

Julie Willoughby

From: Matthew Poppen <MPoppen@azmag.gov>
Sent: Friday, March 13, 2026 2:06 PM
To: Julie Willoughby
Cc: Daniel Schwiebert; Samantha Klakulak; Richard Travis
Subject: Updated alternative summer fuel blends emissions and ozone impacts
Attachments: Draft Comparison of the Change in Mobile Source Emissions and Ozone Concentrations from Alternative Summer Fuel Blends_March 13 2026.pdf

Follow Up Flag: Follow up
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Hello Representative Willoughby,

MAG has updated the results of the mobile source emissions modeling of alternative summer fuel blends performed on March 3, 2026, to include ozone concentration impacts. Please find attached an updated pdf file that includes emissions and ozone concentration impacts.

A copy of the updated results will be forwarded to the Arizona Department of Environmental Quality and the Arizona Department of Agriculture (Weights and Measures Division) for reference. Please let me know if you have any questions on the updated modeling results. Thank you.



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Comparison of the Change in Mobile Source Onroad and Nonroad Emissions and Ozone Concentrations from Alternative Summer Gasoline Fuel Blends in the Maricopa Ozone Nonattainment Area

Introduction

The Maricopa Association of Governments (MAG) has completed draft mobile source emissions modeling to determine the emissions and ozone concentration impact of the use of two alternative summer gasoline fuel formulations in the Maricopa ozone nonattainment area: (1) Summer gasoline with a 7.4 RVP; and (2) Summer gasoline with a 9.0 RVP. The emissions modeling was performed with the following parameters:

1. MAG performed emissions modeling for the three pollutants that contribute to summertime ozone formation: carbon monoxide (CO), nitrogen oxides (NO_x) , and volatile organic compounds (VOC).
2. Emissions are displayed as average day emissions (tons per day) for the year 2023. Ozone concentrations are calculated as part per billions (ppb) impact in 2023.
3. Current regulatory fuel formulation (7.0 RVP) emissions are consistent with the emissions modeling MAG performed in the MAG 2025 Clean Air Act Section 179B(b) Retrospective Demonstration submitted to EPA in September 2025.
4. Onroad mobile (cars and trucks) and nonroad mobile (construction, lawn & garden equipment, etc.) emissions from alternative fuel formulations are generated using the EPA MOVES4 model with the same inputs (meteorology, vehicle miles traveled, etc.) used in the MAG 2025 Clean Air Act Section 179B(b) Retrospective Demonstration.
5. EPA MOVES 4 default fuel parameters for Maricopa County were used in the modeling with the exception of a change to the RVP value to reflect the alternative formulations.
6. MAG calculated the ozone concentration impact using two photochemical models, the Comprehensive Air Quality Model with Extensions (CAMx v7.32) and the Community Multiscale Air Quality (CMAQ v5.5) model, consistent with the ozone modeling performed in the MAG 2025 Clean Air Act Section 179B(b) Retrospective Demonstration submitted to EPA in September 2025.

Emissions Impact

Table 1 contains the comparison emissions result for the alternative gasoline with a 7.4 RVP, while Table 2 compares the emissions for the alternative gasoline with a 9.0 RVP. A summary of the results is as follows:

1. On average, using gasoline with a **7.4 RVP** *increases* summertime CO mobile source emissions by 0.12%, NO_x mobile source emissions by 0.08%, and VOC mobile source emissions by 1.39%.
2. On average, using gasoline with a **9.0 RVP** *increases* summertime CO mobile source emissions by 0.94%, NO_x mobile source emissions by 0.37%, and VOC mobile source emissions by 11.39%.

While not a pollutant that contributes to summertime ozone, MAG also evaluated the impact of the alternative summer fuel formulations on particulate matter (PM-10) emissions. The modeling results indicated that for

both alternative fuel formulations, PM-10 mobile source emissions *decreased* slightly (less than 0.3%) when alternative fuel formulations were used in the summer months of June-September.

The emissions modeling results included in Tables 1 and 2 should be considered draft. MAG reserves the right to modify the emissions results in Tables 1 and 2 in response to requests to model the results using different methodologies or if new or revised information becomes available.

Table 1. Comparison with a 7.4 RVP Alternative Fuel.

Month	CO Emissions (tons/day)			NOx Emissions (tons/day)			VOC Emissions (tons/day)		
	Current Fuel (7.0 RVP)	7.4 RVP FUEL	Difference	Current Fuel (7.0 RVP)	7.4 RVP FUEL	Difference	Current Fuel (7.0 RVP)	7.4 RVP FUEL	Difference
June	801.84	802.78	+0.94	66.00	66.05	+0.05	55.12	55.77	+0.65
July	791.43	792.36	+0.93	57.74	57.78	+0.04	61.86	63.00	+1.14
August	850.48	851.53	+1.05	62.21	62.26	+0.05	59.39	60.19	+0.80
September	791.61	792.60	+0.99	62.65	62.70	+0.05	53.35	53.96	+0.61
Average	808.84	809.82	+0.98 (+0.12%)	62.15	62.20	+0.05 (+0.08%)	57.43	58.23	+0.80 (+1.39%)

Table 2. Comparison with a 9.0 RVP Alternative Fuel.

Month	CO Emissions (tons/day)			NOx Emissions (tons/day)			VOC Emissions (tons/day)		
	Current Fuel (7.0 RVP)	9.0 RVP FUEL	Difference	Current Fuel (7.0 RVP)	9.0 RVP FUEL	Difference	Current Fuel (7.0 RVP)	9.0 RVP FUEL	Difference
June	801.84	809.23	+7.39	66.00	66.25	+0.25	55.12	59.96	+4.84
July	791.43	798.63	+7.20	57.74	57.94	+0.20	61.86	72.14	+10.28
August	850.48	858.65	+8.17	62.21	62.43	+0.22	59.39	65.84	+6.45
September	791.61	799.28	+7.67	62.65	62.89	+0.24	53.35	57.95	+4.60
Average	808.84	816.45	+7.60 (+0.94%)	62.15	62.38	+0.23 (+0.37%)	57.43	63.97	+6.54 (+11.39%)

Ozone Concentration Impact

MAG conducted photochemical air quality modeling to evaluate the potential 2023 ozone concentration impacts of two alternative summer gasoline formulations within the Maricopa ozone nonattainment area using two photochemical models: CAMx v7.32 and CMAQ v5.5. As shown in Tables 1 and 2, the use of both alternative fuel formulations resulted in increased emissions of CO, NOx, and VOC emissions from onroad and nonroad mobile sources in June through September 2023. The increased emissions from both formulations were applied to the onroad and nonroad emission files in the photochemical models to estimate 2023 ozone concentration impacts.

Ozone concentrations impacts were determined by comparing both alternative fuel formulation scenarios to the baseline (7.0 RVP) 2023 ozone design value (DVB) concentration to calculate alternative 2023 ozone design values (DVA) concentrations. A design value is EPA’s annual regulatory metric for measuring ozone concentrations. The DVAs for the alternative fuel formulations are calculated by the formula $DVA = DVB \times RRF$, where RRF is a relative response factor that calculates the ratio of alternative fuel formulation ozone concentrations to baseline ozone concentrations at each of the 24 ozone monitoring sites in the nonattainment area. The RRF was derived using EPA’s Space and Time Adjusted Modeling (SMAT) approach, consistent with EPA regulatory guidance.

Tables 3 and 4 present the DVA and associated ozone concentration impacts at each monitoring site for both alternative fuel formulations using CAMx v7.32 and CMAQ v5.5. A summary of the results is as follows:

1. **CAMx results** indicate that for the **7.4 RVP** scenario, *no change* in the reported 2023 DVA occurs at any monitoring site, with the maximum 2023 DVA remaining at 80.00 ppb at the Mesa and JLG Supersite monitoring sites. For the **9.0 RVP** scenario, the 2023 DVA at the Mesa and JLG Supersite monitoring sites increases from 80.00 ppb to 80.03 and 80.04 ppb. Separately, the largest single-site incremental impact occurs at Falcon Field, which sees *an increase of 0.05 ppb*.
2. **CMAQ results** show slightly larger ozone impacts under both scenarios. For the **7.4 RVP** scenario, the maximum 2023 DVA remains at 80.00 ppb at the Mesa and JLG Supersite sites; however, a *maximum impact of 0.01 ppb* is predicted at three sites: Falcon Field, South Scottsdale, and High School. For the **9.0 RVP** scenario, the maximum DVAs at the Mesa and JLG Supersite monitors both increase from 80.00 to 80.05 ppb, with the *largest impact of 0.06 ppb* occurring at the Falcon Field and Lehi monitors.

While the DVAs represent the EPA annual regulatory metric for 2023, MAG also evaluated the 2023 daily ozone response to the 9.0 RVP scenario to estimate the maximum daily ozone impacts (i.e., worst-case ozone impact) the fuel formulations could produce. Specifically, MAG examined the maximum daily 8-hour average ozone concentrations from April through September 2023 for the 9.0 RVP scenario at four monitoring sites with the highest DVA values or impact: JLG Supersite, Mesa, Apache Junction, and Falcon Field. Both CAMx and CMAQ results indicate that the *maximum daily increase in ozone at these sites is no larger than 0.18 ppb relative to the baseline scenario*.

In summary, photochemical modeling using both CAMx and CMAQ demonstrates that the EPA regulatory ozone impacts of both alternative fuel formulations *are 0.06 ppb or less*. The 7.4 RVP scenario increases the maximum ozone DVA by no more than 0.01 ppb, while the 9.0 RVP scenario increases the maximum DVA by up to 0.06 ppb. On a daily basis, the maximum daily ozone impact under the 9.0 RVP scenario *is 0.18 ppb* relative to the baseline.

The ozone concentration modeling results included in Tables 3 and 4 should be considered draft. MAG reserves the right to modify the ozone concentration results in Tables 3 and 4 in response to requests to model the results using different methodologies or if new or revised information becomes available.

Table 3. Ozone Concentration Impacts of the use of Two Alternative Fuel Formulations Using Photochemical Modeling Performed with CAMx v7.32 (maximum values bolded).

Site ID	Site Name	County	*DVB (ppb) (Baseline)	**DVA (ppb)		Ozone Impact (ppb) (DVA-DVB)	
				7.4 RVP	9.0 RVP	7.4 RVP	9.0 RVP
40070010	Tonto NM	Gila	75	75.00	75.02	-	0.02
40130019	West Phoenix	Maricopa	77	77.00	77.03	-	0.03
40131003	Mesa	Maricopa	80	80.00	80.03	-	0.03
40131004	North Phoenix	Maricopa	78	78.00	78.02	-	0.02
40131010	Falcon Field	Maricopa	79	79.00	79.05	-	0.05
40132001	Glendale	Maricopa	79	79.00	79.03	-	0.03
40132005	Pinnacle Peak	Maricopa	77	77.00	77.02	-	0.02
40133002	Central Phoenix	Maricopa	77	77.00	77.04	-	0.04
40133003	South Scottsdale	Maricopa	74	74.00	74.03	-	0.03
40134003	South Phoenix	Maricopa	73	73.00	73.03	-	0.03
40134004	West Chandler	Maricopa	71	71.00	71.01	-	0.01
40134005	Tempe	Maricopa	77	77.00	77.03	-	0.03
40134008	Cave Creek	Maricopa	73	73.00	73.01	-	0.01
40134010	Dysart	Maricopa	75	75.00	75.01	-	0.01
40134011	Buckeye	Maricopa	69	69.00	69.00	-	0.00
40137021	Red Mountain	Maricopa	77	77.00	77.03	-	0.03
40137022	Lehi	Maricopa	79	79.00	79.03	-	0.03
40137024	High School	Maricopa	75	75.00	75.03	-	0.03
40139508	Humboldt Mountain	Maricopa	70	70.00	70.01	-	0.01
40139702	Blue Point	Maricopa	76	76.00	76.02	-	0.02
40139704	Fountain Hills	Maricopa	74	74.00	74.02	-	0.02
40139997	JLG Supersite	Maricopa	80	80.00	80.04	-	0.04
40213001	Apache Junction	Pinal	72	72.00	72.04	-	0.04
40218001	Queen Valley	Pinal	75	75.00	75.02	-	0.02

*EPA's 2023 regulatory design values (3-year average of the annual 4th highest maximum daily 8-hour average in 2021-2023).

**Based on SMAT's RRF for April - September 2023 excluding the 14 spin-up days (April 1 - 14) for both baseline and alternative scenarios.

Table 3. Ozone Concentration Impacts of the use of Two Alternative Fuel Formulations Using Photochemical Modeling Performed with CAMQ v5.5 (maximum values bolded).

Site ID	Site Name	County	*DVB (ppb) (Baseline)	**DVA (ppb)		Ozone Impact (ppb) (DVA-DVB)	
				7.4 RVP	9.0 RVP	7.4 RVP	9.0 RVP
40070010	Tonto NM	Gila	75	75.00	75.01	-	0.01
40130019	West Phoenix	Maricopa	77	77.00	77.05	-	0.05
40131003	Mesa	Maricopa	80	80.00	80.05	-	0.05
40131004	North Phoenix	Maricopa	78	78.00	78.04	-	0.04
40131010	Falcon Field	Maricopa	79	79.01	79.06	0.01	0.06
40132001	Glendale	Maricopa	79	79.00	79.04	-	0.04
40132005	Pinnacle Peak	Maricopa	77	77.00	77.02	-	0.02
40133002	Central Phoenix	Maricopa	77	77.00	77.05	-	0.05
40133003	South Scottsdale	Maricopa	74	74.01	74.05	0.01	0.05
40134003	South Phoenix	Maricopa	73	73.00	73.04	-	0.04
40134004	West Chandler	Maricopa	71	71.00	71.01	-	0.01
40134005	Tempe	Maricopa	77	77.00	77.05	-	0.05
40134008	Cave Creek	Maricopa	73	73.00	73.02	-	0.02
40134010	Dysart	Maricopa	75	75.00	75.02	-	0.02
40134011	Buckeye	Maricopa	69	69.00	69.00	-	-
40137021	Red Mountain	Maricopa	77	77.00	77.05	-	0.05
40137022	Lehi	Maricopa	79	79.00	79.06	-	0.06
40137024	High School	Maricopa	75	75.01	75.05	0.01	0.05
40139508	Humboldt Mountain	Maricopa	70	70.00	70.01	-	0.01
40139702	Blue Point	Maricopa	76	76.00	76.04	-	0.04
40139704	Fountain Hills	Maricopa	74	74.00	74.02	-	0.02
40139997	JLG Supersite	Maricopa	80	80.00	80.05	-	0.05
40213001	Apache Junction	Pinal	72	72.00	72.04	-	0.04
40218001	Queen Valley	Pinal	75	75.00	75.01	-	0.01

*EPA's 2023 regulatory design values (3-year average of the annual 4th highest maximum daily 8-hour average in 2021-2023).

**Based on SMAT's RRF for April - September 2023 excluding the 14 spin-up days (April 1 - 14) for both baseline and alternative scenarios.