



Tamara Rasberry  
Manager  
State Regulatory Affairs

925 L Street, Suite 650  
Sacramento, CA 95814

(916) 492-4252  
[trasberry@semprautilities.com](mailto:trasberry@semprautilities.com)

June 3, 2010

Mr. Floyd Vergara  
California Air Resources Board  
P.O. Box 2815  
Sacramento, CA 95812

Dear Mr. Vergara:

San Diego Gas & Electric Company (SDG&E) and the Southern California Gas Company (SoCalGas) would like to thank the California Air Resources Board (CARB) for the opportunity to offer comments on potential revisions to the CARB compressed natural gas (CNG) motor vehicle fuel specification regulations discussed during the May 19, 2010 workshop.

SoCalGas and SDG&E are hopeful the potential revisions under development will promote the use of CNG as an economic alternative fuel that can reduce petroleum dependency, improve regional air quality, and reduce greenhouse gas emissions. To that end, SoCalGas and SDG&E offer the following discussion, comments and recommendations to revise the CARB CNG motor vehicle fuel specification regulations ("CARB Regulations"):

## **A. Background**

The current CARB Regulations state that:

*"...no person shall sell, offer for sale or supply an alternative fuel intended for use in motor vehicles in California unless it conforms with the applicable specifications..."*<sup>1</sup>

The CARB Regulations include a set of twelve (12) prescriptive specifications that set minimum and maximum values for components of CNG used as a motor vehicle fuel and were originally designed to prevent CNG engine and storage system damage.<sup>2</sup> The 1991 CARB Staff Report states that:

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<sup>1</sup> California Code of Regulations, Title 13, Section 2291

<sup>2</sup> Components include methane, ethane, C3+, C6+, hydrogen, carbon monoxide, oxygen, inert gases (carbon dioxide and nitrogen), water, particulate matter, odorant, and sulfur.

*“High ethane and propane content in natural gas can cause lower knock limited compression ratios, and even engine damage. Therefore, the staff has limited the concentration of these components in the proposed specification for natural gas. The staff has also limited the concentrations of higher hydrocarbons due to their tendency to increase reactivity, and due to concerns about hydrocarbon dewpoint. There is a possibility of higher hydrocarbons condensing out of the compressed gas at the point where the high pressure gas leaves the regulator and the temperature of the gas decreases abruptly. If this occurs, there may be some loss in fuel metering control...The inert gas specifications have been added due to the effects on combustion and vehicle performance. The water specification was set at a level that should help avoid corrosion of steel storage tanks...The particulate matter specification is intended to avoid engine damage...”<sup>3</sup>*

Since the CARB Regulations were adopted in 1992, CNG engine technology and associated manufacturer fuel specifications have advanced considerably. For example, Table 1 shows how successive CNG engine makes and models from Cummins-Westport have evolved over time.

**Table 1 – Cummins-Westport Engines and Fuel Requirements**

<b>Engine Model</b>	<b>Approximate Production Years</b>	<b>Manufacturer Fuel Specification</b>
L10 Phase 1	1990 - 1994	Prescriptive - Equivalent to minimum Methane Number 83.8
L10 Phase 2	1994 - 1996	Prescriptive - Equivalent to minimum Methane Number 83.8
L10 Phase 3	1996 - 1999	Performance - minimum Methane Number 80
B Gas	1995 - 2002	Performance - minimum Methane Number 80
C Gas	1996 - 2001	Performance - minimum Methane Number 80
B Gas Plus	2002 - 2009	Performance - minimum Methane Number 65
C Gas Plus	2001 - 2007	Performance - minimum Methane Number 65
L Gas Plus	2004 - 2007	Performance - minimum Methane Number 65
ISL-G	2007 - Present	Performance - minimum Methane Number 75

CNG engine manufacturers such as Cummins-Westport and Detroit Diesel have, since the early 1990s, moved from prescriptive specifications that specify minimum and maximum values for

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<sup>3</sup> California Air Resources Board, “Proposed Specifications for Alternative Fuels for Motor Vehicles”, October 28, 1991, page 30

components of CNG to performance specifications that specify a Methane Number (MN).<sup>4</sup> Further, the performance specifications have grown broader over time demonstrating the capability of modern engines to operate on an increasingly wider range of CNG composition.<sup>5</sup>

The CARB Regulations are inconsistent with the gas quality required by the California Public Utilities Commission (CPUC) for gas supplies delivered to Southern California when the natural gas is processed into CNG. The 1991 CARB Staff Report shows that several maximum and minimum values established in the CARB Regulations are not consistent with SoCalGas gas supplies when the natural gas is processed into CNG.<sup>6</sup> For example, CARB Regulations require a minimum of 88% methane in CNG, yet California Producers show a methane range of 84.23% to 97.05%. This issue was addressed more recently by the CPUC in CPUC Decision 06-09-039, that states:

*“...According to the Producers testimony, only five percent of California production could meet the current CARB CNG specifications. The specific constituent requirements could also limit LNG supplies. The impact on supplies would likely raise costs for all the state’s gas consumers. The public benefits that would accompany these costs appear to be quite small. Natural gas vehicles consume only a small fraction of the total volume of gas consumed in the state. Furthermore, the current CARB CNG specifications are only necessary for a small subset of vehicles within the current natural gas vehicle fleet. Therefore, we do not adopt the CARB CNG specifications as part of the SDG&E/SoCalGas tariff...”*<sup>7</sup>

This regulatory inconsistency frustrates the development of the alternate fuel market and has a significant impact on the CNG vehicle and refueling industry.

The current CARB Regulations include a minimum requirement of 1.5% for inerts for CNG intended for use as a motor vehicle fuel. However, the amount of inerts in the gas received by SoCalGas from major supply sources for re-delivery to customers can be below this level. In 2010, it was discovered that some traditional interstate gas supplies delivered to California do not consistently meet the CARB Regulations minimum requirement of 1.5% for inerts. A similar issue exists for potential future supplies of natural gas sourced from liquefied natural gas (LNG) that may arrive from Tangguh, Indonesia. Although these gas supplies meet the CPUC approved gas quality requirements, which sets no minimum inerts limit, and are very comparable to other traditional supplies they are not expected to meet the minimum inerts requirement set in the CARB Regulations. This highlights the inconsistency that exists between the gas quality of existing and future natural gas supplies and the CARB Regulations. Because of these types of conflicts and the mismatch of state regulations, SoCalGas and SDG&E have requested numerous exemptions for our CNG refueling stations and on behalf of customers with CNG refueling stations to ensure continued compliance with CARB Regulations.

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<sup>4</sup> The Methane Number (MN) is related to the motor octane number (MON) through the following formula:  $MN = 1.624 * (MON) - 119.1$

<sup>5</sup> Detroit Diesel updated the fuel specification for the Series 50G “TK” and “MK” CNG engine models on July 25, 2008 from a narrow prescriptive specification to a broader prescriptive specification and a minimum Methane Number of 65.

<sup>6</sup> California Air Resources Board, “Proposed Specifications for Alternative Fuels for Motor Vehicles”, October 28, 1991, Table 9, page 28

<sup>7</sup> California Public Utilities Commission, Decision 06-09-039, September 21, 2006, page 163

In the event that CNG used as a motor vehicle fuel is not expected to meet the CARB Regulations, the current CARB Regulations state that:

*“The executive officer shall consider and grant test program exemptions from the Requirements...”*<sup>8</sup>

Although the CARB Regulations currently allow exemptions, it is only for use within a test or research program. Since 1992, CARB has both granted and denied a number of exemptions for CNG at refueling stations serving commercial and industrial fleets as well as home refueling appliances serving consumers.

## **B. Problems With Current CARB Regulations**

SoCalGas and SDG&E have identified several problems with the existing CARB Regulations that are currently inhibiting the use and growth of CNG vehicles, CNG refueling stations and new CNG technologies, such as home refueling appliances:

1. CNG vehicles currently in operation can efficiently and reliably operate on a wider range of CNG composition than currently permitted under the CARB Regulations, and CNG engine technology has advanced considerably since 1992. Unfortunately, CNG motor vehicle fuel that is acceptable to CNG engine manufacturers may also be prohibited by the CARB Regulations.
2. Current and future gas supplies from California production, interstate supplies, and imported LNG all will comply with CPUC gas quality requirements but may not consistently (if ever) meet the outdated CARB Regulations when the natural gas is processed into CNG.
3. The existing CARB Regulations only permit exemptions for the purpose of a test or research program. Test program exemptions are not uniformly granted to all CNG station operators, require significant paperwork to initiate, do not continue indefinitely or through the life of the CNG station, and require burdensome on-going reporting. Since the range of gas supplies that comply with CPUC gas quality requirements is broad with respect to gas quality, the current exemption process is uncertain and unnecessarily restrictive.

## **C. Ancillary Issues**

SoCalGas and SDG&E have three ancillary, yet important issues that should be addressed as the CARB Regulations are revised: (1) the issue of how potential emission impacts related to changes in the CARB Regulations are being determined; (2) the issue of how natural gas appliance safety is being mischaracterized; and (3) the issue of how natural gas quality is being portrayed by CARB.

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<sup>8</sup> California Code of Regulations, Title 13, Section 2293.5

## 1. Potential Emission Impact Determination

In discussions with CARB staff, SoCalGas and SDG&E have learned that CARB intends to evaluate the potential impact on emissions resulting from changing the CARB Regulations. SoCalGas and SDG&E urge CARB to exercise caution and diligence so that the process of deterring potential emission impacts (if any) from changes to the CARB Regulations is not transformed into an attempt to regulate or control the quality of natural gas transported and distributed by regulated utilities, which falls under the sole jurisdiction of the CPUC.

San Diego County Air Pollution Control District (SDCAPCD) has raised concerns that changing the CARB Regulations could have an impact on stationary source emissions.<sup>9</sup> Those concerns, however, are misplaced, both substantively and procedurally. SDCAPCD's concerns assume incorrectly that the CARB Regulations somehow influence the natural gas SDG&E and SoCalGas can or cannot accept into their systems and deliver to their customers and that by changing the CARB Regulations, CARB may be allowing SDG&E and SoCalGas to accept and deliver natural gas within their systems that they otherwise would be prohibited from accepting and delivering. That is simply incorrect. The quality of natural gas that is permissible for SDG&E and SoCalGas to accept and deliver to customers is within the sole jurisdiction of the CPUC and has been set forth in the utilities' respective tariff rules. So long as natural gas meets the requirements set forth in their respective CPUC tariff rules, SDG&E and SoCalGas must and will accept and deliver that natural gas to customers. There is no "cause and effect" relationship between changes in the CARB Regulations that apply to CNG intended for use as a motor vehicle fuel, the quality of natural gas delivered to customers and equipment of all types in SoCalGas' and SDG&E's service territories, and any potential changes in stationary source emissions. Consequently, there will be no stationary source emission impacts as a result of any changes to the CARB Regulations.

## 2. Mischaracterization of Natural Gas Appliance Safety

During the May 19, 2010 workshop, SDCAPCD provided a presentation that, in part, discussed equipment testing performed by the Air-Conditioning, Heating, and Refrigeration Institute (AHRI).<sup>10</sup> SDCAPCD discussed how recent AHRI testing suggests that changes in natural gas quality may affect the safety of using everyday natural gas appliances. SDCAPCD asserts that not only would CO increase, but higher Wobbe Index natural gas would also reduce a gas appliance's safety margin.

During a brief question and answer exchange with a SoCalGas representative, however, SDCAPCD admitted that the gas appliances that were the subject of the AHRI testing all had their safety mechanisms intentionally disabled – something that only the appliances' manufacturers can do. Also, the information on the AHRI testing provided in the presentation was based on unpublished data. Further, the testing used an equivalent Wobbe Index of approximately 1500, well above the maximum Wobbe Index of 1385 currently

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<sup>9</sup> San Diego County Air Pollution Control District, "Impacts of Potential Revisions to CNG Fuel Standard", May 19, 2010, slide 89, 91

<sup>10</sup> San Diego County Air Pollution Control District, "Impacts of Potential Revisions to CNG Fuel Standard", May 19, 2010, slide 75 through 83

allowed under CPUC gas quality requirements. As a result, the AHRI testing is not an accurate characterization of safety with respect to higher Wobbe Index natural gas, nor a correct depiction of what would or could actually occur. Because of this inaccuracy, SoCalGas and SDG&E respectfully request that CARB strike from the record slides 75-83 of the SDCAPCD presentation.

### 3. Natural Gas Quality Portrayed by CARB

During the May 19, 2010 workshop, CARB staff provided a presentation that contained a negative description of gas quality.<sup>11</sup> CARB staff stated that LNG-derived natural gas “[m]ay cause decreases in pipeline gas quality,” and that in-state gas production is showing “[s]light degradation of gas quality over time.” CARB has no regulatory or technical basis to be able to judge whether gas quality is “decreasing” or undergoing “degradation.” The CARB Regulations do not constitute such a basis, because they were never developed, designed or intended to be a normative measure of natural gas quality. The CARB Regulations were intended to function merely as a set of target specifications that CNG motor vehicle manufacturers could focus on in 1992 when designing, building and marketing CNG vehicles in California. Furthermore, the CARB Regulations did not come about as a result of scientific research and development; rather the CARB Regulations merely represent the median or average of all readings of 12 specific gas quality components from natural gas samples taken from natural gas supplies both within and outside the state of California back in the early 1990s. Indeed, using such value-laden terms as “degradation” to portray recent changes in gas quality does not serve much of an informative purpose, and can be misused by others for inflammatory purposes. To avoid such future misuses, SoCalGas and SDG&E respectfully request that the terms “decrease” and “degradation” in slide 11 be replaced with the more factually correct term “change.”

## D. Recommendations For Correcting Existing CARB Regulations

In order to address some of the problems and other issues identified with the existing CARB Regulations, SoCalGas and SDG&E have developed proposed changes to the regulatory language that we believe are needed to ensure CNG is not hindered as a viable, economic, alternate vehicle fuel (see attachment). The regulatory changes are summarized below:

- 1. Replace the existing prescriptive specification with a performance based, statewide minimum Methane Number 75 standard through a series of “transition steps”:**
  - a. Immediate implementation of an interim, statewide minimum MN 80 standard.
  - b. Future implementation of a permanent, statewide minimum MN 75 standard by January 1, 2023.

Adopt a performance based, minimum MN 75 standard, since it is identical to the minimum manufacturer fuel specification for the only heavy-duty CNG engine, the Cummins-Westport ISL-G, currently in production by an original equipment manufacturer. Further, a performance based specification provides the greatest amount

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<sup>11</sup> California Air Resources Board, “Compressed Natural Gas (CNG) Motor Vehicle Fuel Specifications”, May 19, 2010, slide 11

of flexibility for existing and future gas supplies to ensure minimal or no gas conditioning is required by CNG station operators.

Transition steps are proposed since there are still older, CNG heavy-duty engines in operation that require MN 80 or higher fuel and are projected to be in operation through January 1, 2023. The transition date of January 1, 2023 was established based on information contained in the SoCalGas/SDG&E inventory of all Southern California CNG heavy-duty engines entitled “2008 Southern California Heavy-Duty CNG Vehicle Report”.<sup>12</sup> In those cases where individual stations are refueling vehicles capable of fueling with minimum MN 75 CNG, these stations should be allowed to transition earlier than January 1, 2023.

The existing prescriptive specifications should be replaced. Prescriptive specifications are no longer used by current engine manufacturers and a significant portion of the existing California production and traditional interstate supplies, if processed into CNG intended for use as a motor vehicle fuel, may not comply with these specifications. Moreover, under the current CARB Regulations, it is possible to produce CNG as low as MN 73.4. This could present a problem for older, CNG heavy-duty engines that require MN 80 or higher fuel, per manufacturer fuel specifications.

SoCalGas and SDG&E are aware that CARB must evaluate potential emission impacts associated with potential rule changes. In response, SoCalGas and SDG&E have performed extensive CNG engine testing, CNG vehicle inventories, and emission impact analyses to compare potential emissions in Southern California from the current CARB Regulations to potential emissions from the proposed change to a performance based MN 75 standard. The emission testing for heavy-duty engines is detailed in the Southwest Research Institute report “Fuel Composition Testing Using Cummins, John Deere, and Detroit Diesel Natural Gas Engines”.<sup>13</sup> The heavy-duty engine emission impact analysis is detailed in the Sierra Research report “Effects of Gas Composition on Emissions from Heavy-Duty Natural Gas Engines”<sup>14</sup>, that states:

*“...the assessment performed here shows that the performance-based regulations proposed by SoCalGas and SDG&E do not have the potential to increase emissions above the levels that could already occur under the existing CARB CNG motor vehicle fuel regulations.”*

Thus, the Sierra Research report concludes that the proposed performance based MN 75 standard has less potential to increase emissions than the current CARB Regulations that permit fuel as low as MN 73.4.

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<sup>12</sup> SoCalGas/SDG&E report, “2008 Southern California Heavy-Duty CNG Vehicle Report”, March 30, 2009, Appendix 1, page 14

<sup>13</sup> Southwest Research Institute, “Fuel Composition Testing Using Cummins, John Deere, and Detroit Diesel Natural Gas Engines”, Project No. 03.13721, April 2009

<sup>14</sup> Sierra Research, “Effects of Gas Composition on Emissions from Heavy-Duty Natural Gas Engines”, Report No. SR2010-02-01, February 24, 2010, page 3

Emission testing for light-duty vehicles is detailed in Southwest Research Institute report “Natural Gas Fuel Effects on Vehicle Exhaust Emissions and Fuel Economy”.<sup>15</sup> The light-duty vehicle emission impact analysis is detailed in the Sierra Research report “Effects of Gas Composition on Emissions from a Light-Duty Natural Gas Vehicle”,<sup>16</sup> which states that:

*“...the main conclusion of the statistical analysis was that the variations in natural gas quality examined had little impact on emissions from the light-duty CNG vehicle studied.”*

In fact, the report found that at extremely low Methane Number levels, NO<sub>x</sub> values actually decreased or were unaffected when compared to certification gas.

As a result, moving to a more flexible, performance based MN 75 standard would actually reduce the potential for adverse emission impacts.

## **2. Exempt home refueling appliances from the CARB Regulations.**

Home refueling appliances are designed to fuel light-duty CNG vehicles at residences by providing small amounts of fuel over a long period of time (typically overnight). It is not practical or realistic to expect such appliances would be used to fuel any other type of CNG vehicle, such as a heavy-duty vehicle. Since home refueling appliances will only be used to fuel light-duty vehicles and light-duty vehicles can operate safely, reliably, and with no increase in emissions using any gas supplies that meet the CPUC standards, there is no need to regulate the fuel quality of CNG dispensed from home refueling appliances.

A report published by the Gas Technology Institute, “Light-Duty CNG Vehicle Fuel Composition Study”<sup>17</sup>, states that:

*“...Since the compression ratios and BMEP ratings of light-duty Naves in the market are substantially similar to those of the gasoline vehicles upon which they were derived (including NGVs with somewhat increased compression ratios), there is essentially no concern these vehicles will experience engine knock with natural gas mixtures having higher hydrocarbons even at Methane Numbers as low as 65.”*

A letter submitted to SoCalGas on May 18, 2007 by American Honda Motor Company (see attachment), the original equipment manufacturer that markets the CNG Honda Civic, states on page 2;

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<sup>15</sup> Southwest Research Institute, “Natural Gas Fuel Effects on Vehicle Exhaust Emissions and Fuel Economy”, Project 03-13721.01.200, January 2010

<sup>16</sup> Sierra Research, “Effects of Gas Composition on Emissions from a Light-Duty Natural Gas Vehicle”, Report No. SR2009-11-01, November 16, 2009, page 1

<sup>17</sup> Gas Technology Institute, “Light-Duty CNG Vehicle Fuel Composition Study”, Project Number 20245, April 2006, page 17



*“...Honda supports the Southern California Gas Company in requesting a statewide CARB CNG fuel specification exemption for light duty CNG vehicles, as well as companion home refueling appliances... Honda's engine control strategy and experience with a wide range of fuels gives Honda confidence that emissions performance, durability and reliability will not be sacrificed using natural gas compositions ranging from Methane Number 106 to Methane Number 62.”*

The light-duty vehicle emission impact analysis detailed in the Sierra Research report “Effects of Gas Composition on Emissions from a Light-Duty Natural Gas Vehicle”, discussed earlier confirms that at extremely low Methane Number levels, NO<sub>x</sub> values actually decreased or were unaffected when compared to CARB certification gas.

Lastly, in 2009, SoCalGas and SDG&E sent letters to every customer that had ever expressed interest in installing a home refueling appliance to determine if they would support our proposed regulatory change. Out of 779 letters sent to these customers, SoCalGas and SDG&E received 320 responses in support of the proposed change to exempt home refueling appliances from the CARB CNG fuel specification regulations. This is a response rate of 41%, which is far beyond the typical response rate received for similar inquiries. As an example, the Direct Marketing Association 2009 Response Rate Report indicates that a response rate of 5.28% is typical of lead generation from a house list. The response rate for our letter was eight times greater. As such, SoCalGas and SDG&E believe there is overwhelming interest and support for the proposed change.

Since it is apparent that CNG light-duty vehicles can operate safely, reliably, and with no increase in emissions using any gas supplies that meet CPUC standards, CARB should exempt home refueling appliances from the CARB Regulations.

### **3. Provide a streamlined exemption process for any CNG station that requires an exemption.**

Current CARB Regulations only allow exemptions for the purpose of testing or research. Since there is a difference between the gas quality allowed under CPUC standards and the proposed performance based specification of MN 75, there must be a formal exemption process available for any CNG station operator that requires relief.

SoCalGas and SDG&E believe exemptions should be granted automatically to any applicant that has no feasible alternative to dispensing non-compliant CNG and the applicant is required to post a notice on the applicable dispenser(s). Exemptions should have a term of one year that is automatically renewed each year unless the exemption applicant no longer owns or operates the facility in question. This provides certainty to a potential CNG station builder/operator that they can continue operating without fear that an exemption may or may not be renewed at a later date.

Lastly, the exemption process should involve minimal initial effort to inform CARB that a refueling station is or may be dispensing non-compliant CNG intended for use as a motor vehicle fuel with no on-going reporting requirements. Exemption applicants

should only be required to provide basic information, such as the applicant name, contact information, declaration of station ownership/operation, fueling station location, and minimum MN of the fuel to be dispensed. No on-going reporting requirements should be necessary since this is not an exemption granted for the purpose of research. Rather, it is an exemption that allows for the on-going commercial operation of a CNG station.

These changes in the existing exemption process will reduce unnecessary uncertainty and administrative requirements while still allowing CARB to monitor the use of non-compliant CNG.

SoCalGas and SDG&E hope that the discussion, comments and recommendations provided will help to improve the revisions to the CARB Regulations currently under consideration. If you have any questions or concerns, please feel free to contact me at the number above.

Sincerely,

A handwritten signature in black ink, appearing to read "Amara Radly". The signature is fluid and cursive, with a long horizontal stroke extending from the end.

Attachments (2)