State of California
AIR RESOURCES BOARD

STAFF REPORT:

INITIAL STATEMENT OF PROPOSED RULEMAKING

Amendments to the Fuel Specifications for M100 Fuel Methanol

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PUBLIC HEARING TO CONSIDER AMENDMENTS TO THE FUEL SPECIFICATIONS FOR M100 FUEL METHANOL

I. INTRODUCTION

Following a hearing on March 12, 1992, the Air Resources Board (ARB) adopted a comprehensive set of commercial and certification fuel specifications for alternative motor vehicle fuels. Among the fuels included in that rulemaking was M100, which is nominally a 100 percent methanol fuel. Pure (or neat) methanol is a colorless, toxic, flammable liquid with a naturally high octane rating and the potential to provide significant emission reductions over gasoline and diesel fuels. The commercial fuel specifications were based on the American Society for Testing and Materials (ASTM) designation for methanol which in turn was developed to provide a fuel purity sufficient to maintain low exhaust emissions and provide maximum engine durability. In addition to the ASTM specifications, the original proposal included a requirement to enhance the visibility of the methanol flame (referred to as flame luminosity) because pure methanol burns without a readily visible flame under daylight conditions. As a result, there is a safety hazard because fires may not be immediately noticed. It is important to note that while methanol is less likely than gasoline to ignite (i.e., because of its relatively low volatility), the safety concerns, nevertheless, remain.

Because an acceptable flame luminosity additive was not available at the time of the original rulemaking, the Board delayed the deadline for compliance with the luminosity requirement until January 1, 1995. To date, an acceptable luminosity-enhancing additive has not been developed. The purpose of this rulemaking is to consider an alternative to the luminosity requirement.

II. PROPOSED REGULATION

A. Background

Since 1992, industry representatives as well as ARB staff have initiated several test programs to investigate potential flame luminosity additives. Southwest Research Institute (SwRI) under contract to the ARB, California Energy Commission and South Coast Air Quality Management District, conducted a test program to identify potential additives and to demonstrate the effects of those additives on the exhaust emissions of M100 vehicles. SwRI conducted an extensive literature search which identified several potential additives. Two were

finally selected: 1) four percent toluene plus two percent indan and 2) five percent cyclopentene plus five percent indan. Next, SwRI compared the exhaust emissions of M85, M100 and two M100 blends with the identified additives. In general, while the hydrocarbon emissions of the fuels containing additive blends were approximately the same as M100, the specific reactivities, or ozone forming potentials, of the additive fuels were higher and essentially equivalent to the specific reactivity of M85. Based on the results of this program as well as other programs, it is generally accepted that no additive is currently available which could satisfy the luminosity requirements of M100 fuel without sacrificing emissions performance.

B. Description of Proposed Amendment

M100 is a desirable alternative fuel because it promotes energy diversity and because engines which are optimized for M100 have the potential to achieve low exhaust emissions. These engines are especially suited to a heavy-duty application because of their potential to reduce particulate emissions compared to diesel engines. However, heavy-duty M100 vehicles are not currently in widespread use because they are not as cost-effective as their diesel fuel counterparts. There are currently 379 vehicles operating on M100 in California: 336 transit buses, 42 school buses, two dump trucks, one tractor and one refuse packer. The United States Environmental Protection Agency (U.S. EPA) is also investigating the development of light-duty M100 vehicles; however, none of these systems is currently operational in California. The vast majority of methanol-fueled light-duty vehicles are flexible fuel vehicles which use a minimum of 15 percent gasoline (M85). M85 produces a luminous flame because of its gasoline component.

Despite the emissions performance advantages of M100 fuel, the safety issues involved with a fuel that has no readily visible flame cannot be overlooked. Thus, staff does not recommend that the luminosity requirement be removed entirely from the M100 fuel specification at this time. However, staff is proposing additional flexibility in the luminosity requirement which would continue to address safety considerations. In this way safety concerns can be adequately addressed while still allowing vehicles to operate on a fuel with inherently low emissions.

The proposed amendment would affect Title 13, CCR, Section 2292.1. The existing regulation establishes specifications for commercial M100 motor vehicle fuel and includes a requirement that, starting January 1, 1995, the fuel "produce a luminous flame, which is visible under maximum daylight conditions, throughout the entire burn duration." The proposed amendment would allow persons that sell, supply or use M100 motor vehicle fuel to use a fuel that does not meet the luminosity requirement as long as they can demonstrate that it will be used as a motor vehicle fuel only in vehicles that are equipped with either a system for automatically detecting and suppressing on-board fires or a system for on-board luminosity enhancement.

ARB regulations also establish test procedures which are used in certifying motor vehicles that meet the Board's motor vehicle emission standards. These test procedures contain specifications that apply to M100 fuel used in certification testing. The test procedures provide that this fuel must meet the ARB's specifications for commercial M100 intended for use in California motor vehicles. Adoption of the proposed amendment would mean that either the certification fuel used in testing a M100-powered engine would have to contain a luminosity additive, or use of the engine would be limited to vehicles equipped with a system for fire suppression or on-board luminosity enhancement.

C. Description of Fire Suppression and Luminosity-Enhancing Systems

Two basic types of equipment would be considered acceptable in lieu of ensuring the fuel contains a luminosity agent: an automatic on-board fire detection/suppression system or a system for on-board luminosity enhancement. A typical fire suppression system consists of a sensor(s), a fire suppression compound, and a system to activate the release of the compound. If the sensor detects the light and/or heat of a fire, a compound is instantaneously released to extinguish the flame. Costs range from several hundred dollars to as high as $7,000. Currently all M100 buses operating in California are equipped with automatic fire suppression systems. The only vehicles that are not equipped are the four heavy-duty trucks which are a part of a demonstration project conducted in conjunction with the California Energy Commission.

A luminosity-enhancing system would be designed to be able to release a luminosity-enhancing substance. This may be a "bladder" in the fuel tank that would be designed to release a compound(s) in the event of a fire or a rupture of the fuel tank. The compound(s) would mix with the M100 fuel and provide a luminous flame. No such systems are currently commercially available; however, once designed, such systems are likely to be less expensive than fire suppression equipment and more practical for application in passenger cars.

III. SUMMARY OF RECOMMENDED ACTION

For the reasons stated above, staff is proposing that language be added to the alternative fuel regulations which would allow persons to sell, supply or use M100 fuel that does not produce a luminous flame as long as they can demonstrate that it will be used as a motor vehicle fuel solely in vehicles equipped with either an automatic fire suppression system or a luminosity-enhancing system. Appendix A contains the proposed regulatory language.

IV. AIR QUALITY, ENVIRONMENTAL AND ECONOMIC IMPACTS

Staff has determined that there are no adverse air quality impacts that would result from the proposed amendments. The proposal may provide an air quality benefit because the

options to use fire suppression and/or luminosity-enhancing equipment will allow M100 to continue to be used in the State of California and therefore provide the emissions benefits of M100 fuel. The staff has determined that the proposal will not result in any significant adverse environmental impacts.

Since the proposed regulatory amendment would not place any additional requirements on industry, but rather, provides for alternatives that may be more cost effective, the staff has determined that it will not result in an adverse economic impact. In addition, all but four of the M100 vehicles currently operating in California are already equipped with fire suppression equipment. The four M100 trucks not equipped with fire suppression equipment are expected to ultimately qualify for an exemption available to vehicles used in test programs. Therefore, no current M100 fleet owners are likely to incur any costs to meet the proposed requirement.

Several alternatives were considered by staff in the development of this proposal. One alternative was to retain the current luminosity requirement. However, since no practical luminosity additives are currently available, such an alternative would have likely ended the use of M100 as a motor vehicle fuel in California. Another alternative considered was to eliminate the luminosity requirement entirely. However, given the cited safety concerns, this alternative did not appear prudent. The proposed alternative allows continued use of M100 fuel without relaxing safety concerns. For this reason, staff believes that no alternative considered by the agency would be more effective in carrying out the purpose for which the amendment is proposed or would be as effective or less burdensome to affected private persons than the proposed amendment.

APPENDIX A

PROPOSED REGULATION ORDER

Proposed Amendments to Section 2292.1 Title 13, California Code of Regulations

PROPOSED REGULATION ORDER

Note: Proposed new language is shown in underline.

Add Title 13, California Code of Regulations, section 2292.1, footnote (e) which reads as follows:

2292.1 Fuel Specifications for M100 Fuel Methanol

The following standards apply to M-100 fuel methanol
(The identified test methods are incorporated herein by reference):

Specifications for M-100 Fuel Methanol

Specification	*Value*	*Test Method*
* * * * *		
Luminosity		Shall produce a luminous flame, which is visible under maximum daylight conditions, throughout the entire burn duration. Applicable 1/1/95.(e)
* * * * *		

(e) This requirement shall not apply where the person selling, supplying, or using the M100 fuel methanol demonstrates that it will be used as a motor vehicle fuel only in vehicles that are equipped with a system for automatically detecting and suppressing on-board fires or a system for on-board luminosity enhancement.

NOTE: Authority cited: Sections 39600, 39601, 43013, 43018, and 43101, Health and Safety Code; and Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District, 14 Cal.3d 411, 121 Cal.Rptr. 249 (1975). Reference: sections 39000, 39001, 39002, 39003, 39010, 39500, 40000, 43000, 43016, 43018, and 43101, Health and Safety Code; and Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District, 14 Cal.3d 411, 121 Cal.Rptr. 249 (1975).