



Informational Report: Motor Vehicle Fuel Standards and Consideration of E15 as an approved Motor Vehicle Fuel in Nevada

Division of Consumer Equitability – December 2019

Nevada Revised Statutes (NRS) Chapter 590.070 provides that the State Board of Agriculture shall adopt by regulation specifications for motor vehicle fuels used in Nevada. The Division of Consumer Equitability's (CE) petroleum chemists serve as technical subject matter advisors to assist the Board of Agriculture in establishing and, as necessary, updating these specifications. This report is intended to provide the Board of Agriculture with a historical review of the use of ethanol in gasoline in the United States, along with an update on current events relating to motor vehicle fuel specifications, particularly the blend of gasoline and ethanol known as E15.

Ethanol is a renewable, domestically produced alcohol fuel made from plant material, such as corn, sugar cane or grasses. Ethanol on its own (not blended into gasoline) has been used in engines since 1826, and was used in a number of early internal combustion engines, including the Model T. The first known instances of ethanol being blended with gasoline for use as an octane enhancer (helping to prevent engine "knocking") occurred in the 1920s.

The modern US fuel ethanol industry began in the 1970s when petroleum-based fuels became increasingly expensive and environmental concerns involving leaded gasoline created a need for an alternative octane enhancer. Corn became the predominant feedstock for ethanol production because of its abundance and ease of transformation into alcohol. Federal and state subsidies for ethanol helped keep the fuel in production when ethanol prices fell with crude oil and gasoline prices in the early 1980s. Ethanol's use as an oxygenate to control carbon monoxide emissions encouraged increased production through the 1980s and into the 1990s.

Longtime residents of Washoe and Clark Counties will be familiar with the Wintertime Oxygenation Program established by the US Environmental Protection Agency (EPA) to control carbon monoxide emissions, which began on November 1, 1992. Carbon monoxide (CO) is produced by the incomplete burning of fuels used in internal combustion engines. Elevated atmospheric levels of CO generally occur during the winter months because of increased CO emissions from cold vehicles and the occurrence of temperature inversions, which trap pollutants near the ground and inhibit dispersion and dilution. The EPA set National Air Ambient Quality Standards (NAAQS) for CO that specified upper limits for a 1-hour period and for an 8-hour period. Generally, the 8-hour limit is the more restrictive and virtually all exceedances in recent years involve violation of this limit. Monitoring stations are allowed one exceedance of the air quality standard per year. A second exceedance constitutes a violation.

An important program for reducing ambient CO concentrations is the use of cleaner-burning oxygenated gasoline. Extra oxygen enhances fuel combustion and helps to offset fuel-rich operating conditions, particularly during vehicle starting in cold weather. The Clean Air Act

requires that gasoline containing at least 8% ethanol is to be used in the wintertime in those areas of the country that exceed the CO NAAQS.

When lead was phased out as an octane enhancer in gasoline in the late 1970's, it was replaced by Methyl-T-Butyl Ether (MTBE). As an octane enhancer, MTBE was initially used at low levels. However, between 1992 and 2005, as Congress set oxygenate requirements to fulfill the 1990 Clean Air Act Amendments, MTBE began to be used at higher concentrations by some gasoline producers as their oxygenate of choice. While being quite effective as an oxygenate, MTBE gives water an unpleasant taste at very low concentrations. Its use was curtailed in response to environmental and health concerns related to pollution of groundwater. The Energy Policy Act of 2005 prompted gasoline refiners to transition to the use of ethanol as a gasoline additive, in place of MTBE.

With the phasing out of MTBE, and a desire to decrease dependence on imported oil and increase the use of more environmentally friendly fuels, ethanol's demand has increased dramatically over the last fifteen years. In 2005, the first Renewable Fuels Standard (RFS) became law as part of the United States' energy policy. The Energy Independence and Security Act (EISA) of 2007 requires renewable fuel usage to increase incrementally on an annual basis to 36 billion gallons by 2022. An expectation of more widespread use of Ethanol Flex Fuels (EFF) was a significant contributor to the volumes required by the EISA and RFS.

Also referred to as E85, EFF are ethanol-gasoline blends containing 51% to 83% ethanol, depending on geography and season. EFF can be used in flexible fuel vehicles (FFV); FFV engines are also compatible with conventional gasoline. Other than lower miles per gallon, motorists driving FFVs see little difference in vehicle performance when using EFF versus gasoline. Depending on the actual ethanol content, EFF has, to varying degrees, less energy per gallon than gasoline (the impact on fuel economy lessens as the ethanol content decreases).

The proponents of the EISA and RFS anticipated that there would be an abundance of gas stations selling EFF, both new stations designed specifically for EFF and existing stations retrofitted for flex fuels. These stations would be serving the drivers who had purchased the increasing numbers of flex fuel vehicles (FFV) available in the national fleet. However, this did not come to pass to the extent hoped, primarily because the cost for gas station owners to retrofit the infrastructure needed for EFF turned out to be prohibitive. In addition, because drivers of FFVs saw a significant decrease in fuel mileage from EFF as compared to conventional gasoline, many FFV owners abandoned use of EFF.

Nonetheless, the volume requirements established in the RFS still had to be satisfied. As a result, conventional gasoline sold throughout the US marketplace came to contain more and more ethanol. Eventually, refiners bumped up against the so-called 'blend wall'. The EPA had granted that conventional gasoline could only contain a maximum of 10 percent ethanol, and almost every gallon sold in the US had reached that level. Since 1996, NAC 590.065 has codified an allowable maximum of 10 percent ethanol in conventional gasoline sold in Nevada.

One solution to the blend wall problem was to raise the maximum allowed ethanol percentage in conventional gasoline to 15 percent. This would also be to the benefit of renewable fuels groups looking to increase the amount of ethanol in the marketplace.

The EPA defines E15 as gasoline blended with 10.5-15% ethanol. In 2011, the EPA approved E15 for use in light-duty conventional vehicles of model year 2001 and newer, including cars, light-duty trucks, medium-duty passenger vehicles (SUVs), and all flex-fuel vehicles (FFVs). This approval was granted through a Clean Air Act waiver request, based on significant testing and research funded by the U.S. Department of Energy. E10 remained the limit for passenger vehicles older than model year 2001 and for other non-road and small engines and vehicles that use gasoline, such as lawnmowers, motorcycles, and boats.

Expanded Clean Air Act waivers were announced in October 2018, to help to increase domestic energy production and to support the domestic agriculture industry. On May 31, 2019, the EPA issued a final rule allowing the year-round sale of E15 for use in the same model years and vehicles as noted in the 2011 rule. This EPA rule extended an existing 1.0 psi vapor pressure waiver during summer months to include E15 blends and updated EPA's interpretation of the statute. By considering E10 and E15 as substantially similar, the new interpretation effectively opened the opportunity for year-round E15 sales in most markets. While these rulings and waivers did not mandate that E15 be sold in states, nor supersede state regulations that set ethanol maxima (such as in Nevada), they do potentially make for more aggressive lobbying by pro-E15 interests in states where sale of the fuel is not currently allowed.

At the 2019 National Meeting of the National Conference on Weights and Measures (NCWM), conference members voted to adopt an amendment to the National Institute of Standards and Technology (NIST) Handbook 130 (Uniform Laws of Regulations in the areas of legal metrology and fuel quality) reflecting the May 2019 EPA ruling. The amended provisions will become effective January 1, 2020. During testimony on the proposed amendment, there was concern expressed that this change would supersede the will of those states that do not presently allow E15. It should be noted that while Nevada adopts much of NIST Handbook 130 by reference, the specific section of the handbook dealing with fuels and lubricants is not adopted by reference and therefore the revised provisions will not in and of themselves result in a change to Nevada fuel specifications.

The EPA decision to allow expanded E15 use has not come without unease from some sectors. Small engine manufacturers have been concerned about the potential impact E15 might have on performance of their products. The chance of vehicles not approved for E15 being erroneously fueled led the EPA to require that companies submit a Misfuelling Mitigation Plan to the EPA for approval before selling E15. Ethanol is fairly corrosive to rubber and certain metals, so it can cause damage to engine components, particularly in higher concentrations. Ethanol also attracts and bonds with water from the air or in a gas tank, and that water can separate out inside the tank due to the inherent phase separation of water from gasoline. If a vehicle sits for long periods between use, the moisture settles to the bottom of the tank and can potentially clog in-tank pumps and filters. Damage is also possible in fuel lines, injectors, seals, gaskets, and valve seats, as well as carburetors in older engines. Another identified issue is whether or not a vehicle would

be covered under warranty for any damage caused by E15 usage. However, with each passing model year, more automakers are amending their warranties to allow for the use of E15.

Although newly constructed fueling stations typically install fueling equipment that is E15 compliant, older stations may need to install new equipment to accommodate the slightly more corrosive nature of E15 gasoline. Retrofits may be cost-prohibitive if they require equipment, such as underground storage tanks, to be replaced.

E15 blends are currently sold at more than 1,800 retail fuel stations across 30 states, according to Growth Energy, a trade association that represents producers and supporters of fuel ethanol. On a national level, less than 2% of retail fueling stations offer E15. The most widespread availability is centered on the ‘corn belt’ in the middle of the US. According to Growth Energy, Minnesota is home to the largest number of E15 stations with 303 stations, followed by Wisconsin (197), Iowa (187), and Florida (185). No states west of Wyoming have yet approved the use of E15.

In 2017, Murphy Oil Co., who was then opening retail motor fuel stations in southern Nevada, asked NDA to raise the allowed maximum for ethanol in gasoline from 10 percent to 15 percent to allow for the sale of E15 in Nevada. At that time, the Division of Consumer Equitability requested approval from the Board of Agriculture to explore this change, a request that was granted. To date, no company or entity other than Murphy has requested that NAC Chapter 590 be amended to allow for the sale of E15. Through attendance and participation at NCWM and ASTM meetings over the past several years, CE staff have been gathering and analyzing information on the expanded use of E15.

Moving forward, CE staff will continue looking critically at the question of whether E15 should be allowed in Nevada. E15 has many proponents, but that support is not universal, even within the fuel industry. The Nevada Chapter of the Petroleum Marketers Association of America has expressed significant concern with E15 being allowed to be sold, especially with regard to labelling and the potential for misfuelling. Traditionally, Nevada has regulated specifications with a relatively light hand, but that is not necessarily a position to take here. If amendments are to be made, the regulations must be clear on what is allowable for infrastructure (blender pumps, piping, etc.), and labelling. It may be prudent for NDA to be part of industry’s planning for misfuelling mitigation in Nevada. It will be useful to reach out to states currently selling E15, especially those that like Nevada do not have refineries or ethanol production facilities in their states to identify challenges due to those positions.

To be sure that the best possible decisions are made on behalf of Nevadans, the above-mentioned analysis and consideration will take time, and the landscape is still changing. As mentioned earlier, NCWM recently took action on an item related to E15, and at present there are two more items concerning E15 that NCWM is considering. All three of these items are the result of the May 2019 EPA ruling. It is possible that more NCWM action items will follow in the near term. Because of the nature of NCWM (a consensus driven organization bringing together state and local regulatory officials, federal agencies, manufacturers, retailers and consumers), under normal circumstances, an item requires at least one year to develop enough to reach voting status, often longer. Brokering agreement and acceptance amongst the various stakeholders will be a necessary part of the process. As a result, CE staff believes that it is a year to two years out

from concluding its analysis and presenting the Board of Agriculture with a final recommendation regarding the allowance of E15 in Nevada. Should significant additional EPA actions or other developments occur during this time period, CE will provide informational updates to the Board of Agriculture.