Review of NAC 590.065: Overview and Implications of Gasoline Volatility Rule Change

FINAL REPORT

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# TABLE OF CONTENTS

A. Introduction ........................................................................................................................................... 1
   Background ........................................................................................................................................... 1
   Objectives of This Work .................................................................................................................. 1

B. Gasoline Fuel Specifications .............................................................................................................. 2
   Composition and Standards ................................................................................................................ 2
   Gasoline Volatility Definitions ......................................................................................................... 2
   Gasoline Volatility Classes .............................................................................................................. 4

C. Establishment of Seasonal and Geographical Volatility Classes .................................................. 6
   ASTM Process ................................................................................................................................. 6
   Climatological Basis for ASTM Classifications ........................................................................... 10

D. Significance of TV/L = 20 .................................................................................................................... 12
   Past CRC Driveability Test Programs .......................................................................................... 12
   Future CRC Driveability Test Programs ...................................................................................... 14

E. Consequences of NDOA’s Recent Change in Volatility Standards .............................................. 16
   Evidence that Gasoline Changes have Occurred in Southern Nevada ........................................ 16
   Potential Emissions Impacts .......................................................................................................... 18
   Potential Driveability Impacts ....................................................................................................... 20
   Other Stakeholder Concerns .......................................................................................................... 24

F. Observations and Discussion ........................................................................................................... 25

G. Conclusions .......................................................................................................................................... 27

H. References .......................................................................................................................................... 28

List of Appendices .................................................................................................................................. 29
   1. WSPA petition to repeal amendment to regulation LCB File No. R002-04 ................................ 30
   2. AIAM comments in support of WSPA petition ...................................................................... 35
   3. AAM comments in support of WSPA petition ...................................................................... 37
   4. Special gasoline requirements in Nevada .................................................................................. 42
   5. Questionnaires used with Stakeholders .................................................................................... 43
Discussion of NAC 590.065:  
Overview and Implications of Gasoline Volatility Rule Change

A. Introduction

Background

During a public hearing on May 7, 2004, the Nevada Department of Agriculture (NDOA) adopted a 
change in Nevada Administrative Code (NAC) 590.065 that modified the gasoline volatility 
classifications within the State of Nevada. On September 21, 2004, this change was signed into law 
by the Nevada Secretary of State (LCB File No. R002-04). The wording of this modification 
includes the following:

“Notwithstanding the provisions of Table 4 (‘Schedule of Seasonal and Geographical 
Volatility Classes’) of ASTM designation D 4814-01a that apply to this State, the schedule 
that is designated in Table 4 for the area of the State that lies north of the 38th degree of north 
latitude applies to the entire area of the State unless the United States Environmental 
Protection Agency requires a county to comply with a different requirement relating to vapor 
pressure.”

The motivation for this change in volatility requirements for southern Nevada was to create more 
flexibility in gasoline supply and distribution, so that fuel from outside areas could be supplied to 
areas south of the 38th Latitude during times of fuel shortage. NDOA believed that this change 
would have minimal impact upon motorists within the State since heavily populated Clark County 
has different gasoline specifications approved by the U.S. EPA, leaving only sparsely populated 
areas within Esmeralda, Nye, Lincoln, and Mineral Counties to be affected by elimination of the 38th 
Latitude line of demarcation.

The Western States Petroleum Association (WSPA) objected to this action by the NDOA. On 
December 6, 2004, WSPA filed a petition to repeal the gasoline volatility changes made to NAC 
590.065, alleging that these changes would adversely affect vehicle driveability in Southern Nevada (see Appendix 1). The WSPA petition was supported by subsequent letters from the Association of 
International Automobile Manufacturers (AIAM; December 8, 2004; Appendix 2) and from the 
Alliance of Automobile Manufacturers (Alliance; December 9, 2004; Appendix 3).

Objectives of This Work

Despite numerous interactions among the NDOA, WSPA, Alliance, AIAM, and other interested 
parties, no consensus has emerged as to the exact nature of the gasoline changes that will occur in the 
marketplace, and the impact of these changes upon operation of the Nevada light-duty vehicle fleet. 
To help clarify these issues, provide additional context, and explain certain technical matters, the 
NDOA and other interested parties agreed to contract the Desert Research Institute (DRI), the 
environmental research branch of the Nevada System of Higher Education (NSHE).

In this effort, DRI has assimilated existing relevant information, has met individually with numerous 
stakeholders [NDOA’s Bureau of Petroleum Technology, Nevada State Office of Energy (NSOE), 
Clark County Department of Air Quality and Environmental Management (DAQEM), WSPA,
Alliance, AIAM, and Kinder Morgan Pipeline Company] to gain further insights, and has summarized their learnings in the form of this report.

B. Gasoline Fuel Specifications

Composition and Standards

Gasoline is a complex mixture containing hundreds of hydrocarbons that vary widely in their physical and chemical properties. Gasoline may also contain oxygenated compounds – particularly ethanol and methyl-t-butyl ether (MTBE). The properties of gasoline-oxygenate blends can differ considerably from those of hydrocarbon-only gasoline. Consequently, additional requirements are needed for some gasoline-oxygenate blends.

Since gasoline is exposed to a wide variety of mechanical, physical, and chemical environments, its properties must be balanced to give satisfactory performance over a range of conditions. Thus, by necessity, gasoline standards represent compromises among numerous quality and performance requirements.

The most widely recognized body for establishing gasoline standards in this country is ASTM International (formerly known as the American Society for Testing and Materials). ASTM is a consensus-driven, standard setting organization, which is made up of numerous committees. ASTM Committee D02 deals with petroleum products and lubricants. Subcommittee D02.A0 is responsible for establishing gasoline specifications. Membership on this subcommittee includes groups involved in producing, distributing, and using gasoline – including governmental agencies, industrial members, and consumer organizations. Though not itself a regulatory body, many states (including Nevada) have elected to adopt gasoline specifications developed by ASTM in specific state fuel regulations.

The ASTM designation for gasoline specifications is D 4814. Over the years, there have been many changes in gasoline specifications, reflected in many versions of ASTM D 4814. The current edition (published in December, 2004) is ASTM D 4814-04b. This is the version we refer to throughout this report.

Gasoline Volatility Definitions

One of the most important characteristics of gasoline is its volatility, or tendency to vaporize. There is no single best volatility for gasoline. Rather, volatility must be adjusted for altitude and seasonal temperatures of the location and time where the fuel will be used. For cold weather, gasoline is blended to vaporize easily (high volatility) to allow an engine to start quickly and run smoothly until it is warmed-up. For warm weather, gasoline is blended to vaporize less easily (low volatility) to prevent vapor lock (and other hot fuel handling problems) and to minimize evaporative losses that contribute to air pollution.

Gasoline volatility is a key determinant of vehicle driveability. The term “driveability” refers to the performance of a vehicle with respect to engine start-up, idling, stalling, accelerating, etc. Gasoline with inappropriate volatility may cause unacceptable driveability in some vehicles. Individual vehicles can differ significantly in their sensitivity to gasoline volatility change as well as to changes in temperature.
There is no single property to define gasoline volatility. The three most commonly used properties are (1) vapor pressure, (2) distillation profile, and (3) vapor/liquid ratio. [A fourth metric, driveability index (DI) is often used as well. DI is calculated from the fuel’s distillation profile.] Thus, these three properties are all specified in ASTM D 4814. Each of these three properties is further explained below:

1. Vapor pressure is an important property for cold-start and warm-up driveability. (Note: the term “cold start” means that the engine is at ambient temperature, not that the ambient temperature is cold.) Low vapor pressure can lead to long engine crank times and difficulty starting. Vapor pressure is normally expressed in units of pounds per square inch (psi).

   Historically, gasoline vapor pressure was measured by the Reid Method (ASTM D 323); hence the term Reid Vapor Pressure (RVP). However, with introduction of ethanol-blended fuels, the Reid method could no longer be used. The current method used is ASTM D 5191, which reports results as “dry vapor pressure equivalent (DVPE), or simply, “vapor pressure.”

   The vapor pressure limits defined in ASTM D 4814 are given as maximum allowable pressure. Typically, higher vapor pressures are allowed during the cooler winter months than during the warmer summer months.

2. Distillation profile refers to the temperature range over which a gasoline boils (or distills). Since gasoline is not a single, pure compound, but consists of hundreds of compounds, it distills over a wide range – typically from around 100ºF to 400ºF. Gasoline front-end volatility is adjusted to provide easy start under both hot and cold conditions; mid-range volatility is adjusted to provide rapid warm-up and smooth running; tail-end volatility is adjusted to provide minimal fuel dilution of crankcase oil and minimal exhaust emissions.

   The Driveability Index (DI) is a single measure of distillation profile that many experts consider to be the best predictor of cold-start and warm-up driveability. DI is calculated from the 10%, 50%, and 90% distillation points of the gasoline profile using the following equation:

   \[
   DI = 1.5\times T_{10} + 3.0 \times T_{50} + 1.0 \times T_{90}
   \]

   In this equation, DI, T_{10}, T_{50}, and T_{90} are all expressed as ºF. In general, higher DI values lead to poorer driveability performance. ASTM D 4814 defines maximum allowable DI values from 1200 ºF to 1250 ºF for different gasoline classes (see Table 1 below). The U.S. automobile industry has recently petitioned the U.S. EPA to establish a nationwide DI specification of 1200 ºF maximum. (1)

   The ASTM DI equation was developed for pure hydrocarbon gasolines. Several vehicle test programs have demonstrated that when oxygenates are included (especially ethanol), the standard DI equation is no longer an accurate predictor of vehicle performance. (Inclusion of oxygenates results in poorer driveability than predicted by the standard DI equation.) To address this, it is recommended that an “Oxygen Offset” term be included
in the DI equation. The following is currently being considered by ASTM as an improved equation for DI:

$$\text{DI} = 1.5*T_{10} + 3.0*T_{50} + 1.0*T_{90} + (2.4^\circ \text{F} \times \text{Ethanol vol.\%})$$

For example, a gasoline containing 10% ethanol (such as is used in Las Vegas during winter months) would have a DI offset of approximately 24°F. (The term “Distillation Index” is sometimes used when referring to this equation including the ethanol correction factor.)

3. Vapor/liquid ratio (V/L) is the ratio of the volume of vapor formed at atmospheric pressure to the volume of liquid fuel tested. As temperature increases, the V/L for a particular gasoline also increases. In the past, high levels of V/L led to vapor lock problems in older, carburetor-equipped vehicles. In modern, fuel-injected vehicles, high levels of V/L can produce similar hot fuel handling problems, resulting in hard starting and rough idling.

Based upon numerous experimental test programs, the temperature at which V/L = 20 has been identified as an important predictor of vapor lock problems. For this reason, ASTM D 4814 includes a standard for $T_{V/L=20}$. The $T_{V/L=20}$ limits defined in ASTM D 4814 are given as minimum allowable temperature. Typically, $T_{V/L=20}$ allowable limits are higher during the warmer summer months, and lower during the cooler winter months.

The original test procedure used to measure $T_{V/L=20}$ (ASTM D 2533), is no longer commonly used. However, a new method, ASTM D 5188 is now used by many refiners and some regulators. In addition, several estimation methods have been developed to supplement direct measurement of $T_{V/L=20}$. One example is the following equation, based upon the vapor pressure and distillation properties of the gasoline:

$$T_{V/L=20} = 114.6 - 4.1 \times \text{VP} + 0.20 \times T_{10} + 0.17 \times T_{50}$$

In this equation, VP is the vapor pressure expressed in units of psi, $T_{10}$ is the distillation temperature (°F) at which 10% of the gasoline has evaporated, and $T_{50}$ is the distillation temperature (°F) at which 50% of the gasoline has evaporated. More commonly used is a non-linear “Computer Method,” which also estimates $T_{V/L=20}$ from vapor pressure and distillation properties of the gasoline.

**Gasoline Volatility Classes**

ASTM has defined six vapor pressure/distillation classes and six vapor lock protection classes to satisfy vehicle performance requirements under different climatic conditions. The vapor pressure/distillation classes are designated by the six alphabetic characters shown in Table 1; vapor lock protection classes are designated by the six numbers in Table 2.
ASTM combines the vapor pressure and distillation class requirements (Table 1) with the vapor lock protection class requirements (Table 2) to create an alpha-numeric volatility designation for each state (or portion of the state) and each month of the year. These volatility designation codes are defined in Table 4 of ASTM D 4814. (This is the table referenced in the wording of NDOA’s recent modification to NAC 590.065.)

### Table 1
ASTM D 4814 Vapor Pressure and Distillation Class Requirements

<table>
<thead>
<tr>
<th>Class</th>
<th>Vapor Pressure, psi, max.</th>
<th>Distillation Temperatures, ºF, max.</th>
<th>Driveability Index, ºF, max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>10%</td>
<td>50%</td>
</tr>
<tr>
<td>AA</td>
<td>7.8</td>
<td>158</td>
<td>250</td>
</tr>
<tr>
<td>A</td>
<td>9.0</td>
<td>158</td>
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</tr>
<tr>
<td>B</td>
<td>10.0</td>
<td>149</td>
<td>245</td>
</tr>
<tr>
<td>C</td>
<td>11.5</td>
<td>140</td>
<td>240</td>
</tr>
<tr>
<td>D</td>
<td>13.5</td>
<td>131</td>
<td>235</td>
</tr>
<tr>
<td>E</td>
<td>15.0</td>
<td>122</td>
<td>230</td>
</tr>
</tbody>
</table>

For most states, ASTM D 4814 defines a single set of volatility classes – though the classes change seasonally. Several states – including Arizona, California, Idaho, Illinois, New Mexico, Oregon, Texas, and Washington – have more than one set of volatility class designations. In general, these are large states spanning a range of climatic zones, where different volatility classes were established to ensure satisfactory vehicle operability throughout the entire state.

Table 3 shows the ASTM D 4814 volatility designations for Nevada and surrounding areas. For Southern Nevada, (south of 38º Latitude) two sets of volatility schedules are shown: one prior to the recent modification to NAC 590.065 and one after the modification. Specific volatility designations for gasoline marketed in Clark County are not defined in ASTM D 4814. Thus, the alphanumeric...
volatility designations shown for Clark County in Table 3 (pre- and post-rule change) are identical to the designations shown for Southern Nevada (pre- and post-rule change).

Numerous state and local areas have created exceptions to the ASTM D 4814 volatility designations. In most cases, these exceptions are meant to address air quality problems in regional areas. This is true for Clark County, which by virtue of other regulations (see Appendix 4) has limited the RVP of gasoline to 9.0 psi, for most of the year. (Exceptions occur during April and the latter half of September, when neither Clark County nor EPA RVP caps apply. During these periods, ASTM vapor pressure limits apply, and gasoline exceeding 9.0 psi may be sold in Clark County.) Thus, the recent modification to NAC 590.065, which eliminated the 38º Latitude line of demarcation and created a single gasoline volatility schedule for the entire state, did not substantially change the RVP specifications in Clark County. However, other measures of volatility -- specifically $V_{L=20}$ -- may change in Clark County, as there are no special state or local exemptions governing volatility measures other than RVP. As shown in Table 3, the $V_{L=20}$ volatility specifications that apply in Clark County were relaxed as a consequence of the recent modification to NAC 590.065.

These changes in gasoline volatility specifications can be seen more clearly in the colored maps of Figures 1-2. Figure 1 depicts RVP limits during the spring (March) and summer (August), before and after the recent rule change. This shows that the Nevada RVP limits were relaxed only in the area of the State south of the 38th parallel, but excluding Clark County which maintained the same 9.0 psi limit most of the year due to local requirements. As shown in the Table 3, the RVP relaxation in Southern Nevada occurs during the months of January – April and October – December, but not during the highest temperature months of May – September.

Figure 2 depicts $V_{L=20}$ limits during spring (March) and summer (August), before and after the rule change. This shows that the recent rule change has relaxed the $V_{L=20}$ limit for all areas in Nevada south of the 38th parallel, including Clark County. Furthermore, as shown in Table 3, this relaxation occurs in every month throughout the year.

C. Establishment of Seasonal and Geographical Volatility Classes

ASTM Process

ASTM is a consensus-based, standards-setting organization. By necessity, gasoline standards represent compromises among the numerous quality and performance requirements. These specifications are established on the basis of the broad experience and close cooperation of fuel producers, manufacturers of automotive equipment, and users of both. ASTM Subcommittee D02.A0 is responsible for monitoring and reviewing the gasoline specifications in ASTM D 4814, and for recommending changes in these specifications, as necessary.

Much of the experimental data upon which ASTM gasoline volatility specifications are set originate from test programs conducted by the Coordinating Research Council (CRC). CRC has existed for over 50 years. It is jointly supported by the automobile and oil industries. CRC is “a non-profit organization that directs engineering and environmental studies on the interaction between automotive equipment and petroleum products.” (More information about CRC can be found on their web site at www.crcao.org.)
## Table 3

### ASTM Volatility Designations for Nevada and Surrounding Areas

<table>
<thead>
<tr>
<th>N Nevada before rule change</th>
<th>S Nevada before rule change</th>
<th>Clark Co. before rule change</th>
<th>Clark Co. after rule change</th>
<th>Calif. S. Coast</th>
<th>Calif. Southeast</th>
<th>Utah</th>
<th>Arizona before rule change</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>E-5</td>
<td>E-5</td>
<td>D-4</td>
<td>D-4</td>
<td>D-4</td>
<td>E-5</td>
<td>D-4</td>
</tr>
<tr>
<td>March</td>
<td>D-4</td>
<td>C-3/B-2</td>
<td>D-4</td>
<td>D-4/C-3</td>
<td>D-4</td>
<td>D-4/C-3</td>
<td>D-4/C-3</td>
</tr>
<tr>
<td>May</td>
<td>A-3(C-3)</td>
<td>A-2(B-2)</td>
<td>A-2(B-2)</td>
<td>A-3(C-3)</td>
<td>A-2(B-2)</td>
<td>A-3(C-3)</td>
<td>A-2(B-2)</td>
</tr>
</tbody>
</table>

### Vapor Pressure Maximum Limits; RVP, psi
(For state or local exceptions in parentheses)

<table>
<thead>
<tr>
<th>N Nevada before rule change</th>
<th>S Nevada before rule change</th>
<th>Clark Co. before rule change</th>
<th>Clark Co. after rule change</th>
<th>Calif. S. Coast</th>
<th>Calif. Southeast</th>
<th>Utah</th>
<th>Arizona before rule change</th>
</tr>
</thead>
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<tr>
<td>January</td>
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<td>15.0</td>
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<tr>
<td>February</td>
<td>15.0/13.5</td>
<td>13.5/11.5</td>
<td>15.0/13.5</td>
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<td>13.5</td>
<td>15.0/13.5</td>
<td>13.5/11.5</td>
</tr>
<tr>
<td>March</td>
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<td>11.5/10.0</td>
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<td>13.5</td>
<td>13.5/11.5</td>
<td>13.5/10.0</td>
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<tr>
<td>April</td>
<td>13.5/9.0</td>
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<tr>
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<td>June</td>
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<td>August</td>
<td>9.0</td>
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<td>9.0</td>
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<tr>
<td>Sept. 1-15</td>
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<td>September 16-30</td>
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<td>9.0/0.10</td>
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<td>October</td>
<td>10.0/11.5</td>
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<td>November</td>
<td>11.5/13.5</td>
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<tr>
<td>December</td>
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</table>

### T<sub>V, L = 20</sub> Minimum Limits, °F

<table>
<thead>
<tr>
<th>N Nevada before rule change</th>
<th>S Nevada before rule change</th>
<th>Clark Co. before rule change</th>
<th>Clark Co. after rule change</th>
<th>Calif. S. Coast</th>
<th>Calif. Southeast</th>
<th>Utah</th>
<th>Arizona before rule change</th>
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<tbody>
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<td>January</td>
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<td>November</td>
<td>124/116</td>
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<td>133/124</td>
<td>133/124</td>
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</tr>
</tbody>
</table>

Notes:

(a) Where alternative levels are shown for a given period, either level is permitted
(b) North of 38° Latitude
(c) South of 38° Latitude
(d) Federal RFG areas; no RVP waiver allowed for gasoline-ethanol blends
(e) Portion of Arizona bordering Nevada
(f) Washoe County volatility class of AA-2; RVP max = 7.8 psi, T<sub>V, L = 20</sub> min = 133 °F
(g) Davis and Salt Lake Counties have volatility class of AA-2; RVP max = 7.8 psi, T<sub>V, L = 20</sub> = 133 °F
(h) Imperial and part of Kern Counties
Gasoline RVP Limits – Effect of Rule Change

<table>
<thead>
<tr>
<th>Season</th>
<th>Region</th>
<th>Before Rule Change</th>
<th>After Rule Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring (March)</td>
<td>38th Parallel</td>
<td><img src="before-spring.png" alt="Map" /></td>
<td><img src="after-spring.png" alt="Map" /></td>
</tr>
<tr>
<td>Summer (August)</td>
<td>38th Parallel</td>
<td><img src="before-summer.png" alt="Map" /></td>
<td><img src="after-summer.png" alt="Map" /></td>
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</tbody>
</table>

Figure 1

<table>
<thead>
<tr>
<th>RVP max, psi</th>
<th>ASTM Class</th>
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</thead>
<tbody>
<tr>
<td>13.5</td>
<td>D</td>
</tr>
<tr>
<td>11.5</td>
<td>C</td>
</tr>
<tr>
<td>10.0</td>
<td>B</td>
</tr>
<tr>
<td>9.0</td>
<td>A</td>
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<tr>
<td>7.8</td>
<td>AA</td>
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<td>7.0</td>
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</table>
Gasoline $T_{V/L=20}$ Limits – Effect of Rule Change

### Before Rule Change

- **Spring (March)**
- **38\(^{th}\) Parallel**

### After Rule Change

- **Summer (August)**
- **38\(^{th}\) Parallel**

---

**Figure 2**

<table>
<thead>
<tr>
<th>Temp min, °F</th>
<th>ASTM Class</th>
</tr>
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<tbody>
<tr>
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<tr>
<td>105</td>
<td>5</td>
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</table>
CRC operates through a variety of technical committees, composed of experts from within the respective industries. These committees oversee the design, execution, and analysis of results from research and testing programs in topic areas of interest related to the use of petroleum products in automotive applications. Over the years, the CRC Volatility Committee has conducted numerous testing programs investigating the effects of gasoline volatility properties upon vehicle operability under various driving conditions.

**Climatological Basis for ASTM Classifications**

For optimum vehicle performance, it is important to match gasoline volatility properties with climate conditions – particularly ambient temperature. In defining volatility classes for different geographic regions, ASTM has relied upon an analysis of temperature data conducted by the U.S. Army in the early 1970’s. The methodology and temperature data used in this assessment are documented in a report authored by John P. Doner – hence the name, “Doner Report.”

The Doner Study utilized temperature data collected at approximately 200 stations in the continental U.S. Many of these stations were located at U.S. military facilities. The locations of the sites from the western part of the U.S. are shown in Figure 3. Also shown in this figure are the locations of current meteorological stations accessed by the Western Regional Climate Center (WRCC) at DRI. It is obvious that many more stations are available today, and many of these have a much longer data record than those used in the Doner study.

---

**Figure 3.** Locations of Western U.S. Meteorological Reporting Stations.

---

The Doner study used hourly data from the selected stations. Daily maximum temperature values were extracted from the data, and these values were then grouped into monthly datasets. A cumulative frequency plot was created, and the monthly datasets were used to determine temperature distributions for each month, based on a normal Gaussian distribution.
The DRI study used the same techniques with minor differences. First, the number of stations was significantly increased, thereby improving detail. Second, the maximum temperature data were actual daily maximum temperatures, whereas, the Doner study used the highest hourly temperature for the day. Third, the period of record used for the Doner study was generally 1950-1964, while the DRI study used the 30-year period of 1971-2000. Fourth, the DRI study used GRaDS, a publicly available program to generate the contour maps. The Doner maps were manually created, which led to certain discrepancies and inconsistencies, although these did not seem to cause any major problems in overall data interpretation.

Overall, DRI’s analysis of the climate data led to maximum temperature distributions quite similar to those reported by Doner. Due to the greater number of stations, longer period of record, and improved plotting routines, the temperature contour maps produced by DRI show much more detail than those from Doner. Examples of this are shown in Figures 4 and 5 which depict 90th percentile temperature maxima data for April and August, respectively.

Our analyses indicate that northern and southern Nevada have distinctly different maximum temperature profiles throughout the year. The 38th parallel appears to be a reasonable line of demarcation to separate the northern and southern temperature conditions.

---

**Figure 4.** 90th Percentile Maximum Temperature, °F – April.
One of the primary concerns voiced by WSPA, the Alliance, and AIAM is the potential impact of the gasoline volatility rule change on vehicle driveability. At the July 7, 2005 NDOA Technical Workshop on the rule change Mike Ingham, representing WSPA, presented results showing increased vehicle driveability problems with decreasing TV/L = 20 from two Coordinating Research Council (CRC) studies \(^{(3, 4)}\).

A key issue related to the mission of CRC is the influence of fuel volatility on vehicle performance. This has resulted in a long history of CRC-sponsored studies beginning with “Vapor Lock Road Test” which was conducted in Indio, California during the period of August to September, 1946. Over the years many studies have been performed to evaluate the influence of ambient temperature, altitude, vehicle technology, and fuel composition on performance.

While the 1999 and 2001 studies \(^{(3, 4)}\) evaluated fuels and vehicle technologies relevant to the Nevada case, both programs were performed in Yakima, Washington where maximum ambient temperatures are well below those experienced in Southern Nevada during the summer. However, the summertime Yakima temperatures are similar to those encountered in Southern Nevada during the spring and fall seasons; thus, the previous CRC studies are relevant to Southern Nevada during these periods of the year.
The primary objective of the 1999 study was to determine which fuel parameters best correlate with driveability problems in fuel-injected vehicles. Only vehicles with demonstrated sensitivity to fuel volatility were used in the study. This was based on a screening of procured vehicles using a 15 psi ethanol blend. Of the 11 vehicles chosen, 10 were 1999 model year; 1 was 1998 model year. Manufacturers included DaimlerChrysler, Ford, GM, Honda, and Toyota. Fourteen fuels were used, 7 hydrocarbon-only and 7 containing 10 volume percent ethanol. Vapor pressures ranged from 9 psi to over 15 psi. The tests were conducted during the period of July 26 to August 23, 1999 at the Renegade Raceways near Yakima, Washington. The altitude of test location was 990 ft. Ambient temperatures ranged from 73 to 101°F. The test procedure included a vehicle warm-up period and a series of hot-soaks, restarts, idles, and accelerations. During each phase of the test cycle, driveability malfunctions were noted by trained personnel. Driveability malfunctions and demerits are listed below in Table 4. The total weighted demerits (TWD) reported for each vehicle is the sum of all demerits for each test.

The 2001 study was a follow-on to the 1999 study and further evaluated the reliability of different fuel parameters to predict vehicle TWDs. Tests were conducted using 3, 6, and 10 volume percent ethanol blends and matching hydrocarbon-only fuels with vapor pressures ranging from 8 psi to more than 18 psi. Eighty-five vehicles were screened and a test fleet of 20 vehicles was chosen. Manufacturers included Daimler/Chrysler, Ford, GM, Saab, and Mitsubishi. Testing was conducted from July 7 to August 30, 2001. Ambient temperatures ranged from 77 to 104°F.

### Table 4

System used in the 1999 and 2001 CRC studies to calculate Total Weighted Demerits (TWD) from the observed driveability malfunctions (from reference 4).

<table>
<thead>
<tr>
<th>Malfunction</th>
<th>Rating</th>
<th>Demerit(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start Time</td>
<td>Seconds</td>
<td>5 x (Seconds-1)</td>
</tr>
<tr>
<td>Rough Idle</td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
<td>0</td>
</tr>
<tr>
<td>Trace</td>
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</tr>
<tr>
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<td>4</td>
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<tr>
<td>Extreme</td>
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</tr>
<tr>
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</tr>
<tr>
<td>No Start (3 maximum)</td>
<td>Count</td>
<td>32 x Count</td>
</tr>
<tr>
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<td></td>
<td>192(1)</td>
</tr>
<tr>
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<td>Extreme</td>
<td></td>
<td>32</td>
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<tr>
<td>Stall</td>
<td></td>
<td>64</td>
</tr>
</tbody>
</table>

(1) Maximum demerit rating; excludes all other malfunction demerits for that individual soak cycle; equivalent to three driving stalls.
(2) Includes hesitation, stumble, surge, and backfire.
Using the detailed data sets contained in the reports from the 1999 and 2001 studies it is possible to assess the potential impact of altering the $T_{VL=20}$ on vehicle driveability. Figure 6 presents graphs of the observed TWD (or ln TWD) vs. $T_{VL=20}$ for the 1999 study. Figure 6a is taken directly from the report (reference 3, Figure 1), while Figure 6b is the same data in a slightly different format presented at the July 7, 2005 workshop. Both figures show a clear trend of increasing driveability problems with decreasing $T_{VL=20}$. The 2001 report (reference 4, Figure 5) found a similar relationship.

These CRC studies imply that gasoline volatility modifications which decrease $T_{VL=20}$ (such as that permitted by the recent Nevada rule change) could lead to increased vehicle driveability problems. As Figure 6 shows, the most dramatic increases in driveability problems (under the Yakima test temperature conditions) occurred only at very low levels of $T_{VL=20}$, generally below 100°F. The recently modified Nevada specifications do permit a decrease in $T_{VL=20}$ in southern Nevada (including Clark County) throughout the entire year, but the lowest level is 105°F, which applies during the months of December-February. Throughout the rest of the year, the minimum $T_{VL=20}$ is substantially higher.

On the basis of statistical distributions of TWD data, as generated from the CRC test programs, Nevada’s revised gasoline volatility rule would be expected to increase driveability problems. However, at present, the magnitude of these problems is unknown. Further testing, under Nevada-appropriate summer conditions is needed to better quantify the expected driveability problems that may occur during the summer months. A relevant study to investigate this is now underway (see description below).

One other factor to consider is inclusion of ethanol in gasoline, which is known to cause poorer vehicle driveability. (Because of this, ASTM is considering adding an “oxygen offset” to their equation for Driveability Index.) The magnitude of the ethanol effect can be seen by comparing Figures 6a and 6b.

All gasoline sold in Clark County during October-March is required to contain 3.5% oxygen, in the form of ethanol (roughly 10 vol.%). Also, ethanol usage is common in all areas surrounding Clark County. Given this situation, there may be legitimate concerns of noticeable driveability problems during certain periods of the year, such as the spring “transition season.” For example, wintertime oxygenated gasoline having relatively high RVP and low $T_{VL=20}$ may occasionally be used during particularly warm days in April, leading to poor vehicle performance.

**Future CRC Driveability Test Programs**

As stated in the previous section, the 1999 and 2001 CRC studies were conducted under different temperature and altitude conditions from what would be experienced in Southern Nevada. In order to address the issue of high ambient temperatures, CRC is conducting a Hot-Fuel Handling Study in the summer of 2006 at the GM Desert Proving Grounds in Mesa, Arizona (near Phoenix). Test temperatures will be a minimum of 105°F, with the desire to conduct testing above 110°F but below 115°F. Test fuels will include hydrocarbon-only and three ethanol blends (5, 10, and 20 volume percent). Approximately 20 late model and 5 10-year old model vehicles will be evaluated. The same procedures employed in the 2001 study will be used for this program. This study should shed light on the issue of the impact of $T_{VL=20}$ on TWD under temperatures relevant to Southern Nevada in the summer.
Figure 6a. Relationship between the natural log of the mean corrected total weighted demerits and $T_{V/L=20}$ from the 1999 CRC Hot-Fuel Handling study (from reference 3).

Figure 6b. Relationship between the mean corrected total weighted demerits and adjusted $T_{V/L=20}$ (for 10% ethanol) from the 1999 CRC Hot-Fuel Handling study as (from Ingham presentation July 7, 2005).
E. Consequences of NDOA’s Recent Change in Volatility Standards

Evidence that Gasoline Changes have Occurred in Southern Nevada

As part of their normal operations, the Bureau of Petroleum Technology of NDOA performs surveillance of fuel quality at locations throughout Nevada. One of the key parameters routinely quantified is RVP. The Bureau provided DRI with all gasoline RVP data collected over the past three years (2004-2006). Monthly RVP results from Clark County are shown below in Figure 7 and summary statistics are detailed in Table 5. These results shown in Figure 7 are simply the arithmetic means of all samples collected anywhere in the County during the given month. The numbers and specific locations of the samples varied from month to month. Typically, the number of samples in any month is in the range of 50-150. Also, as seen in this figure, no samples were collected during the month of August, 2005.

![Monthly Average Gasoline RVP - Clark County](image)

**Figure 7.** Monthly average gasoline RVP levels in Clark County

Two significant observations can be drawn from the data presented in Figure 7. First, the monthly average RVP values were consistently higher in 2005 than in 2004. (The 2006 data, which do not include the month of December, tend to lie between the 2004 and 2005 data.) Whether the overall RVP increase in 2005 is due to the gasoline volatility rule change is unknown.

A second important observation is that in every year, average RVP levels during the month of April are higher than in the surrounding months. As explained previously, Clark County has special gasoline requirements that control the allowable RVP level throughout most of the year. However, in the month of April, these requirements do not apply. During this time, gasoline volatility in Clark County is controlled only by ASTM requirements. Prior to NDOA’ modification to the gasoline rules, ASTM standards for Clark County allowed a maximum RVP of 10 psi in April. After the rule change, Clark County gasoline can have an RVP as high as 13.5 psi in April.
Table 5
Summary of NDOA RVP data for Clark County for the 2004-2006 time period.

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<th></th>
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<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
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<td></td>
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<td></td>
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<td></td>
<td></td>
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</tr>
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</table>
To further explore potential impacts of the gasoline rule change, we closely inspected the Clark County RVP results for two specific months: April and July. For both months, we considered all gasoline samples collected and analyzed over a 3-year period. Within each year, the data were sorted by RVP level, and then lumped into RVP bins of 0.1 psi increments. The RVP distributions resulting from this analysis are shown in Figure 8. Since the sample numbers varied from year to year, these distributions are expressed as percent of total samples for a given year.

Figure 8a depicts the RVP distributions of all Clark County samples collected during the month of April. In 2004 (the year before the gasoline rule change) the average RVP was 8.52 psi, 13% of samples had RVP levels above 9.0 psi, and no sample exceeded 9.5 psi. In 2005 (the year after the gasoline rule change) the average RVP was 8.91 psi, 35% of samples had RVP levels above 9.0 psi, and 8% exceeded 9.5 psi. The single highest RVP was 12.8 psi, which is still within the 13.5 psi level now allowed in Clark County in April. The RVP distributions from 2006 tend to be intermediate between those of 2004 and 2005. The average 2006 RVP was 8.75 psi, 36% of samples had RVP above 9.0 psi, and no sample exceeded 9.5 psi.

Figure 8b depicts the RVP distributions of all Clark County samples collected during the month of July. In 2004, the average RVP was 8.03 psi and no samples exceeded 9.0 psi. In 2005, the average RVP was 8.41 psi and 30% exceeded the allowable limit of 9.0 psi. 2006 distributions were again intermediate, with an average RVP of 8.22 psi and 10% exceeding the limit of 9.0 psi.

**Potential Emissions Impacts**

Changing RVP can have a significant impact on emissions. For example, a recent study focusing on carbon monoxide (CO) effects reported a predicted increase in CO emissions of 45% in going from a 9 psi fuel to 13.5 psi (6). Other work has modeled the impact of capping the distillation index (DI, a measure of volatility) and concluded that this could result in a reduction of both CO and HC emissions (7).

Over the past few years Clark County has made major strides in reducing ambient CO levels; however, following the implementation of the new 8-hr Ozone standard (80 ppb), there is concern over elevated ozone (O₃) levels. Mobile sources are significant emitters of the O₃ forming precursors (NOₓ and HC). Thus changes in emissions of these species could result in increased O₃ in Clark County.

Since the major effect of varying RVP is on HC emissions (and O₃ formation in Clark County is HC limited), we evaluated potential changes in HC emissions with varying RVP and temperature. The results using the USEPA MOBILE6.2 model with the default model year distribution for the gasoline fueled fleet are shown in Table 6. There is significant uncertainty in these predictions, along with a number of cases where the results are questionable (e.g., exhaust emissions the same for RVP = 8 and 9 at T = 70 °F, emissions greater at 100 °F than at 120 °F for an RVP of 13.5, etc.). However, if one solely considers the relative trends, increasing RVP by 1 psi (from 8 to 9 and 9 to 10) could lead to an increase in mobile source HC emissions of between 5 and 25%, depending upon ambient temperature. Thus any increase in RVP as a consequence of the recent rule modification is likely to lead to increased levels of ambient O₃.

Although the causes of the changes are not known, Figure 7 suggests that Clark County gasoline had an RVP level of about 0.4 psi higher throughout the O₃ season in 2005 compared to 2004. Assuming
an ambient temperature of 100 °F, this translates to a predicted increase in vehicle hydrocarbon emissions of about 6-8%.

---

**Figure 8a.** Clark County gasoline RVP distributions – April

**Figure 8b.** Clark County gasoline RVP distributions – July
Table 6
MOBILE6.2 predicted impacts of temperature and RVP on tailpipe (exhaust) and evaporative hydrocarbon emissions.

<table>
<thead>
<tr>
<th>TEMP (*°F)</th>
<th>RVP</th>
<th>EXHAUST (g/veh-mi)</th>
<th>EVAP (g/veh-mi)</th>
<th>TOTAL (g/veh-mi)</th>
</tr>
</thead>
<tbody>
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<td>70</td>
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<td>0.572</td>
<td>0.534</td>
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In addition to temperature and RVP impacts, vehicle performance can also affect emissions. A vehicle that is misfiring or not operating properly is likely to have elevated emissions (both Mike Ingham and Loren Beard noted this in their July 7, 2005 presentations). Thus, if one assumes the rule change will lead to an increase in driveability problems, there is the potential for increased emissions based solely on an increase in vehicle performance issues.

Potential Driveability Impacts

While controlled test studies indicate a potential impact of the Gasoline Volatility Rule Change on driveability, it is difficult to unequivocally identify real-world cases of this occurring. One manufacturer attempted to address this by searching for vehicles serviced under warranty in the Las Vegas area. They found a significant number of issues unresolved by repairs, implying these could be fuel related. The major problem identified was misfiring. There was no correlation with vehicle type or model year; however, there was an increase in problems during the periods of March - May and September - November. The number of reported cases for 2004 and 2005 were similar, implying the rule change did not have an impact on driveability. However, it is possible that many of the vehicles brought in for repair had last refueled north of the 38th parallel, indicating the potential for driveability impacts when vehicles operate on fuel from outside the Las Vegas area. Similar issues were identified by another manufacturer, where an unusual number of starting and misfire problems were noted. Again, these reports do not definitively implicate the Gasoline Volatility Rule Change as being the source of the problem but they do indicate the nature of problems that can occur.
Gasoline Supply and Demand

The primary motivation for implementation of the Gasoline Volatility Rule Change was concern over the ability to supply fuel to Southern Nevada. This concern was mentioned by a number of Stakeholders (see previous section) and was due, in part, to increasing demand, limited tankage capacity, insufficient upstream infrastructure, limited pipeline capacity, and the large distance over which gasoline has to be transported to the region. All this results in a fragile system for supplying fuel to Nevada.

Evidence of the limited pipeline capacity and large transport distances is contained in Figures 9a and 9b, which detail the Kinder-Morgan pipeline distribution network. Northern Nevada is supplied by a single 8” pipeline from California. In Southern Nevada there is an 8” pipeline that supplies jet fuel to McCarran Airport, a 14” pipeline that supplies gasoline, diesel, and jet fuel, and an 8” pipeline that is dedicated to Nellis Air Force Base. All pipelines operate at close to capacity. Eastern Nevada receives fuel via truck delivery, which is typically transported from Salt Lake City. Ethanol is transported to Southern Nevada via unit trains and is splash blended at the terminal. Incidents leading to significant down time for any of these pipelines, or disruptions of the rail system used for ethanol transport, have a major impact on fuel availability. In the future, this situation may be further complicated by new gasoline requirements (i.e., additional fuel classes) and the increased use of ethanol.

One issue that arose was the impact of the rule change on fuel supplies. We received information regarding two suppliers. For the period of December 2005 through March 2006, one company shipped 356,000 gallons from north of the 38th parallel (6% of their total), while the other shipped 295,000 gallons (12% of their total). Based on this input, it was estimated that the rule change resulted in an upper limit of 1 million gallons being supplied during this four month period.

There are a number of potential options for increasing gasoline supply to Southern Nevada. These include the following:

1. Build a pipeline from Arizona. Currently there is a pipeline between Phoenix and Southern California (Figure 9a) and it would be possible to build a line from Phoenix to Southern Nevada. Given the costs, it is unlikely this option is viable.
2. Increase use of ethanol in Nevada gasoline. While possibly extending the fuel supply, this also creates additional dependency upon rail imports of ethanol, and it raises concerns about adverse impacts upon vehicle drivability and emissions.
3. Institute a variance procedure. This process has been implemented in other regions of the country (including California) to increase fuel availability during periods of limited supply. A good example of this approach was the use of variances to supply fuel to the Gulf Coast following Hurricane Katrina. It should be noted that variances are temporary and may include financial penalties to limit their use.
4. Employ the Gasoline Volatility Rule Change. This would allow increased flexibility to ship fuel between Northern and Southern Nevada during periods when there is a shortage. (In a sense, this approach is like a permanent variance, but without any financial penalties.) However, given the limited excess capacity that exists in both areas, this option is unlikely to present a long term solution.

Based upon our analysis of these options, we believe that a variance procedure is the most viable, near term solution to temporary gasoline supply problems in Nevada.
Figure 9a. Schematic of the Kinder-Morgan pipeline distribution system to Northern and Southern Nevada.
Figure 9b. Schematic the nationwide Kinder-Morgan pipeline distribution system.
Other Stakeholder Concerns

In order to obtain input on the technical issues surrounding the gasoline volatility rule change, and identify issues and concerns from the stakeholders, DRI prepared a series of questionnaires. Stakeholders queried included the following: Nevada Department of Agriculture’s Bureau of Petroleum Technology (1/13/06), Nevada State Office of Energy (1/19/06), Clark County Department of Air Quality and Environmental Management (1/26/06), Western States Petroleum Association (2/08/06), Alliance of Automobile Manufacturers (2/14/06), Association of International Automobile Manufacturers (2/28/06), and Kinder Morgan (3/08/06). Face-to-face meetings to fill out the questionnaires were held with all groups except AIAM and Kinder-Morgan, who were interviewed over the phone. Questionnaires were tailored for each Stakeholder, with a limited number of questions asked of all participants.

Following these meetings, DRI prepared completed questionnaires based on notes taken during the interviews. In order to minimize discrepancies between the reported answers/comments and what the Stakeholders felt they had said, the completed questionnaires were distributed to the specific parties for comment and revision. The corrected questionnaires are contained in Appendix 5 of this document.

A number of concerns were raised during the interview process. A summary of these concerns is presented below. The order is random and does not reflect a perceived level of importance. Further, the list is not comprehensive and may not represent the concerns of all Stakeholders.

- Sub-octane gasoline [meaning \((R+M)/2\) levels below 87] can be marketed throughout Nevada but must be posted on the pump. (Figure 10 – taken from ASTM D 4814 – shows regions of the country where sub-octane gasoline is permitted. In Nevada, this includes the northeastern portion of the State.) This may aggravate performance at high altitude and high temperatures and/or loads.

- \(T_{V/L=20}\) is not directly measured by NDOA (or by many similar agencies in other states) as part of routine fuel surveys. It can be estimated by calculation from \(T_{10}, T_{50}\), and RVP properties, although for ethanol-containing gasolines, some calculation methods may not be valid.

- The year around blending of ethanol into gasoline needs to be considered. Clark County gasoline has an RVP limit of 9.0 psi throughout most of the year – even for gasolines containing ethanol. However, splash-blending ethanol into gasolines from other areas could increase RVP levels beyond this limit.

- The increased use of ethanol has the potential to exacerbate hot fuel performance problems unless other fuel properties are adjusted.

- The increased use of ethanol is expected to increase permeation emissions of hydrocarbons.

- There is an inadequate ability to supply and store fuel to Nevada. This is especially true for Southern Nevada. The ability of unit trains to supply ethanol may also be problematic.

- The amount of tankage capacity within Southern Nevada is limited. Requirements for additional gasoline grades and classes could further reduce the storage capacity per class.
There is insufficient infrastructure upstream of Las Vegas to handle an additional volatility class.

In spite of the lack of identified performance cases by the Stakeholders, an increase in TWD would be expected from reduced T_v/L=20. This represents an increased risk of performance problems that could lead to an increase in complaints. No manufacturer can afford an increase in customer complaints.

In order to minimize problems, ASTM standards are adopted based on extensive testing and review. Potential deviations from ASTM standards due to the NDOA Rule Change have not undergone these tests, so problems could arise.

There is concern over the precedent of a state agency modifying an ASTM standard without first demonstrating that no adverse impacts will result.

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**F. Observations and Discussion**

In order to address gasoline supply concerns, the NDOA adopted a rule change in May 2004 allowing for fuel having ASTM specifications for Northern Nevada to be used in Southern Nevada, an area with different ASTM specifications. The process of this rule change has been controversial and a number of Stakeholders have expressed concerns about potential impacts of change.

DRI was hired to provide an impartial review of the technical issues related to the rule change and prepare a summary document for the NDOA Board’s guidance in determining how to address the problem. To accomplish the goal, we have completed the following tasks:

1. Summarized gasoline specifications and the methods by which they are defined
2. Explained the changes in Nevada’s gasoline specifications resulting from the recent NDOA rule modification
3. Evaluated the climatological data upon which the ASTM gasoline volatility standards were based, and prepared revised temperature isopleths using additional observations
4. Reviewed and summarized reports on experimental studies related to hot-fuel handling, and the impact of fuel volatility on vehicle driveability
5. Analyzed surveillance data for Clark County gasolines sampled before and after the volatility rule change
6. Modeled the impacts of changing RVP on vehicle exhaust and evaporative emissions

In addition, we sought to identify the issues and concerns from the perspective of the Stakeholders through interviews and the use of a set of questionnaires. Our major observations are given and discussed below.

- The recently adopted gasoline rule change allows for several potential impacts in Clark County that may not have been fully understood at the time the change was made. For example, defining the northern ASTM standards to apply statewide now allows gasoline vapor pressure in Clark County to increase during the month of April. Also, the ASTM-defined property of $T_{V/L=20}$ is now relaxed in Clark County throughout the entire year.

- Although the gasoline rule modification permits these changes, the extent to which they have occurred is not known. There is some information to indicate that gasoline from the north (Salt Lake refineries) has been shipped to Southern Nevada as a consequence of the rule change, but the amount of this fuel – and the extent of its distribution – is difficult to confirm.

- Inspection of Clark County gasoline surveillance data indicates that RVP levels were higher in 2005 compared to 2004, though the reasons for this are not known. The average monthly increase was about 0.4 psi throughout the O3 season. It was also observed that in 2005, many Clark County gasolines exceeded the 9.0 psi limit (30% in July), while such exceedances were rare in 2004.

- Another unintended consequence of the rule change is the potential for increased use of sub-octane gasoline throughout Nevada. This would likely result if additional gasoline from Salt Lake refineries were shipped into areas of Southern Nevada. The automakers are very concerned about potential use of reduced-octane gasoline, as this aggravates vehicle performance problems under all circumstances.

- Both the fuel producers (WSPA members) and automakers (Alliance members) are concerned about vehicle performance problems resulting from relaxation of the ASTM $T_{V/L=20}$ specification. Several controlled vehicle test programs have shown that $T_{V/L=20}$ is a reliable predictor of vehicle driveability performance. Strong evidence to indicate that the problems have occurred in Southern Nevada is lacking, although some suggestive information was provided by individual automakers.

- The ambient conditions under which the above-mentioned vehicle test programs have been conducted are representative of Southern Nevada temperatures during spring and fall seasons. A more recent test program, having temperatures more representative of Southern Nevada in
the summer, was just conducted. However, final results from this study will not be available for several more months.

- The lack of widespread reported vehicle performance problems in Southern Nevada should not be taken as proof that the recent gasoline rule change has had no adverse impacts. First, it is difficult to say how much previously non-complying gasoline has actually been used in Southern Nevada. Second, it is difficult to quantify the number and severity of problems that have occurred. It is quite likely that most minor driveability problems would go unreported. More serious problems would probably be reported to mechanics, who may or may not attribute them to changes in gasoline properties.

- One reason given for the recent gasoline rule change was to address concerns about gasoline supply throughout Nevada. There is no clear evidence that the rule change has proven helpful in this regard. Serious concerns remain about the inadequacy and fragility of Nevada’s gasoline supply system. Some stakeholders (notably the NDOA’s Bureau of Petroleum Technology) believe that EPA enforcement discretion procedures allow sufficient flexibility to address periodic, serious fuel supply problems. Other stakeholders (notably WSPA) believe that a fuel variance procedure would be a more effective way to address intermittent fuel shortages.

- Several Stakeholders emphasized that ASTM standards and procedures are established by consensus processes involving numerous experts and considerable experimental data. The gasoline specifications defined by ASTM are intended to ensure satisfactory performance by the entire vehicle fleet. In the view of these Stakeholders, changes in ASTM standards should not be made without extensive testing (and consensus agreement) demonstrating that no adverse impacts will result.

G. Conclusions

Based upon the discussions we held with Stakeholders, our review of the existing technical literature, and our own independent analyses, we draw the following conclusions:

1. Based upon an extensive analysis of climatological data, we conclude that northern and southern Nevada have distinctly different maximum temperature profiles throughout the year. The 38\textsuperscript{th} parallel is a reasonable line of demarcation to separate the northern and southern temperature regimes. This confirms the results from the “Doner Study” which has been used by ASTM as the basis for establishing two different gasoline volatility class areas within Nevada.

2. The recent rule change adopted by the NDOA permits gasoline having higher vapor pressure to be used south of the 38\textsuperscript{th} parallel during much of the year (January through April and October through December). Due to local and federal fuel regulations, the allowable vapor pressure changes in Clark County are much less. However, during April and half of September, gasoline vapor pressure in Clark County is governed by the normal ASTM designations. Thus, during these periods, vapor pressures above 9.0 psi are allowed in Clark County.

3. The recent rule change adopted by the NDOA permits use of gasoline having less restrictive (lower) values of the gasoline property known as $T_{V/L=20}$. This relaxation is permitted in all
areas south of the 38th parallel, for all months of the year. There are no local (Clark County)
regulations governing $T_{V/L-20}$. Thus, eliminating the 38th parallel line of demarcation results
in southern Nevada gasoline now having the same $T_{V/L-20}$ designation as northern Nevada
gasoline.

4. Numerous vehicle testing programs conducted by the Coordinating Research Council (CRC)
and others have confirmed that $T_{V/L-20}$ is an important predictor of vapor lock and other hot
fuel handling problems resulting in poor vehicle driveability. At a given ambient
temperature, the vehicle fleet driveability will degrade as $T_{V/L-20}$ levels decrease. Past CRC
test programs have been conducted at ambient temperatures representative of spring and fall
conditions in southern Nevada. Based upon results from these test programs, driveability
performance of the overall vehicle fleet is expected to decline in southern Nevada. The
magnitude of this deterioration, and the number of vehicles with noticeable problems, are not
known. Additional information to address this will soon become available from a more
recent CRC test program.

5. It is not known how much gasoline having relaxed RVP or $T_{V/L-20}$ has been used in Clark
County since adoption of the NDOA volatility rule change. Information from fuel
distributors indicates that some northern gasoline has been shipped to southern Nevada, but it
is not known how much of this reached Clark County. At present, routine gasoline
surveillance data in Nevada do not include a measure of $T_{V/L-20}$.

6. Nevada’s gasoline supply and storage systems are barely adequate to meet today’s needs.
Additional growth within the State will increase the vulnerability of these systems.
Appropriate regulatory bodies and other Stakeholders are considering longer-term solutions
to these problems. In the near term, some form of a variance procedure may be the most
useful solution to intermittent gasoline supply problems within Nevada.

H. References

DaimlerChrysler Corporation, Ford Motor Company, General Motors Corporation, and the
Association of International Automobile Manufacturers, January 26, 1999.

2. A predictive Study for Defining Limiting Temperatures and their Application in Petroleum
Product Specifications,” John P. Doner, U.S. Army Mobility Equipment Research and
Development Center, Aberdeen Proving Ground, Maryland, November 1972.


2004.

6. CRC Project No. E-74a, “Examination of Temperature and RVP Effects on CO Emissions in
EPA’s Certification Database,” April 2005.

List of Appendices

1. WSPA petition to repeal amendment to regulation LCB File No. R002-04
2. AIAM comments in support of WSPA petition
3. AAM comments in support of WSPA petition
4. Special gasoline requirements in Nevada
5. Questionnaires used with Stakeholders
   A. Nevada Department of Agriculture
   B.1 Nevada State Office of Energy
   B.2 Kinder-Morgan
   C. Clark County Department of Air Quality and Environmental Management
   D.1 AAM
   D.2 AIAM
   E. WSPA
December 6, 2004

Mr. Don Henderson
Nevada State Board of Agriculture
350 Capitol Hill Avenue
Reno NV 89502-2923

Re: Petition to Repeal Amendment to Regulation LCB File No. R002-04.

Dear Don:

As we discussed, please find enclosed one original and fourteen copies of the above-referenced document for distribution to the members of the Board of Agriculture and the State Department of Agriculture.

If you have any questions regarding the enclosed, please do not hesitate to contact me.

Very truly yours,

JONES VARGAS

By
John P. Sande, III

JPS:nkb
Enclosure
TO: Nevada Department of Agriculture
   Nevada State Board of Agriculture
   350 Capitol Hill Avenue
   Reno NV 89502


PETITION TO REPEAL AMENDMENT TO REGULATION

LCB FILE NO. R002-04

Pursuant to section 233B.100 of the Nevada Revised Statutes, the Western States Petroleum
Association ("WSPA"), by and through its attorneys, Jones Vargas, hereby requests the repeal of
that amendment to section 590.065(1) of the Nevada Administrative Code (LCB File No. R002-04),
which was considered and adopted by the Nevada State Board of Agriculture at its May 7, 2004 and
August 13, 2004 meetings. WSPA is a non-profit trade association that represents approximately 30
companies that account for the bulk of petroleum exploration, production, refining, transportation
and marketing in the six western states of Arizona, California, Hawaii, Nevada, Oregon and
Washington. WSPA member companies supply in excess of 89 percent of all motor vehicle fuel
sold in the State of Nevada.

By its May 7, 2004 and August 13, 2004 actions, the Nevada State Board of Agriculture
eliminated the South 38th Parallel volatility distribution area in the State of Nevada and provided
that the North 38th Parallel schedule should apply to the entire State unless the counties require
another standard to meet EPA requirements. WSPA believes that the amendment to create only one
volatility distribution area in the State of Nevada may be harmful to consumers as hereinafter
outlined.

Over 40 years of vehicle testing by the Coordinating Research Council (CRC) has shown
that the gasoline property, temperature for a vapor-liquid ratio of 20 (T V/L=20), is the best single
predictor for vapor lock and hot fuel handling driveability problems for both carbureted and modern
Engine Fuel uses the U.S. Army (Doner) ambient temperature study (over 20 years of data) to assign
volatility classes to states and portions of states (if a state is divided into more than one area). The
volatility distribution areas in a state, if the state is divided into more than one area, are established...
based on temperature zones, natural boundaries, elevation, and fuel supply distribution patterns. The
ASTM volatility class system and state class assignments were originally set up in 1970, and had
major revisions in 1982 and 1992. A task force is currently being set up to make recommendations
for additional revisions.

The change adopted by the Nevada State Board of Agriculture to volatility class assignments
for conventional gasoline sold south of 38° latitude has the following effects on the vehicle-fuel
system. Depending on the month, the fuel vapor pressure can be from 1 to 3.5 psi higher for seven
and one-half months of the year over that specified by the previous ASTM volatility schedule,
resulting in increased evaporative emissions from the vehicles. This change in volatility class
assignments also will lower the T V/L=20 by 7 to 17 °F for all twelve months of the year over that
specified by the previous ASTM volatility schedule. The lowering of the T V/L=20 increases the
chances of encountering vapor lock or hot fuel handling problems in both carbureted and modern
fuel-injected vehicles, thus adversely impacting consumers. The chances of encountering problems
increase as the ambient temperature increases for any month.

CRC vehicle testing programs have shown that modern fuel injected vehicles respond
adversely as gasoline T V/L=20 decreases (i.e., as the front end volatility increases), just like older
carbureted vehicles, although the specific driveability problems may differ somewhat due to the
different mechanisms at work. The classic carburetor vapor lock occurs because the carburetor is
starved for gasoline causing a loss in acceleration ability and, in the extreme, the engine stalls and
can’t immediately be restarted until it cools. In modern fuel-injection systems, bubbles form in the
fuel lines and injectors. When the bubbles are injected into the engine in place of liquid fuel, the
air-fuel ratio becomes lean and the engine runs roughly. If the engine is shut down with lots of
vapor bubbles in the fuel system, the engine is difficult to start or won’t start until the engine cools.
Customer experience has shown that fuel injected vehicles also are susceptible to loss of
acceleration and even stalling during operation when high volatility fuels are subjected to hot
temperatures.

In early fuel injection systems, the fuel pump circulates the fuel from the fuel tank to the fuel
injectors and then back to the fuel tank. While this sweeps some of the vapor bubbles from the fuel
system, this fuel recirculation also heats the fuel in the tank. To reduce evaporative emissions caused by this heating, the new design of fuel injection systems is returnless (no fuel is returned from the injectors). As a result, vapor bubbles that form in the fuel system must be dealt with by the fuel injectors.

The original injector nozzle had a single orifice. To improve atomization, the injector design went to an orifice plate with two holes. The latest designs now have up to 12 holes in the orifice plate. Since the same amount of fuel is injected, the holes are very tiny and more subject to problems from bubbles.

Not all vehicles on the road today are equipped with fuel-injection systems. About 10 to 15 percent of the vehicles on the road are still equipped with carburetors. Almost all of the older gasoline-powered farm equipment are equipped with carburetors.

With the introduction of fuel-injection systems, driveability improved over that provided by carburetors because the fuel was more evenly distribution among the cylinders. Consumers liked this improvement and became accustomed to it. Now, when small malfunctions in driveability occur, consumers are unhappy and, if under warranty, return to the dealership and complain. What was once acceptable driveability by consumers with carbureted engines is no longer acceptable for fuel-injected engines. Thus, when volatility-sourced problems occur, the consumer doesn’t know it is caused by the gasoline and complains to the car dealer or manufacturer, who may end up replacing vehicle parts that don’t need replacing due to the difficulty of diagnosing the problem.

The key point in this discussion is that all types and ages of vehicles on the road today are vulnerable to driveability problems if gasolines are not properly matched to the local ambient conditions. These problems hurt consumers and the businesses that serve them.

WSPA appreciates the opportunity that the Nevada State Board of Agriculture has granted it to present more detailed information and to answer any questions of the Board at its December 9, 2004 meeting in Las Vegas, Nevada. After consideration of the information provided herein and any further information presented at the December 9, 2004 hearing, WSPA requests that the amendment (LCB File No. R002-04), which was considered and adopted by the Nevada State Board of Agriculture at its May 7, 2004 and August 13, 2004 meetings, be repealed.
DATED this ___ day of December, 2004.

JONES VARGAS

By: ________________________________
   John P. Sande, III
December 8, 2004

Nevada Department of Agriculture
Nevada State Board of Agriculture
350 Capitol Hill Avenue
Reno, Nevada 89502

Dear Sir or Madam:

The Association of International Automobile Manufacturers (AIAM) is a trade association representing fourteen international automobile manufacturers which account for approximately 30 percent of the passenger cars and light trucks sold annually in the United States. AIAM auto manufacturer members include Aston Martin, Ferrari, Honda, Hyundai, Isuzu, Kia, Maserati, Mitsubishi, Nissan, Peugeot, Renault, Subaru, Suzuki, and Toyota. AIAM members also include original equipment suppliers and other auto-related trade associations.

AIAM is pleased to provide comments in support of the Western States Petroleum Association’s (WSPA) petition to the Board, requesting repeal of the amendment enacted earlier this year to section 590.065(l) of the Nevada Administrative Code (LCB File No. R002-04). This amendment eliminated the historical classification of separate gasoline volatility levels for Southern and Northern Nevada (with the line of demarcation at the 38th parallel latitude) and imposed a uniform volatility level for the whole state based on the historical levels for Northern Nevada (except for counties which require another standard to meet EPA requirements). AIAM shares WSPA’s concern that this amendment could lead to situations whereby consumers could experience vehicle driveability or performance problems due to inappropriate gasoline volatility. Moreover, despite the fact that such problems would be caused by improper fuel parameters, many consumers will take their vehicles to repair shops, mistakenly believing that their vehicles need repair. Repair technicians will spend time and effort trying to identify and repair nonexistent problems, leading to needless and expensive repair bills for consumers and higher warranty claims for auto manufacturers.

As explained in the WSPA petition, the historical gasoline volatility classifications are based on extensive testing by the Coordinating Research Council, which is jointly supported by the petroleum industry and the auto manufacturers, to ensure that motor fuels sold to the public are compatible with vehicles. In the case of gasoline volatility, improper fuel specifications can lead to vapor lock and hot fuel handling driveability or performance problems. Older carburetor equipped vehicles and equipment, which continue to be used by many consumers, are the most susceptible to these problems, but even modern fuel-injection equipped vehicles are vulnerable.
AIAM realizes that the amendment was adopted to address concerns about the impact of gasoline shortages. We believe a better approach would be to establish an emergency variance procedure for use if such situations should develop.

Thank you for your consideration of these comments. Please feel free to contact me at (703) 247-2107 if you have any questions.

Sincerely,

[Signature]

John Cabaniss
Director, Environment & Energy
Alliance of Automobile Manufacturers Statement
To the
Nevada State Board of Agriculture and
Nevada Department of Agriculture,
Public Meeting, December 9, 2004

Re:  WSPA’s Petition to Repeal Amendment of Gasoline Standards Relating to the 38th
Parallel, LCB File No. R002-04

Introduction

The Alliance of Automobile Manufacturers (Alliance) is a trade association of nine car and light truck manufacturers that account for more than 90 percent of vehicle sales in the United States. Gasoline front-end volatility, which is the subject of the regulation at issue and which is measured by such parameters as RVP and T_{V/L=20}, is a key gasoline quality issue that affects how well—or how poorly—a vehicle operates in the marketplace. Poor vehicle performance is not merely an annoyance or irritation to consumers; it can cause serious economic impacts in addition to tarnishing the reputations of automobile manufacturers. As such, the Alliance has a strong interest in Nevada’s new regulation to allow high volatility gasoline to be sold in the southern part of the state.

The Alliance agrees with the information presented in WSPA’s petition to repeal the regulation concerning the new volatility limits below the 38th parallel and supports the request to repeal the regulation. We submitted comments in late June about the impact this regulation can have on vehicles. Given the state’s decision to proceed and adopt the regulation and a recent dialogue with the state on November 23, these comments bear restating and elaboration.

The Impact of Vehicle Design

One of the issues that emerged at the November 23d meeting was whether new vehicle designs are less vulnerable to the problems of high front-end volatility than older vehicle designs. The Alliance unequivocally emphasizes that all vehicles in the marketplace today are vulnerable to driveability problems caused by high front-end volatility.

Vehicle technology has changed a great deal over the last decade or so. One of the key innovations was the elimination of carburetors in favor of fuel injection systems. Many drivers today remember times when they experienced vapor lock in hot weather in older technology vehicles. Usually, this occurred in the fuel delivery system or in the carburetor. Modern vehicles also can experience vapor lock in the fuel handling system, but their engines can further become fuel-starved in new ways.
Modern fuel handling components include air-fuel sensors, computerized controls and other technologies that are affected by high front-end volatility. Fuel injectors, which increase fuel atomization inside the combustion chamber to improve fuel efficiency, also are affected by hot, high volatility gasoline. Trapped vapors in the fuel lines and injector orifices can cause the engine to hesitate, run rough, lose acceleration or even stall. The consumer, in turn, complains to the auto dealer or other service provider. But since the fuel leaves no telltale signs, the mechanic is left without any way to diagnose the problem. Faced with an unhappy customer, most mechanics simply start replacing vehicle parts, starting with the fuel injectors, which may or may not be covered under warranty at the time. Besides costing consumers, service providers and manufacturers time, resources and money, these responses will not fix the problem. Eventually, reputations will suffer, and this has a lasting impact on businesses.

**Consumer Complaints as Evidence of No Harm**

The state has asserted that the new regulation will not harm consumers, basing its opinion on the lack of consumer complaints in the state over the past five years. It has asked the auto industry to provide similar or other evidence to counter this claim.

We have not reviewed the state’s research and analysis regarding complaints, but we can say that this type of information fails to provide a proper basis for concluding the regulation will not cause problems in the future.

To begin, one would not expect to see many complaints in recent years because the fuel's front-end volatility probably has been meeting the ASTM requirements during this time. Indeed, ASTM established these standards to prevent such complaints. In general, the problem of poor performance due to excessive front-end volatility has become less prevalent due to improvements in both vehicle technology and fuel volatility in the marketplace, because fuels and vehicles work as a system. Eliminating the 38\textsuperscript{th} parallel rule, however, could very well cause the retail fuel volatility to increase. In this case, automakers would expect to find vehicle performance problems to increase significantly. Importantly, both older and newer vehicles would be at risk.

This expectation is based on the best scientific evidence available regarding vehicle-fuel systems. The Coordinating Research Council (CRC) is a joint auto-oil non-profit research consortium that studies the interactions between automotive equipment and petroleum products and has examined the impact of front-end volatility at great length. The attached list of some of these and other peer-reviewed research papers shows the depth and breadth of this body of research and reflects the best available science on these issues. It is unclear to us why the state is appearing to reject this information and the collective expertise of the auto and oil industries.

The scientific conclusions produced by the CRC and other researchers are endorsed by automakers from around the world, as reflected in the World Wide Fuel Charter (see www.autoalliance.org). The Charter defines the minimum acceptable front-end volatility as measured by $T_{\nu L=20}$ for six different class areas that were defined based on recorded historical ambient temperatures. Northern and southern Nevada can differ by as much as two classes at the same time of year. To automakers, this means that vehicles are much more likely to have performance problems in the southern part of the state if higher volatility fuel is actually marketed as allowed under the new regulation.
Another reason why performance complaints are an unreliable indicator of potential future problems is that, as noted, mechanics have no tools with which to determine whether the kind of performance problems caused by excessive volatility are due to the gasoline, to a vehicle flaw or to some other cause (such as driver behavior). Further complicating the issue is the fact that driveability problems caused by high volatility fuels are usually intermittent and leave no signs on or in the system. Since fuel quality can change from tank to tank and batch to batch, even tracing a complaint to a fuel retailer is unlikely to yield useable information.

Finally, to the extent consumers or mechanics even report performance problems, they are more likely to report them to the vehicle manufacturer than to anyone else, including the government and the oil industry. And to the extent individual companies have any information of this kind, it is held as business confidential due to the potential impact on a company’s reputation and competitive position.

**Conclusion**

All types and ages of vehicles are at risk of responding poorly to the high RVP fuels allowed by the new regulation. The conclusion that it will not cause hot fuel handling problems and thereby not harm consumers has no scientific basis. The Alliance agrees with WSPA that the regulation allowing high volatility fuels to be sold in the southern half of Nevada should be repealed.

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Selected Research Papers on Front End Volatility


   Abstract: It is generally known that fuel volatility considerably influences driveability and the composition of exhaust gas. Recently, many papers have clarified the relationship between the influence of driveability/exhaust gas composition with fuel volatility expressed by such parameters as T10, T50, RVP. These prompted us to study fuel volatility sensors, paying attention to the correlation between cavitation number and vapor pressure. This paper describes the development of a Fuel Composition Sensor with a long orifice to facilitate cavitation and a photocoupler to detect cavitation events.

2. SAE 952521: The development of driveability index and the effects of gasoline volatility on engine performance

   Abstract: To reduce engine exhaust emissions, we have had to deal with this global environmental problem from the fuel side by introducing oxygenated fuels, reducing the RVP and using low aromatics. But when we change the fuel components and distillation, we must take note about how these affect the engine driveability. We have used T50, T90, RVP and so on as the fuel index up to the present. It is possible to characterize the fuel from one aspect, but these indexes don't always represent the real feature of the fuel. In this paper, we propose a New Driveability Index (hereinafter referred to as NDI) that is more realistic and accurate than the other fuel indexes. We used a 1600cc DOHC L4 MPI type engine. We used Model Gasolines and Market Gasolines and tested them according to the Excess Air Ratio Response Test Method that was suggested in SAE paper 930375, and we calculated the NDI statistically. This NDI is a function of the fuel distillation. We could express NDI as a linear function of the excess air ratio response test results. NDI is suitable for using with not only hydrocarbon gasolines but also oxygenated gasolines such as those mixed with MTBE, ETBE and Ethanol. Furthermore, we tested two other engine types and confirmed that we could apply this NDI to them.


   Abstract: Evaporative emissions of Japanese older and current vehicles (1990-1998 MY) and U.S. current vehicles, which were adapted to federal regulations in 1996, were investigated using typical Japanese gasoline. Japanese older and current vehicles exhibited high levels of Running Loss (RL), Hot Soak Loss (HSL) and Diurnal Breathing Loss (DBL), and their emissions showed strong Reid vapor pressure (RVP) dependence. On the other hand, U.S. vehicles showed very weak RVP dependence, between 62 kPa and 76 kPa. Their emissions also showed very low levels of RL, HSL and DBL. These results suggest RVP reduction is just effective for Japanese older and current vehicles. Evaporative emissions of Japanese and U.S. vehicles were also tested according to a new Japanese test procedure and the 35 degrees centigrade RL test procedure. In the case of the RL and DBL tests, the impact of test conditions on evaporative emissions was discussed as well.

Contains a section on "CHARACTERISTICS OF VAPOR LOCK - Influence of Fuel Distillation Property"


6. Auto Oil - Emissions Results of Oxygenated Gasolines and Changes in RVP, September 1991


8. CRC Report No. 629 - 2001 CRC Hot-Fuel Handling Program


ASTM D 4814 was originally developed to establish gasoline standards throughout the country to assure satisfactory performance as an automotive spark-ignition fuel. Over the years, ASTM D 4814 has evolved as fuels, vehicles, and testing procedures have changed. Some of the most significant changes to ASTM D 4814 have resulted from special oxygenate and volatility requirements imposed to address air quality concerns. The principal concerns are due to exceedences of established National Ambient Air Quality Standards (NAAQS) for ozone (O₃) and carbon monoxide (CO).

Many states and local areas have requested exceptions or modifications to the standard ASTM specifications in order to address summertime O₃ problems and/or wintertime CO problems. Once officially adopted, state and local volatility changes become incorporated into ASTM D 4814 – thus, this document has become increasingly complex over time.

In Nevada, both Washoe and Clark Counties have special gasoline requirements that differ from the standard ASTM specifications established for Northern and Southern Nevada. These requirements are described below:

**Washoe County**

To address summertime O₃ problems, the vapor pressure of gasoline sold in Washoe County is controlled to a tighter limit than throughout the rest of Nevada from June 1 to September 15 of each year. This is shown in Table 4 where the ASTM volatility designation for Washoe County is “AA-2” during this period, while the rest of Northern Nevada (and now Southern Nevada) is designated “A-2.” These designations correspond to a maximum RVP of 7.8 psi in Washoe County, versus 9.0 psi throughout the rest of the State.

To address wintertime CO problems, Washoe County has an oxygenate requirement for all gasoline sold between October 1 and January 31. During this period, gasoline must contain 2.7 wt.% oxygen. In practice, this requirement is met by inclusion of ethanol, though other oxygenated blending stocks are permitted.

**Clark County**

To address wintertime CO problems, Clark County’s Air Quality Regulations were expanded in the late 1980’s to include Section 53, “Oxygenated Gasoline Program.” This section requires that gasoline sold in and around the Las Vegas Valley contain 3.5 wt% oxygen from October 1 through March 31 of each year. This oxygenate requirement can only be met by use of ethanol.

As part of the year 2000 State Implementation Plan (SIP) process for CO in Las Vegas, the RVP of wintertime gasoline was restricted to 9.0 psi. This RVP restriction covers the same period as the wintertime oxygenate program; namely October 1 to March 31. This wintertime RVP control, combined with the standard ASTM summer volatility designation for Southern Nevada, means that Las Vegas gasoline has a 9.0 psi RVP limit all year-round.

More recently (1999) Clark County adopted Air Quality Regulation Section 54, “Cleaner Burning Gasoline (CBG): Wintertime Program.” This regulation further limits the amount of sulfur and aromatic hydrocarbons permitted in gasoline from November 1 to March 31, but has no impact upon volatility or oxygenate requirements.
A. Questions for Nevada Department of Agriculture Bureau of Petroleum Technology (1/13/06)
Met with Vernon Miller and Bill Striejewske

1. What are the current gasoline volatility specifications throughout Nevada?

The current gasoline volatility specifications throughout Nevada are outlined in the Nevada Administrative Code (NAC) 590.065.2. NAC 590.065.2 reads as follows:

Notwithstanding the provisions of Table 4 (“Schedule of Seasonal and Geographical Volatility Classes”) of ASTM designation D 4814-01a that apply to this State, the schedule that is designated in Table 4 for the area of this State that lies north of the 38th degree of north latitude applies to the entire area of this State unless the United States Environmental Protection Agency requires a county to comply with a different requirement relating to vapor pressure.

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2. What special gasoline requirements pertain to Clark County?

Clark County Gasoline Specifications

**RVP:**
- NAC 590.065.3 establishes a maximum RVP of 9.0 PSI in Clark County for the winter months, October 1 to March 31. Adopted by the Board of Agriculture. (with ethanol)
- NAC 590.065.2 – American Society of Testing Materials (ASTM) 4814, adopted by reference by the Board of Agriculture, established RVP limits for the entire state of Nevada. The RVP limit is 9.0 in the summer months (Mid April to mid October), and ranges from 10.0 to 13.5 in the winter months.
- Between these two rules, the RVP limit is 9.0 in Clark County 12 months of the year.

**Oxygenate:**
- Clark County AQR Section 53 establishes 3.5% oxygen content by weight requirement for the winter months, from Oct 1 to March 31.
- Applies to the Las Vegas Valley, the Eldorado Valley, the Ivanpah Valley, the Boulder City limits, and any areas within three miles.

**Cleaner Burning Gasoline (CBG):**
- Clark County AQR Section 54 establishes wintertime CBG specifications which apply from November 1 to March 31.
Review of NAC 590.065.2: Overview and Implications of Nevada’s Gasoline Volatility Rule Change

- The area of applicability is all of Clark County.
- Sulfur standard:
  - Max = 80 ppm by weight
  - Flat = 40 ppm OR
  - Average = 30 ppm
- Aromatic Hydrocarbon standard:
  - Max = 30 percent by volume
  - Flat = 25 percent
  - Averaging = 22 percent

Note, during the summer they go with the State rule

3. What gasoline oxygenate requirements currently exist throughout Nevada?

Washoe County and Clark County are the only counties in Nevada with an oxygenate requirement.
- Clark County AQR Section 53 establishes 3.5% oxygen content by weight requirement for the winter months, from October 1 to March 31.
- Washoe County has 2.7% oxygen content by weight requirement for the winter months, from October 1, to January 31.

4. Does Nevada allow an RVP increase due to blending of ethanol?

Nevada does allow an RVP increase due to the blending of ethanol in gasoline. NAC 590.065.3-4 addresses the current Nevada rule.

NAC 590.065 Gasoline: Adoption of specification guides by reference; exemption from strict compliance with standards; limitations on vapor pressure; limitations on contents.

3. Except as otherwise provided in subsection 4, gasoline containing 9.0 percent ethanol by volume or more is permitted an additional 1.0 pound per square inch on the vapor pressure specification.

4. Gasoline sold in Clark County between October 1 and the following March 31 must not exceed a vapor pressure of 9.0 pounds per square inch and must meet the specifications relating to distillation set forth for volatility class A, B or C in ASTM designation D 4814-01a.

5. Is gasoline having reduced octane number marketed anywhere in Nevada?

Sub Octane gasoline is marketed throughout Nevada but must be posted as such. NAC 590.063 addresses the octane rating of gasoline sold in Nevada.

NAC 590.063 Gasoline: Posting of octane rating number on pump or other device; required accuracy of rating number. (NAC 590.070, 590.100)

1. The octane rating number of the gasoline from the proof of transfer must be posted on the pump or other device for dispensing the gasoline.

2. The octane rating number of the product that is in the pump or other device for dispensing gasoline must not be lower than the octane rating that is posted on the pump or device.

(Added to NAC by St. Sealer of Weights & Measure, effective 10-23-91; Approved by Bd. of Agriculture, 2-20-96).
Note: Below the 38 parallel, sales of sub-octane fuel could be problematic.

6. What future changes in gasoline requirements (volatility, oxygenates, other) are likely to be considered?

Clark County is considering an oxygenate change and a summertime RVP change. (This would involve a shorter season but nothing is planned statewide.)

7. To what extent has the recent change in Nevada’s gasoline volatility schedule mitigated fuel supply problems throughout the State?

We have not had any instances where we have been unable to obtain fuel in the state of Nevada since the recent volatility change. But we had an instance where Clark County’s winter time fuel was disrupted due to environmental factors (1/05) and ethanol availability (12/05).

8. How much previously noncomplying gasoline has been imported south of the 38th Latitude since implementation of the volatility rule change? When and where has this occurred? What have been the sources of this fuel?

NDOA has no record of receiving non-compliant fuel south of the 38th Latitude since the implementation of NAC 590.065.2.

9. What are Nevada’s reporting requirements for gasoline that is shipped into the State from other areas?

DMV handles the reporting of gasoline specs shipped into Nevada. (This includes what is shipped through the pipeline.)

10. Does the Nevada Department of Agriculture routinely measure T_{V/L}=20 or compute it from other volatility parameters?

The Nevada Department of Agriculture’s (NDOA) petroleum laboratories do not routinely measure T_{V/L}=20 or compute it from other volatility requirements. Pipeline companies may require a certificate of analysis for T_{V/L}=20 before accepting shipments of gasoline.

11. Does the Nevada Department of Agriculture routinely measure T_{10}, T_{50}, and RVP?

NDOA’s Bureau of Petroleum Technology does routinely measure T_{10}, T_{50}, and RVP. (This can be used to calculate T_{V/L}=20.)

12. Are you aware of any fuel performance problems that have occurred as a result of the gasoline volatility rule modification?

We are not aware of any fuel performance problems that have occurred in Nevada as a result of the gasoline volatility rule modification.

13. Are additional contingency plans are being developed (or considered)?

Yes, a fuel emergency contingency plan is in the process of being developed by the Nevada State Office of Energy (NSOE) and NDOA. (Note: A standardized fuel for the State is considered to be important.)
14. Are there any other important matters that should be considered with respect to the recent change in Nevada’s gasoline volatility schedule?

The probability of ethanol being blended into gasoline all year around is another important matter that should be considered.
B1. Questions for Nevada State Office of Energy (1/19/06)
Met with Pete Konesky

1. What are the current gasoline volatility specifications throughout Nevada?
   Defer to Department of Ag.

2. What special gasoline requirements pertain to Clark County?
   Defer to Clark County.

3. What gasoline oxygenate requirements currently exist throughout Nevada?
   Variable, defer to Department of Ag.

4. What is the current gasoline supply situation in Nevada?
   Normal situation:
   Western and Northern NV are supplied from northern CA.
   Northern NV is supplied by an 8” pipeline from Benicia/Sacramento.
   In the South there is an 8” pipeline that supplies jet fuel to McCarran Airport and a 14” pipeline that supplies gasoline, diesel, and jet fuel. This pipeline is close to capacity.
   Eastern NV gets fuel from Salt Lake City. This is transported by truck. This is sub-octane gasoline (R+M/2 of 85)
   Some gasoline shipped by pipeline to Las Vegas ends up in Southern Utah and other outlying locations.
   Increased military use of fuels in Nevada has further tightened the supply of non-military fuels.
   Estimate 15-20 pipeline disruptions per year in Nevada. These disruptions can last from a few hours to a few days in length.

5. What forms of oxygenate are used – when and where? How are the oxygenates transported to Nevada and blended into finished fuels?
   EtOH brought in from the Midwest by rail.
   Over the past New Year’s weekend there was EtOH shortage in Southern NV. Fortunately they found 75 railroad cars of EtOH.

6. How much previously noncomplying gasoline has been imported south of the 38th Latitude since implementation of the volatility rule change? When and where has this occurred? What have been the sources of this fuel?
   He (Pete) will look at this.

7. What future changes in gasoline requirements (volatility, oxygenates, other) are likely to be considered?
Increased use of oxygenates.

8. What contingency plans are currently in effect to ensure adequate gasoline supply in Nevada?

More storage is needed. This is being investigated. Requiring biodiesel and EtOH as alternative feed stocks could help increase fuel supply. These would come in by rail.

Unit trains of jet fuel can come in from Texas. This would free-up space on the pipeline from Southern California and allow increased gasoline shipment to Las Vegas.

9. What additional contingency plans are being developed (or considered)?

The NSOE is heading up efforts to develop additional contingency plans. No date for completion. Nevada will consider fuel variance procedures; also EtOH, biodiesel and other sources. Pipeline from El Paso to Arizona and on to Las Vegas is still under consideration.

10. To what extent has the recent change in Nevada’s gasoline volatility schedule mitigated fuel supply problems throughout the State?

Not enough data to answer. He’s not aware that this rule change has mitigated the problem. One specific fuel supplier normally runs out of fuel but this is because they have a storage problem.

11. Are you aware of any fuel performance problems that have occurred as a result of the gasoline volatility rule modification?

No – not aware of any problems.
The only calls he gets are complaints about things like water in fuel.

12. Are there any other important matters that should be considered with respect to the recent change in Nevada’s gasoline volatility schedule?

There is a serious supply problem and we need to look at all options to mitigate the situation. He had a concern that the focus of this issue was on moving fuel between Washoe and Clark Counties. The real problem is an inadequate ability to supply and store fuel. (In the south there is enough storage for 3 to 4 days, while in the north there is ~ 1 week’s worth of storage capacity.)
B2. Questions for Kinder-Morgan (3/08/06)
Spoke with Russ Kinzig

1. What are the current gasoline volatility specifications throughout Nevada?
   Not appropriate.

2. What special gasoline requirements pertain to Clark County?
   Not appropriate.

3. What gasoline oxygenate requirements currently exist throughout Nevada?
   Not appropriate.

4. What is the current gasoline supply situation in Nevada?
   Fuel is supplied by pipeline to Reno and Las Vegas. The pipelines supply gasoline, diesel, and jet fuel. Salt Lake City may also be supplying fuel but the amount is unknown. NV is 100% dependent on out-of-state sources for their fuel.

   The Reno pipeline is at 100% capacity with suppliers requesting more capacity than available. Kinder-Morgan pro-rates the requests to determine the amount each supplier can ship. The Reno shipment levels have been frozen and there is little flexibility. Las Vegas is not yet at capacity but there is not much spare capacity. The Las Vegas pipeline has had numerous outages for a host of reasons (smell, valves, etc.).

5. What forms of oxygenate are used – when and where? How are the oxygenates transported to Nevada and blended into finished fuels?
   EtOH is brought in by rail. Kinder-Morgan owns the Las Vegas facility but the Reno storage facility is owned by a 3rd party. During the oxygenate season there have been supply limitations but overall the rail supply has been satisfactory.

6. How much previously noncomplying gasoline has been imported south of the 38th Latitude since implementation of the volatility rule change? When and where has this occurred? What have been the sources of this fuel?
   He does not know how much has been shipped. If this occurred, the source would have been Salt Lake City and even though he was not aware of any specific cases, he does believe this has occurred.

7. What future changes in gasoline requirements (volatility, oxygenates, other) are likely to be considered?
   Not appropriate.

8. What contingency plans are currently in effect to ensure adequate gasoline supply in Nevada?
   No idea of what the plans may be and nothing has been worked out with Kinder-Morgan. In all likelihood it would have to be by truck since the pipeline capacity is not available.
9. What additional contingency plans are being developed (or considered)?

See previous question.

10. To what extent has the recent change in Nevada’s gasoline volatility schedule mitigated fuel supply problems throughout the State?

Nothing has mitigated this problem.

11. Are you aware of any fuel performance problems that have occurred as a result of the gasoline volatility rule modification?

No.

12. Are there any other important matters that should be considered with respect to the recent change in Nevada’s gasoline volatility schedule?

As an operator of a 3rd party fuel terminal, Kinder-Morgan would like to have as many grades and volatility classes of products available as their customers need. However, given the fixed amount of tankage in Las Vegas, adding another volatility class would reduce the storage capacity per class. As a further complication, there is insufficient infrastructure upstream of Las Vegas to handle an additional volatility class.
C. Questions for Clark County Department of Air Quality and Environmental Management (1/26/06)
   Met with Dennis Ransel and Robert Tekniepe

1. What are the current gasoline volatility specifications for Clark County?

2. What are the current RFG and oxygenate specifications for Clark County?
   See Clark County Gasoline Specification Sheet and Air Quality references. Note, these cover a limited geographical area.

3. Is there an RVP waiver for use of ethanol in Clark County?
   Only for EtOH. They ship in 8 lb RVP and splash blend EtOH.
   (Note: the NAC allows a 1 lb bump so it could go to 10 lbs in the winter months.)

4. Is there concern about increased VOC emissions in Clark County? Will VOC emissions reductions be required in the upcoming ozone SIP?
   Yes, they are concerned. They are still evaluating what they will do in the SIP.

5. What is the estimated VMT for Clark County?
   For this, contact Zheng Li – 455-1670
   In Clark County there are ~ 1.2 M vehicles, of which 30K are diesel.

6. How much of an impact will changes in the volatility requirements have upon mobile source emissions in Clark County?
   Not sure, but they estimate that wintertime CO emissions are reduced by 20-30% by virtue of Clark County’s reduced wintertime RVP of 9 psi.

7. Are additional gasoline specification changes being contemplated to address the current ozone non-attainment problem in Clark County?
   Yes but they are not sure at this time. (One possibility is further lowering RVP during the ozone season.)

8. Have there been concerns about emissions increases or operability problems with vehicles in Clark County that operate on Utah or California gasoline?
   No.

9. To what extent has the recent change in Nevada’s gasoline volatility schedule mitigated fuel supply problems in Southern Nevada?
   They are unaware of any impact.
10. Are you aware of any fuel performance problems that have occurred as a result of the gasoline volatility rule modification?

Not aware of any impact.

11. Are there any other important matters that should be considered with respect to the recent change in Nevada’s gasoline volatility schedule?

What is the impact on air quality (e.g. the work done by Mike Ingham).
Not aware of any impacts but these are likely to be small.
CA gasoline is cleaner than LV fuel.
The contribution from UT vehicles on VMT is probably small.
AZ (Phoenix) fuel has the same or more stringent specs.
As fuel specs become more stringent, the supply becomes more limited.
Clark County Gasoline Specifications

RVP:

- Nevada Administrative Code (NAC) 590.065.3 establishes a maximum RVP of 9.0 PSI in Clark County for the winter months, October 1 to March 31. Adopted by the Board of Agriculture.

- ASTM 4814, adopted by reference by the Board of Agriculture, establishes RVP limits for areas of Nevada north and south of the 38th parallel. South of the 38th parallel the RVP limit is 9.0 in the summer months (Mid April to mid October), and ranges from 10.0 to 13.5 in the winter months. The area south of the 38th parallel includes all of Clark County, and most of Nye, Lincoln and Esmeralda counties.

- Between these two rules, the RVP limit is 9.0 in Clark County 12 months of the year.

Oxygenate:

- Clark County Air Quality Regulation (AQR) Section 53 establishes a 3.5 % oxygen content by weight requirement for the winter months, from Oct 1 to March 31.

- Applies to the Las Vegas Valley, the Eldorado Valley, the Ivanpah Valley, the Boulder City limits, and any areas within three miles.

- Only ethanol can be used as an oxygenate.

Cleaner Burning Gasoline (CBG):

- Clark County AQR Section 54 establishes wintertime CBG specifications which apply from Nov 1 to March 31.

- The area of applicability is all of Clark County.

- Sulfur standard:
  
  Max = 80 ppm by weight  
  Flat = 40 ppm OR  
  Average = 30 ppm

- Aromatic Hydrocarbon standard:
  
  Max = 30 percent by volume  
  Flat = 25 percent  
  Averaging = 22 percent
D.1 Questions for AAM (2/14/06)

Met with Ellen Shapiro (Auto Alliance), Loren Beard (DaimlerChrysler), Dominic DiCicco (Ford), David Patterson (Mitsubishi), and Marie Valentine (Toyota)

1. What are the current gasoline volatility requirements for Clark County, the rest of Nevada, and the surrounding States?

The Alliance accepts the revised matrix as presented by DRI. [Note: this is shown in Table 3 of this report.]

2. Are you aware of any increase in vehicle operability complaints as a result of the recent modification to the gasoline volatility rules?

Individual manufacturers, who may collect information about complaints, would expect to see an increase in complaints only if northern fuel had been sold in southern NV, but they have no evidence that such fuel has been sold in Southern Nevada.

The association does not have or collect any information about consumer complaints.

3. What is an acceptable range of total weighted demerits (TWD)? What increase in TWD would typically be noticed by a non-trained driver? What level of TWD increase would be expected to result in customer complaints?

Operational problems, as determined by trained drivers and reported as TWD, occur in a probability distribution, and there is no particular range or level that is acceptable. All manufacturers expend considerable effort to reduce potential performance problems, because no auto manufacturer can afford or accept any increase in customer complaints. For untrained drivers, it is difficult to say what TWD increase might lead to increased complaints. Any increase in TWD, however, represents an increased risk of performance problems that can lead to an increase in complaints.

4. Are there any concerns about potential use of reduced octane gasoline in Southern Nevada?

Yes. This aggravates performance under all circumstances, including at high altitude, and is especially problematic at high temperature and/or high loads. This is an issue for all vehicles. Older vehicles without knock sensors are susceptible to permanent damage when using gasoline with an octane level below 87; many of these vehicles remain in the fleet. Newer vehicles equipped with knock sensors are likely to experience degraded performance with this fuel.

5. Do you routinely monitor gasoline properties (including volatility, octane, and oxygenates) using marketplace samples?

The Auto Alliance conducts a regular fuel survey that takes retail fuel samples from stations in Las Vegas, Denver, Albuquerque and Phoenix, as well as from other cities across the U.S. It collects samples two times per year, winter and summer, to look for significant year-to-year trends in 20 different gasoline properties. These properties include several volatility measures, octane and oxygenates.

6. Are you aware of marketplace fuels that fail to meet the ASTM vapor lock protection class requirements in Southern Nevada?
The Alliance is not aware of any fuels that fail to meet the vapor lock protection class requirements, but this could be due to the low frequency and limited geographic scope of sampling, combined with the fact that the new regulation has been in place only a short time.

7. Are you aware of any vapor lock or other hot fuel handling performance problems in Southern Nevada that could be attributed to vehicles that had received their fuel in Utah?

Not aware of any.

8. What additional vehicle drivability test programs are being considered by the CRC or other organizations?

There is a CRC hot fuel handling study planned for the summer of 2006. The CRC does not generally reveal details of projects under consideration until it is ready to begin a test program. Outside of CRC, the auto industry is generally interested in the impact of 0 – 20% ethanol, among other things.

9. What further changes in gasoline requirements (volatility, oxygenates, other) are likely to be considered?

The automakers petitioned EPA in 1999 to cap the Distillation Index (Driveability Index corrected for ethanol) at 1200.

With EtOH use increasing throughout the U.S., the automakers have concerns about the potential for EtOH to exacerbate hot fuel performance problems and to increase permeation emissions, when the base gasoline properties are not adjusted to account for, or offset these effects.

10. Are any volatility-related changes currently being considered for ASTM D 4814?

ASTM recently circulated a ballot to add an offset due to EtOH to be added to the drivability index (DI) equation.

11. Are there any other important matters that should be considered with respect to the recent change in Nevada’s gasoline volatility schedule?

To the extent the State of Nevada needs additional flexibility to ensure adequate gasoline supply, the Auto Alliance supports the variance procedure as used in California, instead of permanently allowing a degradation in fuel quality. Alliance members are concerned that by implementing the recent Nevada rule, the probability that problems will arise has increased.

The Auto Alliance strongly opposes modifying long established ASTM specifications based upon anecdotal reports (or a lack of anecdotal reports) of fuel performance. If Nevada wishes to modify its gasoline specifications, it should work through the ASTM process.
D.2 Questions for AIAM (2/28/06)
Spoke with John Cabaniss

1. What are the current gasoline volatility requirements for Clark County, the rest of Nevada, and the surrounding States?

Did not ask.

2. Are you aware of any increase in vehicle operability complaints as a result of the recent modification to the gasoline volatility rules?

They don’t track. The companies do this as do some dealers. He has heard about hot handling issues. Complaints have been focused on “shoulder” seasons and this is almost universally the case.

3. What is an acceptable range of total weighted demerits (TWD)? What increase in TWD would typically be noticed by a non-trained driver? What level of TWD increase would be expected to result in customer complaints?

Did not ask.

4. Are there any concerns about potential use of reduced octane gasoline in Southern Nevada?

Issue of vehicle with mid-grade and high-grade fuel needs can be a problem. >90% use regular grade. 85 octane can be a problem.

5. Do you routinely monitor gasoline properties (including volatility, octane, and oxygenates) using marketplace samples?

They do not collect gasoline spec. information.

6. Are you aware of marketplace fuels that fail to meet the ASTM vapor lock protection class requirements in Southern Nevada?

No, they don’t measure this.

7. Are you aware of any vapor lock or other hot fuel handling performance problems in Southern Nevada that could be attributed to vehicles that had received their fuel in Utah?

Not aware – see response to #2.

8. What additional vehicle drivability test programs are being considered by the CRC or other organizations?

Did not ask.

9. What further changes in gasoline requirements (volatility, oxygenates, other) are likely to be considered?

EPA is doing a rulemaking to govern mobile source air toxics (e.g. Benzene). There is also the issue of renewable fuels.
10. Are any volatility-related changes currently being considered for ASTM D 4814?

Did not ask.

11. Are there any other important matters that should be considered with respect to the recent change in Nevada’s gasoline volatility schedule?

National ASTM is derived from testing and scientific scrutiny. Changes should undergo the same tests. They would be supportive of changes if the data support these changes. He supports a variance procedure to deal with a crisis but not to make it a rule change (as was done in this case). AIAM’s overriding concern is there have not been tests to assess problems that could arise.
E. **Questions for WSPA (2/08/06)**

Met with Gina Grey, Lew Gibbs (Chevron), Mike Ingham (Chevron), Simone Yuan-Newman (Valero), Vic Dugan (ExxonMobil), and Paul Richmond (on the phone).

1. What are the current gasoline volatility requirements for Clark County, the rest of Nevada, and the surrounding States?

   See updated sheet from Lew Gibbs. [Table 3 in this report]

2. How much variance typically exists between mandated volatility specifications and actual fuels in the Nevada marketplace?

   This is not the type of data that WSPA collects or is aware of. The so-called NIPER gasoline surveys, which are available from Northrup-Grumman, compile summer and winter inspection data for samples collected from the major suppliers in Las Vegas and Reno. While not a complete picture, these surveys would provide some indication of the variance between specifications and actual fuels.

3. Is $T_{V/L} = 20$ routinely measured (ASTM Test Method D5188) or calculated (from vapor pressure and distillation properties) to ensure compliance with ASTM D 4814 requirements?

   Producers and distributors measure or calculate $T_{V/L} = 20$ for every batch of gasoline. This is reported on a Certificate of Analysis – no states measure this routinely.

   This is done for every batch – not sure what Kinder-Morgan does.

   Calculation does not work for EtOH-containing gasolines. Test method must be run in these cases.

4. What gasoline oxygenate requirements currently exist throughout Nevada?

   Washoe County: 2.7% wt. Nov – Jan

   Clark County: 3.5% wt. Oct – March – This requirement can only be met by using EtOH.

5. What is the actual practice of oxygenate usage in Nevada? What forms of oxygenate are used -- when and where? How are the oxygenates transported to Nevada and blended into finished fuels?

   EtOH – in winter – North & South.

   Transported by train or truck, but cannot be transported through the pipeline as either neat or blended with gasoline.

   Blending occurs at the terminal.

6. Does Nevada allow an RVP increase due to blending of ethanol?

   Based on the Federal Regulations for conventional gasoline fuel, a 1-psi increase is allowed for blending 9 to 10% EtOH (May 1 - September 15). (Note – State SIPs take precedent.)

7. Is gasoline having reduced octane number being marketed anywhere in Nevada? Are there concerns about the potential use of such fuel in Southern Nevada?
ASTM D 4814 has a section which discusses how vehicle octane requirements decrease with altitude. ASTM documents also include a map showing different areas where sub-octane grades are permissible. Because of the altitude, gasolines in northeastern Nevada can have lower octane numbers. The Autos would have to answer the second question themselves, but they probably would have some concerns. (Note, in subsequent discussions between DRI and the Alliance, the Autos were surprised to learn that sub-octane fuel is marketed. They stated that this could be as big a problem as the TV/L issue.)

8. What are the reporting requirements for transport of fuels into Nevada from neighboring states?

Tax reporting.

Not sure of the routine fuel quality reporting requirements. (Note, it was mentioned that there are Clark County specific requirements and there may be EPA requirements.)

In the case of downgrading CARB CBG3 to conventional gasoline and moving it into Nevada, there are no specific reporting requirements, but such events generally accompany supply disruptions, so there is usually communication with appropriate NV agency staff. In the case of moving AZRBOB from AZ into Las Vegas to supplement LVBOB supplies, we must inform the DAQEM how we intend to comply with the CBG requirements (e.g., by meeting the “flat” standards) and we must inspect and report each truckload of fuel for sulfur, aromatics and oxygen contents.

9. How much previously noncomplying gasoline has been imported south of the 38th Latitude since implementation of the volatility rule change? When and where has this occurred? What have been the sources of this fuel?

Did not know.

10. To what extent has the recent change in Nevada’s gasoline volatility schedule mitigated fuel supply problems in Clark County?

Did not know.

11. What future changes in gasoline requirements (volatility, oxygenates, other) are likely to be proposed by WSPA.

Shorten winter time oxygenate season – don’t need Oct. or Feb/March (based on the results of the Sierra Research study). This would be consistent with the proposed shorter oxyfuel season in Phoenix, which could permit additional fuel to come to Las Vegas. May not need the winter RVP cap or the oxygen and CBG requirements at all in Clark County, although the MOBILE6 model still predicts large CO benefits from use of oxygenates and the RVP cap.

They have looked at the Washoe County wintertime program and feel it is no longer required (again based upon results of the Sierra Research study.

12. To what extent has the recent change in Nevada’s volatility schedule mitigated fuel supply problems throughout the State?

Did not know.
13. Are you aware of any fuel performance problems that have occurred as a result of the gasoline volatility rule modification?

No, they are not aware of any; however, they have heard the Autos say this. Directionally this is a concern. The issue is one of increased risk.

14. What additional vehicle driveability test programs are being considered by the CRC or other organizations?

Hot fuel handling study in Mesa, AZ (late May start). Clark County would need a test track if something like this would take place there. They anticipate the results of the Mesa study to be available in early 2007. Fuel costs for this study is $18/ga. The study will assess the impacts of $T_{v/A}=20$ in oxygenated and non-oxygenated gasolines at summertime temperatures typical of the southwest, and will use a broader range of ethanol concentrations (0-20 vol%).

15. Are any volatility-related changes being considered for ASTM D 4814?

An oxygenate offset for EtOH is being considered for the calculated driveability index (DI).

16. Have gasoline variance procedures used in other states proven to be workable and useful?

Yes. CA has variances procedures for both diesel and gasoline. The diesel variance has been used on multiple occasions, while the gasoline variance has been used only once. The CA variance procedure is aimed at individual companies. When there is a variance, the company has to pay a penalty fee administered by CARB. (If this were to go through, NDEQ would have to administer the program.) In WSPA’s view the CA variance has worked well.

The situation following hurricane Katrina provided an additional example of an EPA nationwide variance. EPA has shown an increased willingness to provide regional or state-wide variances for the entire industry. There are few examples of where they have given variances for individual companies. WSPA’s point is a variance procedure could have addressed Nevada’s situation; the 38th parallel rule change was not necessary.

17. Are there any other important matters that should be considered with respect to the recent change in Nevada’s gasoline volatility schedule?

WSPA is concerned about the precedent setting act of a state agency modifying a long-established ASTM standard. These standards are set by a consensus process involving many stakeholders, and are meant to ensure satisfactory fuel performance in the vehicle fleet. Modifications to ASTM standards have frequently been made to address air quality concerns, but these modifications are generally more restrictive than ASTM standards. However, this was not the case with Nevada’s recent rule change, which resulted in less restrictive requirements than ASTM.

WSPA believes that a variance procedure, with a compliance fee, would have been the appropriate way to go.