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Air Quality Department

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MEMORANDUM

**DATE:** March 04, 2010

**TO:** Mr. Lawrence Odle, Director

**FROM:** Cheri Dale, Planner

**SUBJECT:** Applicability of Maricopa County Rule 353 to E-85 fuels

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**Applicable Rule: Maricopa County Rule 353 GASOLINE IN STATIONARY DISPENSING TANKS**

**Issue:** The purpose of this policy is to establish guidance to department staff concerning the **applicability of E-85 fuel to Maricopa County Rule 353** use pending revisions of Rule 353: Gasoline in Stationary Dispensing Tanks.

**Background**: Advances in technology have lead to new blends of fuel. Ethanol fuel facilities are being developed throughout the country and within the State of Arizona. Plant capacities are increasing and currently range from 500,000 to 310 million gallons per year[1].

With the projected increase in the production capacity within the state, the availability and use of E-85 will also increase within Maricopa County. Currently seven gasoline dispensing facilities are located within Maricopa County[2]. Maricopa County Rule 353 (revision date June 16, 1999), does not specifically identify the applicability of E-85 fuels to the current rule.

Per **Maricopa County Air Quality,**[3] Rule 353, Section 204, GASOLINE is defined as any petroleum distillate or blend of petroleum distillate with other combustible liquid(s), such as alcohol, that is used as a fuel for internal combustion engines and has a vapor pressure between 200 - 760 mm Hg (4.0 and 14.7 psi), as determined by the applicable method pursuant to subsections 503.2 and 504.2. Rule 353, Section 503 allows the Control Officer to accept a manufacturer's data sheet (MSDS), data certified by an officer of the supplying company, or test data for the product as verification of a vapor pressure. In a review of MSDS for E-85, the vapor pressure was as follows:

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|---|---|---|
| • Speedway | SSA E85 | 43-776 mm Hg @ 100°F |
| • Archer Daniels Midland Company Fuel | Ethanol E85 | 340-560 mm Hg |
| • Aventine Renewable Energy | Fuel Ethanol E-85 | 340-560 @ 35°C |

Two additional MSDS were reviewed but no vapor pressure was listed. The three MSDS listed above demonstrate that the E-85 fuel meets the vapor pressure requirement in the MCAQD definition of gasoline.

Rule 535, Section 503.2 discusses the two methods used for determining the vapor pressure of gasoline (reference Section 204). ASTM Method D323-94 includes procedures for the determination of vapor pressure of gasoline, volatile crude oil and other volatile petroleum products. The procedures are based on vapor pressures. For example, using an E-85 vapor pressure of 340 mm Hg, ASTM Method D323-94, Procedure A would be used to determine vapor pressure of the fuel. Method D4953 is the second method listed in Section 503.2 used to determine vapor pressure. Per the scope the "test method covers and is applicable to gasolines…with a vapor pressure range from 35-100kPa (5 to 15 psi)…" The vapor pressure is calculated to approximately 258 to 775 mm Hg. Again, this is within the vapor pressure range stated in the definition of gasoline.

**South Coast AQMD**[4], Rule 461, revised on March 07, 2008: Definition (12) E-85 is any petroleum distillate/alcohol blend having a Reid Vapor Pressure greater than 205 mmHg (4.0 psi) and meeting the requirements of Title 13 CCR Section 2250 et seq., and as further defined in Title 12 CCR Section 2250(b) and containing a minimum of 15% of a petroleum distillate and a maximum 85% of ethyl alcohol. Per the rule, E-85 is only exempt from Rule 461 with respect to the Phase II vehicle fueling requirements. Maricopa County Rule 353 is limited to Stage I requirements.

Per **EPA**[5] (74 FR 66485), December 15, 2009, Proposed Rules 11. Definition of Gasoline) the definition of gasoline was developed for the NSPS in 40 CFR part 60, subpart XX, Bulk Gasoline Terminals, and is used in many State Implementation Plans for Ozone Attainment, as well as 40 CFR part 63, subpart R, the major source NESHAP for gasoline distribution. Even though the NSPS is cross-referenced in the definitions of 40 CFR part 63, subparts BBBBBB and CCCCCC, EPA is proposing to add the definition to these subparts for clarity with this rulemaking.

Both E-85 and E-10 are petroleum distillate/alcohol blends of 85- or 10- percent ethanol, respectively, with gasoline. Ethanol has a Reid vapor pressure of about 2 pounds per square inch (psi), but when mixed with gasoline at the highest percentage of ethanol (E85), the vapor pressure of the blend is 6 to 12 psi for the different volatility classes of gasoline. The vapor pressure of E-85 and E-10 is over the lower limit in the definition of gasoline of 4 psi (27.6 kilopascals is about 4 psi) and considered gasoline under the definition used. Gasoline storage tanks containing E-10 and E-85 at bulk facilities and GDF would be subject to applicable controls.

Based on limited information obtained by EPA, denatured ethanol mixed with normal gasoline appears to have a vapor pressure of about 4 psi or less. It is currently unclear if the mixture meets vapor pressure threshold for the various blends and volatility of gasoline. Given that the storage of denatured ethanol to mix with additional gasoline normally occurs at gasoline bulk terminals, EPA believes storage emissions should be addressed and controlled whether the liquid meets or does not meet the current definition of gasoline criteria of at or above 4 psi. EPA is proposing that any gasoline mixture with alcohol be

considered gasoline and be controlled under the current control requirements in subpart BBBBBB and CCCCCC.

**Conclusion:** E-85 is not specifically exempted from Rule 353 either in the definition of gasoline or in Section 305 exemptions. E-85 does meet Rule 353 definition of gasoline because of the following:

- E-85 is a "blend of petroleum distillate with other combustible liquid(s), such as alcohol…" as required in the definition of gasoline. E-85 is listed on MSDS as containing at least 80% ethyl alcohol, thus meeting the "…other combustible liquids…" section of the rule.
- The vapor pressure of E-85 listed on three MSDS is between 4 .0 and 14.7 psi (200-760 mm Hg) range as required in the definition of gasoline.

Vapor pressure of E-85 can be determined using methods listed for determining vapor pressure:

- Compliance determination of the vapor pressure of E-85 can be determined by ASTM Method D323-94, Procedure C.
- Compliance determination of the vapor pressure of E-85 can be determined by ASTM Method D4953-93.

Therefore, E-85 is subject to the current Maricopa County Air Quality Regulation III, Rule 353 requirements.

**References:**

1. E-85. http://e85.whipnet.net/

2. National Ethanol Vehicle Foundation (NEVF). http://www.e85refueling.com/locations.php?state=AZArizona&PHPSESSID=0d0ecab09cab013d8a60bc341f975fcb

3. Maricopa County Regulation III - Control of Air Contaminants, Rule 353 Gasoline In Stationary Dispensing Tanks, Revised 06/16/99. http://www.maricopa.gov/aq/divisions/planning_analysis/rules/docs/353-9906.pdf

4. South Coast Air Quality Management District RULE 461 - GASOLINE TRANSFER AND DISPENSING Amended March 7, 2008. http://www.aqmd.gov/rules/reg/reg04/r461.pdf

5. 40 CFR Parts 9 and 63 National Emission Standards for Hazardous Air Pollutants for Source Categories: Gasoline Distribution Bulk Terminals, Bulk Plants, and Pipeline Facilities; and Gasoline Dispensing Facilities, December 15, 2009. http://www.epa.gov/ttn/atw/area/fr15de09.pdf

**Attachments:**

ASTM D4953 - 06 Standard Test Method for Vapor Pressure of Gasoline and Gasoline-Oxygenate Blends (Dry Method). http://www.astm.org/Standards/D4953.htm

ASTM D323 - 08 Standard Test Method for Vapor Pressure of Petroleum Products (Reid Method). http://www.astm.org/Standards/D323.htm

Speedway/Super America Material Safety Data Sheet, MSDS ID number 0137SPE012, revised January 30, 2004. http://www.speedway.com/AboutUs/ProductSafety/PDFs/0137SPE012.pdf

Archer Daniels Midland Company, Material Safety Data Sheet, Fuel Ethanol E85, prepared July 05, 1995. http://www.martineagle.com/MSDS/e85_msds.pdf

Aventine Renewable Energy, Inc., Material Safety Data Sheet, Fuel Ethanol E-85, prepared June 01, 2006. http://www.aventinerei.com/pdfs/Fuel%20Ethanol%20E-85%2092224.pdf