 2009 Off-Road Large Spark-Ignition Engines," Subpart B section 1048.140. The table of the "Optional Exhaust Emission Standards" in section 2433(b) was also corrected to parallel the provisions in the incorporated sections 1048.140.

5. **Comment:** CARB has apparently failed to include corresponding field testing standards for its optional standards. This may be an oversight, since EPA's and CARB's mandatory standards and EPA's optional standards all have corresponding field test standards, which are 40-50 percent higher than the certification standards. The issue is substantive, since having to meet the same standard in the field as in certification may well dissuade anyone from certifying to the optional standards, which would completely defeat their purpose. (ITA)

6. **Comment:** EPA Tier 2 and Blue Sky emission standards allow for more lenient in-use field-test emission standards to reflect the observed variation in emissions from in-field testing due to varying engine operation, and the projected effects of ambient conditions on different technologies. ARB does not specify more lenient field-test standards in either of the following: - MY10+ Tier 2 Standards (1048.101) or - MY07+ Optional Lower-Emission Engines (1048.140). Until data is collected which indicates to the contrary, ARB should include separate, more lenient field-test emission standards consistent with those allowed by EPA. (IMPCO)

Agency Response: ARB has included field testing standards for its optional standards. They appear in Section 2433 subparagraph (b)(2)(B) and are consistent with U.S. EPA's Blue Sky standards. The U.S. EPA field testing standards contained in 40 CFR, Part 1048.101(c) are already incorporated by reference into the ARB's 2007 and 2010 engine standards.

7. **Comment:** In section 2433(b)(4)(D), the statement, "Design-based certification may be used instead of generating new emission data" should be followed by a reference to 40 CFR 1048.105 and 40 CFR 1048.245, which explain what the design requirements are. (ITA)

Agency Response: References to 40 CFR Sections 1048.105 and 1048.245 have been added for manufacturers opting to use design-based certification for the evaporative emission standards.

8. **Comment:** The 15-day notice proposes no further modification to this section, which would leave in place the modification announced in the 45-day notice. That modification changes §2434(c)(5)(G) by apparently requiring that the emission level to which the engine is certified be placed on the label. There are at least two problems with this: 1. The first example given in the proposed modification applies to 2002 engines, which is confusing, since all new 2002 engines were sold long ago and there was no previous requirement to include the emission level on such engines; and 2. CARB says that it is adopting 40 CFR 1048.135, which has not been consistently interpreted to require putting the numeric certification level on the label. (ITA)

Agency Response: The ARB has added a provision to 40 CFR Part 1048.135 stating that the State's labeling requirements (title 13, CCR, section 2434) also apply. And section 2434(c)(5)(G) as presented in the 45-day public hearing notice, clearly specifies that the HC+NOx and CO emission standard to which the engine is certified must be contained in the emission label. See FSOR section III. Subsequent Modifications, part E. incorporated "California Exhaust and Evaporative Emission Standards and Test Procedures for New 2007 through 2009 Off-Road Large Spark-ignition Engines" and incorporated "California Exhaust and Evaporative Emission Standards and Test Procedures for New 2010 and Later Off-Road Large Spark-Ignition Engines for a description of the final regulation.

9. **Comment:** CARB's supplemental notice was intended to correct the omission of EPA's separate standards for severe-duty engines. However, the correction is also in error because it inserts the wrong standards for HC+NOx. The EPA language is as follows: "For severe-duty engines, the Tier 2 HC+NOX standard is 2.7 g/kW-hr and the Tier 2 CO standard is 130.0 g/kW-hr." The language that CARB proposes to add is as follows: "For severe-duty engines, the HC+NOx standard is 0.8 g/kW-hr and the CO standard is 130.0 g/kW-hr." ITA assumes this was also inadvertent. (ITA)

10. **Comment:** ARB issued a December 18, 2006 Errata notice specifying the following HC+NOx emission standard for MY07-09 severe-duty engines: "For severe-duty engines, the HC+NOx standard is 0.8 g/kW-hr and the CO standard is 130.0 g/kW-hr…" The MY07-09 Tier 2 HC+NOx emission standard is 2.7 g/kW-hr. Therefore, the severe-duty engine HC+NOx standard specified in the Errata notice is far more stringent than the MY07-09 Tier 2 standard. This

0.8 g/kW-hr value should be revised to read 2.7 g/kW-hr, consistent with EPA and ARB MY07-09 Tier 2 exhaust emission standards, and EPA MY07+ severe-duty engine standards. (IMPCO)

Agency Response: The language providing the HC+NOx and CO standards for model year 2007 through 2009 and 2010 and later severe-duty engines has been modified to reflect the correct federal HC+NOx standard for these engines.

11. **Comment:** The difference between the MY07-09 Tier 2 (1048.101) and OLES (1048.140) emission standards is not clear. Manufacturers are allowed to certify to the Tier 2 emission standards using one of two methods: a) Certify to 2.7 g/kW-hr HC+NOx and 4.4 g/kW-hr CO, or b) Use the formula (HC+NOX) × CO 0.784 ≤ 8.57, as long as HC+NOx does not exceed 2.7 g/kW-hr and CO does not exceed 20.6 g/kW-hr. The first three OLES HC+NOx and corresponding CO values are identical to those found using the formula (HC+NOX) × CO 0.784 ≤ 8.57 under the Tier 2 standards. Further clarification of the difference between engines certified under the Tier 2 emission standards (1048.101) and the OLES emission standards (1048.140) is appreciated. (IMPCO)

Agency Response: The ARB promulgated Manufacturer Advisory Correspondence 2005-01 in March 2005, establishing interim voluntary OLES. The MAC allowed equipment manufacturers to certify equipment to levels below the existing ARB and U.S. EPA Tier 1 standard so that it would be available to equipment operators working to attain the 2009 fleet average emission level requirements. Those same MAC standards minus the 2.7 g/kW-hr standard beginning in 2007 became the OLES. The first three OLES levels (2.0, 1.3, and 0.8 g/kW-hr HC+NOx) are identical to levels that manufacturers can certify to under the U.S. EPA's alternative certification formula in 40 CFR Part 1048.101(a)(3). The field testing standards for the ARB's OLES engines align with the field testing standards for the U.S. EPA's Blue Sky standard engines (40 CFR Part 1048.140) and are therefore more stringent than those for the U.S. EPA'S Tier 2 standard. As such, a manufacturer might choose to certify to a low HC+NOx standard under the U.S. EPA Tier 2 standard to avoid the more stringent field testing standards associated with either the Blue Sky or OLES field testing standards. While concern about the more stringent field testing standards may preclude some manufacturers from certifying either OLES or Blue Sky engines, it is ARB's hope that manufacturers will certify OLES engines to the first three OLES levels in the near term and to the three remaining OLES levels (0.5, 0.3, and 0.1 g/kW-hr) in the longer term as they become more comfortable controlling their engines to levels below the minimum HC+NOx level that a manufacturer can certify to under the U.S. EPA's alternative certification formula.

12. **Comment:** The proposed language, in setting forth the requirements for optional low emission standard engines ("OLES") in the 2007-2009 time frame, states, "These engines . . . must meet all the requirements in this part that apply to 2010 model year engines . . ." This appears to be an error, where the reference should

have been "all the requirements in this part that apply to 2007-2009 model year engines." (ITA)

13. **Comment:** ARB has proposed in 1048.140 that "…"OLES" engines must meet all the requirements in this part that apply to 2010 model year engines…" 2010 model year engines are subject to substantially different requirements as compared to those for MY07-09 engines. IMPCO does not believe that ARB's intent was to make it more difficult for a manufacturer to certify a MY07-09 engine to a lower emission standard, by requiring that all of the MY10 requirements are met. (IMPCO)

Agency Response: The final regulation specifies that the requirements being applied to optional lower-emission standard (OLES) engines are those for model year 2007 through 2009 engines and not model year 2010 engines. The 2010 reference was carried over in error from the corresponding exhaust emission standards table in the incorporated by reference "California Exhaust and Evaporative Emission Standards and Test Procedures for New 2010 and Later Off-Road Large Spark-ignition Engines."

14. **Comment:** The Summary of Proposed Modifications says that section 1048.401 is related to production line testing. However, the EPA provision that CARB is proposing to adopt deals with "in-use engines" and "engines that have gone into service," which are completely distinct from production line testing. CARB therefore needs to explain its understanding of the purpose of this provision. (ITA)

Agency Response: The explanation in the First 15-day Notice attempts to explain a mistake that is being corrected. The result of the modification is that the ARB has incorporated the federal test procedure so that there is no unique ARB provision. The ARB provision in the final regulation is identical to U.S. EPA's provision.

D. Airport Ground Support Equipment

1. **Comment:** The definition of "Airport Ground Support Equipment" is based on the 24 categories in the South Coast Ground Support Equipment Memorandum of Understanding ("GSE MOU"). One of those categories is "forklifts." Presumably, however, CARB does not intend to consider forklifts as Airport GSE for purposes of this regulation. Otherwise, a fleet comprised only of forklifts could literally meet the definition of a "non-forklift fleet" if the forklifts are characterized as GSE. In addition, the definition includes equipment designed for on-road use that lacks a California license plate. Taken literally, this could include an on-road truck, such as a fuel truck, catering truck or service truck, which bears a license plate from another state. (In this connection, it may be relevant that the definition of "LSI Engines" does not include the concept of non-road use.) Thus, while the Summary of Proposed Modifications states that the purpose is to clarify the inclusion of "vehicles designed for on-road use, but dedicated to GSE operations and not licensed for on-road use," the regulatory language does not accomplish this purpose. (ITA)

Agency Response: The definition for airport GSE is relevant for only the provisions of the regulation that are unique to GSE. In the final regulation, the sole unique provision is in section 2775.2(e)(2). In all other respects, GSE is treated the same as other mixed fleets. The GSE definition now clarifies that categories of GSE designed for on-road use, but dedicated to GSE operations and not licensed for on-road use may be included in the GSE fleet average calculations. See FSOR Part III. Subsequent Modifications (Second 15-Day Notice), section D. for a description of the modification.

2. **Comment:** CARB's Summary of Proposed Modifications does not address the significant addition of default emission levels for on-road equivalent ground support equipment and whether or not these levels are to be used even if the engine in the piece of equipment has been certified to an emission level or has an absolute verified emission level which is lower than the default level. (ITA)

Agency Response: The ARB developed the default emission levels for on-road equivalent ground support equipment in consultation with the air carrier industry. The 2009, 2011, and 2013 levels represent the expected on-road equivalent fleet average for those compliance dates based upon the GSE turnover rate for on-road vehicles and modeling runs using the ARB's EMFAC2002 emissions model. The Board approved regulatory text incorporating these emission levels as part of the package of 15-day modifications made available at the May 25, 2006 Board hearing. Commenting on these provisions, the Air Transport Association of America was in support. See Comment 3, FSOR section IV. Summary of Comments to the Original Proposal (45-Day Notice) and Agency Responses, Part E. The on-road equivalent definition was further modified to ensure that a vehicle included within the fleet average is not licensed for on-road use in any state. See FSOR Part III. Subsequent Modifications (Second 15-Day Notice), section E. for a description of the final regulation.

E. Fleet Average Emission Level Requirements

1. **Comment:** The explanation in the Summary of Proposed Modifications does not match the proposed change, making effective comment impossible. The proposed change permits fleet operators to exclude uncontrolled 2003 and 2004 model year rental equipment rented for less than one year until 2010. However, the explanation says that the new language would "exempt uncontrolled 2004 rental equipment from the operator fleet average calculations for an additional year and equipment leased prior to May 25, 2006." (ITA)

Agency Response: A complete explanation for the changes was included in the Summary of Proposed Modifications. Since the changes had a impact on both equipment dealers and agricultural crop preparation services, the explanation for the changes was contained in both (a)(2) and (c)(3).

2. **Comment:** Moreover, the explanation says that the purpose of the change is to "alleviate the economic burden on dealers" in light of the fact that "model year

2004 equipment contained in many instances uncontrolled engines produced in 2003." Given this purpose, the question arises why the relief is limited to equipment leased for less than one year or, for that matter, why the relief is limited to rented or leased equipment. (ITA)

Agency Response: The ARB worked with the affected industry to establish provisions to address this select group of engines. The changes made were sufficient to alleviate the impact on dealers and agriculture while remaining sufficiently narrow to prevent unintended negative impacts to air quality.

3. **Comment:** Section 2775.1(c)(3) distinguishes between leased forklifts and rental forklifts, imposing different conditions for excluding them from the fleet calculations for agricultural crop preparation services depending on whether they are leased or rented, but the proposal never explains the difference. Although the intended distinction may be that "rental" refers to contracts that are for less than one year while "lease" refers to contracts for one year or longer, no definitions are given and the distinction is not followed in other parts of the proposal. (ITA)

Agency Response: The ARB agrees with the comment and added definitions for rental and lease as applied to forklifts used in agricultural crop preparation services in title 13, CCR, section 2775.1(c)(3) to clarify intent.

4. **Comment:** Another problem making the treatment of forklifts used in agricultural crop preparation services incomprehensible arises from the contradiction between the introductory portion of §2775.1(c) and the subparts under it. The introductory part, or scope, is limited to "owned uncontrolled" forklift engines. However, (c)(3)(A) and (B) deal, respectively, with leased and rented forklifts, not "owned" forklifts. Both also deal with forklifts that meet a 4 g/kW-hr standard, not "uncontrolled" forklifts (except for the last sentence of (B)). (ITA)

Agency Response: The ARB agrees that clarification was needed. To address this issue, the word "owned" was removed from section (c) and placed into sections (c)(1) and (c)(2) to clarify that section (c) provides requirements not only for owned forklifts, but requirements for rental and leased forklifts as well.

5. **Comment:** The provisions of §2775.1(f) complicate matters further. This subsection exempts operators of forklift fleets used in agricultural crop preparation services from the provisions of §2775.1(c) if the forklift fleet meets a 4 g/kW-hr fleet average emission level--thus it provides an alternative compliance option to §2775.1(c). In fact, it might be characterized as an alternative to an alternative, since §2775.1(c) is itself an alternative or exception to §2775.1(a), which sets forth the basic fleet average requirements. However, as noted, §2775.1(c) is limited to *owned*, *uncontrolled* forklifts. Thus, it appears that there is no exception or alternative compliance option for operators of forklift fleets used in agricultural crop preparation services insofar as those fleets consist of

controlled forklifts. This would suggest that operators of forklift fleets used in agricultural crop preparation services must still comply with §2775.1(a), which sets forth the table of Fleet Average Emission Level Standards, as to their owned, controlled fleets. It seems unlikely that this was CARB's intention and more likely that CARB instead intended a completely separate program for forklift fleets used in agricultural crop preparation services, whether the forklifts are owned, rented, leased, controlled or uncontrolled. Assuming this is the case, the proposal should be reorganized to put those forklifts into a stand-alone section, because the current approach is not comprehensible. (ITA)

Agency Response: The ARB believes that the existing language is clear in its intent. The regulation is applicable to all forklifts used in agricultural crop preparation services. However, for those already controlled, there are no additional requirements.

6. **Comment:** Subsections 2775.2(a) and (b) apply to "fleet operators subject to the requirements in §2775.1(a)." The Summary of Proposed Modifications explains that this is limiting language intended to limit the application of §2775.2(a) and (b) to medium and large fleets. However, the first sentence of §2775.1(a), which requires a determination of fleet size, applies to *all* fleets, including small fleets. Since part of §2775(a)(1) applies to all fleets and part of it applies only to medium and large fleets, there is an ambiguity. The problem is worse in §2775.2(b). Even if one guessed that the first sentence of §2775.2(b) was limited to medium and large fleets (notwithstanding the ambiguity just discussed), the next sentence, which deals with fuel records, applies simply to "Fleet operators," without limitation to "fleet operators subject to the requirements of §2775.1(a)." Since there is no limitation, this might easily be read to require operators of small fleets to keep fuel records, which apparently is not CARB's intention, according to the Summary of Proposed Modifications. These subsections need to be rewritten so as to leave no doubt about which, if any, recordkeeping requirements are imposed on operators of small fleets. (ITA)

Agency Response: The ARB has modified title 13, CCR, sections 2775.2(a) and (b) to clarify that only medium and large facilities and those with a non-forklift fleet (four or more pieces of equipment by definition) are required to conduct a baseline inventory and keep records. See FSOR section III. Subsequent Modifications, part D. Article 2. Large Spark-Ignition (LSI) Engine Fleet Requirements for a description of the final modification.

F. Miscellaneous Comments

1. **Comment:** Nissan would like ARB to harmonize with U.S. EPA by clarifying that the permeation specification is SAE J2260, dated 1996, and not 2004. (Nissan)

Agency Response: The ARB has added a date to Section 2433(b)(4)(B) specifying that the applicable evaporative emission specifications for non-metallic fuel lines are contained in the November 1996, and not the November 2004, issuance of SAE J2260.

2. **Comment:** The ARB is inconsistent in its use of power units. ITA recommends that ARB harmonize with EPA and use kilowatts and additionally recommends that brake horsepower be included parenthetically. (ITA)

3. **Comment:** Terms of grams per brake horsepower-hour (g/bhp-hr), grams per kilowatt-hour (g/kW-hr), horsepower (hp), and kilowatt (kW) are used inconsistently throughout the proposed text. To align with EPA terminology and minimize confusion for certification, labeling, and reporting purposes, the primary units should be in terms of g/kW-hr and kW, optionally referencing g/bhp-hr and hp in parenthesis. (IMPCO)

Agency Response: The ARB has corrected the notes accompanying the standards tables in Section 2433(b)(1)(A) and (b)(2)(A), 40 CFR Part 1048.101(a)(2) (both for the 2007 through 2009 and the 2010 and later model year engines), and 40 CFR Part 1048.140 (both for the 2007 through 2009 and the 2010 and later model year engines) to clarify that emissions are to be reported to the ARB in units of g/kW-hr. Emissions were previously reported in units of g/bhp-hr; however, ARB in harmonizing with the U.S. EPA is now using the kilowatt-hour as the measurement unit for power. ARB engine certification documents will also reference power in g/kW-hr. The ARB will not provide power references parenthetically in g/bhp-hr because of the opportunity it provides for confusion on the part of equipment operators performing fleet average emission level calculations. However, outreach materials will include conversion factors to aid interested parties in converting power from one unit of measurement to the other.

4. **Comment:** IMPCO suggests that ARB update the following CFR sections to remain consistent with the text contained within the CCR: - MY07+ Emission-Control Labels (CCR 2434, 40 CFR 1048.135); - MY07+ Emission Control System Warranty Statement (CCR 2436, 40 CFR 1048.120) (IMPCO)

Agency Response: Provisions were added to the State's warranty and labeling requirements to clarify that both sets of warranty requirements – title 13, CCR, section 2436 and 40 CFR Section 1048.120 – and both sets of labeling requirements – title 13, CCR, section 2434 and 40 CFR Section 1048.135 – apply.

VI. SUMMARY OF COMMENTS TO THE SECOND 15-DAY NOTICE OF MODIFIED TEXT AND AGENCY RESPONSES

The Board received two written comments during the Second 15-Day Notice comment period that began on February 1, 2007 and ended on February 16, 2007. One comment did not specifically address the modifications. The other comment was made regarding the specific regulatory actions proposed in the Second 15-Day Notice. The comments is set forth below, identifying the date and form of the timely submitted comment. That is followed by a summary of each objection or recommendation made regarding the proposed action, together with an explanation of how the proposed action

has been changed to accommodate the objection or recommendation or the reasons for making no change.

Abbreviation	Reference Number	Commenter
IMPCO	IMPCO	Karen Hay IMPCO Technologies Written comment: February 16, 2007
Cal/Trans	Not Applicable	Ed Hardiman California Department of Transportation Written comment: February 16, 2007

A. New Engine Standards

1. **Comment:** ARB added field test standards for optional lower-emission standard (OLES) off-road large spark-ignition engines. However, these proposed field test standards are not incorporated into 40 CFR, Part 1048.140 of either the 2007 through 2009 or 2010 and Later "Proposed California Exhaust and Evaporative Emission Standards and Test Procedures for New Off-Road Large Spark-Ignition Engines." IMPCO suggests that ARB update 1048.140 to remain consistent with the language in CCR 2433. (IMPCO)

Agency Response: The ARB field test standards for OLES engines were inadvertently omitted from section 1048.140 of both the "California Exhaust Emission Standards and Test Procedures for New 2007 through 2009 Model-Year Off-Road Large Spark-Ignition Engines" and the "California Exhaust and Emission Standards and Test Procedures for New 2010 and Later Model-Year Off-Road Large Spark-Ignition Engines." The field test standards for OLES engines will be included in both of these incorporated documents in the final regulation order.

2. **Comment:** The difference between the 2007 through 2009 model year Tier 2 emission standards and the 2007 through 2009 model year OLES emission standards is still not clear. The OLES emission standards greater than or equal to 0.8 g/kW-hr are identical to the Tier 2 standards found in 1048.101 using the alternative certification formula $(HC+NOx) \times CO^{0.784} \leq 8.57$. Whereas the Tier 2 field test standards are more lenient than the Tier 2 certification standards, the OLES field test standards are identical to the OLES certification standards. Also, Tier 2 standards allow for certification to any emission standard using the alternative certification formula, but the OLES provisions only allow certification to three distinct standards. With more stringent field test standards and minimum flexibility when choosing an emission standard, there does not appear to be any reason for a manufacturer to certify under the OLES provisions. IMPCO requests that the ARB either provide further clarification on the difference between engines certified under the Tier 2 and OLES emission standards or remove section 12048.140. (IMPCO)

Agency Response: See the Agency Response to Comment C.11 in FSOR Part V. Summary of Comments to the First 15-Day Notice of Modified Text and Agency Responses for a full discussion of this issue.

3. **Comment:** To minimize confusion between ARB and U.S. EPA regulations, the primary reference to all emission standards should be in g/kW-hr with g/bhp-hr listed after, in parenthesis. (IMPCO)

Agency Response: For the prospective standards, ARB has referenced primarily standards in units of g/kW-hr. For regulations which may apply to 2006 and prior model years, the standard may often be given in units of g/bhp-hr because the standards for those years were given in g/bhp-hr.

4. **Comment:** ARB proposed to add a new paragraph (f) to section 1048.120 of the "California Exhaust and Emission Standards and Test Procedures for New 2010 and Later Model-Year Off-Road Large Spark-Ignition Engines." Because this paragraph already exists, the ARB should clarify that the new paragraph (f) should be renamed paragraph (h). (IMPCO)

Agency Response: The ARB will rename this paragraph as paragraph (h) in the final regulation order for the "California Exhaust and Emission Standards and Test Procedures for New 2010 and Later Model-Year Off-Road Large Spark-Ignition Engines."