2011 - 2012 OXYGENATED FUELS PROGRAM

FOR WASHOE COUNTY

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Background

The oxygenation of gasoline reduces carbon monoxide (CO) emissions from motor vehicles during the winter months, when climatic factors tend to exacerbate CO problems. In 1992, the U.S. Environmental Protection Agency (EPA), under authority of the Clean Air Act Amendments of 1990, mandated an oxygenated fuel (oxy-fuel) program for 39 urban areas in 23 states, including the Truckee Meadows, which had violated the health-based National Ambient Air Quality Standard (NAAQS) for CO.

The Truckee Meadows was designated as a moderate CO non-attainment area since November 15, 1990. Washoe County began its oxy-fuel program in December 1989 and subsequently adopted the EPA’s oxy-fuel program in 1992. From the onset of the oxy-fuel program, the oxygenate of choice were Methyl Tertiary Butyl Ether (MTBE) and ethanol. Depending on the urban areas of concern, the gasoline oxygen content ranged from 2.7 to 3.5% by weight during the oxy-fuel season. MTBE dominated the oxygenate market until the mid 1990’s, making up almost 80% of the market share. By the mid 1990’s, confirmed reports of MTBE groundwater contamination in California prompted MTBE’s phase-out from use in the West.

On October 25, 2000, the District Board of Health (DBOH) adopted revisions to the oxy-fuel regulation, Section 040.095 (Oxygen Content of Motor Vehicle Fuel) of the DBOH Regulations Governing Air Quality Management. The revisions phased out the use of MTBE as oxygenate effective “the same date as the phase-out of MTBE in California.” The original phase-out date was December 31, 2002, but in March 2002, the California Governor extended the date to December 31, 2003. In 2004, MTBE in gasoline was fully phased out in California and Washoe County.

On September 22, 2005, the DBOH further adopted revisions to Section 040.095. This revision primarily addressed enforceability issues during emergency fuel supply interruptions. It also removed the outdated MTBE phase-out date, leaving only the relevant regulation concerning the not-to-exceed MTBE contribution of 0.05% oxygen by weight (or 0.3% by volume) to the required 2.7% oxygen by weight in the oxy-fuel.

In November 2005, the Washoe County Health District - Air Quality Management Division (AQMD) submitted a request to EPA for redesignation of the Truckee Meadows from a moderate CO non-attainment area to an attainment/maintenance area. The redesignation to attainment/maintenance became effective on August 4, 2008. The oxy-fuel program remains in the ten-year CO maintenance plan, which has been approved by EPA and is effective until 2016. The oxy-fuel program will be reevaluated for its effectiveness in maintaining the CO NAAQS in the future. If the oxy-fuel program is removed from the State Implementation Plan (SIP), it will become a contingency measure to be reconsidered if the Truckee Meadows violates the CO NAAQS.

As of December 2010, all urban areas in the United States have achieved attainment for CO. However, only seven (7) urban areas keep the oxy-fuel program in their SIP maintenance plan. The other urban areas use the oxy-fuel program as a contingency measure in their SIP maintenance plans. The Energy Independence and Security Act of 2007 (EISA) required that
eight (8) billion gallons of renewable fuels be blended in transportation fuels by 2008 and that thirty-six (36) billion gallons of renewable fuels be blended in transportation fuels by 2028. Therefore, these urban areas would be expected to have ethanol in their fuel supply despite a lack of oxy-fuel program requirements in their maintenance plans.

Washoe County’s oxy-fuel program has been successful in reducing CO emissions by 5 - 30% since its inception in 1989. The CO emission reduction was more significant during the earlier years of the program when vehicles had less rigorous emission control requirements. In recent years, the benefit of oxy-fuel has diminished due to cleaner vehicles, more stringent regulations, and increase in ethanol content in gasoline due to national energy policies. The 2011-2012 season was the 23rd year of the oxy-fuel program. Over these 23 seasons, decreases in CO concentrations during the winter months have been noticeable in Washoe County, especially in the first decade of the program. The 2011-2012 season continued to be a successful oxy-fuel season with minimal cost incurrence and inconvenience to motorists.

This report was prepared in accordance with Section 040.095.D.1 of the DBOH Regulations Governing Air Quality Management.
2011 - 2012 Program Details

Since the federal oxy-fuel mandate in 1992, the oxy-fuel season has begun on October 1 and ended on January 31. Section 040.095 of the DBOH Regulations Governing Air Quality Management requires all gasoline delivered during the oxy-fuel season to contain a minimum of 2.7% oxygen by weight. Ethanol was again the only oxygenate fuel in the market during the 2011-2012 season, and MTBE was not found at any of the tested stations. According to the State of Nevada, Department of Motor Vehicles, approximately 54.8 million gallons of gasoline were delivered in Washoe County between October 1, 2011, and January 31, 2012.

Air Quality

NAAQS for CO are based on 1-hour and 8-hour averaging times. The 2011-2012 oxy-fuel season was a clean season for CO, and levels were comparable to those observed in 2010-2011. No exceedances of either the 1-hour or 8-hour NAAQS for CO were measured at any of the air quality monitors in Washoe County this season. The AQMD has never measured an exceedance of the 1-hour NAAQS and the last exceedance of the 8-hour standard occurred on December 13, 1991.

Figure 1 illustrates the number of CO exceedances since 1988 at the Galletti, Sparks, and Reno monitoring sites. These are the sites in the AQMD’s ambient air monitoring network that typically measure the highest CO levels.

![Figure 1](image-url)
Additionally, Figure 1 graphically depicts the highest and second highest 8-hour CO concentrations from 1988-1989 to 2011-2012. Although Washoe County has not exceeded the 8-hour CO NAAQS since 1991, CO levels in 1994-1995 and 1997-1998 were very close to the standard and probably would have exceeded the standard if not for the oxy-fuel program.

**Costs**

Normal fluctuations in market prices make it difficult to isolate the increase in gasoline prices due to the oxy-fuel program. According to Western Energetix, LLC, a major local gasoline distributor, oxygenates have not contributed to any gasoline price increase in the last several years. Therefore, no extra cost was incurred for CO emissions reduced by the oxy-fuel program. By comparison, the maximum reasonable cost for CO emission reductions per year for implementation of Best Available Control Technology in Washoe County was determined to be $2,000 per ton.1

**Air Quality Emission Reductions**

According to the 2008 Washoe County Emissions Inventory, gasoline-powered on-road motor vehicles accounted for approximately 53% (48,133 tons per year) of the CO emissions in the Washoe County. Based on the EPA Motor Vehicle Emission Simulator (MOVES) computer model, the oxy-fuel program reduced CO emissions from this category by approximately 3,300 tons in Washoe County during the 2011-2012 oxy-fuel season.2

Non-road mobile sources contributed 31% (28,224 tons per year) of the total county-wide CO emissions. Based on the EPA NONROAD 2008 computer model, the oxy-fuel program reduced an additional 1,417 tons of CO.

**Compliance and Enforcement**

Through a Memorandum of Understanding (revised September 2000) between AQMD and the Nevada Department of Agriculture (NDOA), gasoline samples collected by AQMD are tested by the Petroleum Laboratory of the NDOA. The NDOA is responsible for testing gasoline octane and Reid Vapor Pressure (RVP) year round and oxygenates during the oxy-fuel season.

To ensure compliance with Section 040.095 of the DBOH Regulations Governing Air Quality Management, the AQMD collected a total of 108 random fuel samples of all available grades of gasoline during routine inspections of gasoline dispensing facilities. These samples were delivered to the NDOA lab for analysis after each collection.

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1 “Procedures for determining BACT emission controls”, Washoe County District Health Department - Air Quality Management Division, Policy # P-1-92, February 13, 1992.
2 This season’s CO reductions are greater than last season primarily due to a change in the emission model used. From 2003-2004 through 2010-2011, CO emission reductions were estimated using MOBILE6. The MOVES model was used for the 2011-2012 season and gives more reduction credit to oxy-fuel programs than MOBILE6.
The NDOA collected and tested 54 additional samples separate from AQMD’s oxy-fuel program for the 2011-2012 oxy-fuel season. The NDOA test results cannot be used for AQMD enforcement; however, they indicate if a facility’s fuel supply contains any oxygenate thus determining whether a follow-up inspection needs to be conducted. Altogether, the NDOA tested 162 samples of gasoline in Washoe County for oxygenates this past season.

The NDOA analyzed all samples using gas chromatography. As a quality assurance measure, some samples were split and submitted to the lab as blind samples to ensure the analysis of each sample was accurate. The AQMD accepts a testing tolerance of +/- 6%, as outlined by ASTM 5599, which is used by the laboratories to allow for minor variations in percent oxygen due to problems of test reproducibility.

Among the 162 samples tested, two samples were below the required oxygen content level. These two samples were not collected by the AQMD and therefore not in AQMD’s enforcement jurisdiction. However, based on the low oxygen content in two out of three samples collected from the same facility, it is inferred that samples with low oxygen content were most likely due to early sample collection in October, the first month of the oxy-fuel season, when low sales of existing inventories did not have an opportunity to be refilled with oxygenated gasoline resulting in lower amount of oxy-fuel being added to the tanks. Therefore, no action was taken.

The AQMD received no formal complaints from the public regarding oxy-fuel this season.
Alternatives

At its inception and through the 1990’s, the oxy-fuel program was a very effective control strategy to reduce CO emissions. Wintertime CO levels improved and are now more than 60% below the health-based NAAQS. The incremental benefits of the program have been diminishing as fleet turnover has led to a newer and less polluting fleet mix, and ethanol content in gasoline has increased due to energy policies (see Table 1). Staff believes that the oxy-fuel program can be eliminated as a CO control measure without adversely affecting air quality in Washoe County.

Table 1 - Washoe County Gasoline Oxygenate Content for 2011

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<th>Average by month</th>
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</thead>
<tbody>
<tr>
<td>2011</td>
<td>Jan</td>
</tr>
<tr>
<td>Oxygen (Wt %)</td>
<td>3.41</td>
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</tbody>
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The oxy-fuel program is an element of the Truckee Meadows portion of the Nevada CO SIP. Revisions to the SIP will require DBOH adoption and EPA approval. If the DBOH directs staff to proceed with elimination of the oxy-fuel program, staff will coordinate with EPA Region IX to ensure that this action is consistent with federal Clean Air Act requirements.

Proceeding with elimination of the oxy-fuel program would focus on three primary areas:

CO SIP: The oxy-fuel program is a component of the EPA approved SIP that demonstrates continued attainment of the CO NAAQS. Removing the program from the SIP requires a demonstration that it will not contribute to future wintertime exceedances or violations of the NAAQS. In August 2011, EPA issued a final rule concluding that the current NAAQS of 9 ppm provided the required level of public health protection. As a result they determined not to revise the CO NAAQS during the Agency’s five-year review. Staff expects CO levels in the Truckee Meadows to continue to meet the 8-hour NAAQS if the oxy-fuel program is eliminated.

Motor Vehicle Emissions Budgets (MVEB): These budgets are used by the Metropolitan Planning Organization (MPO) for transportation conformity analyses. Long and short range transportation plans (i.e., 2035 Regional Transportation Plan) must conform to the MVEB and SIP. Eliminating the oxy-fuel program will require recalculation of the MVEB, DBOH adoption, and EPA approval. AQMD staff will work in consultation with the MPO and EPA Region IX during this process. The current EPA-approved MVEB includes a safety margin for planned or unplanned increases in CO emissions. Approximately 26% of the 2016 MVEB is dedicated to the safety margin. Staff anticipates that future long and short range transportation plans to conform to the revised MVEB.
Other NAAQS: Removing the program from the SIP requires a demonstration that it will not contribute to future wintertime exceedances or violations of the other NAAQS. Preliminary modeling indicated no increases in PM2.5, PM10, NO2, or SO2 tailpipe emissions contributing to exceedances or violations.

If these items can be adequately addressed, then the CO SIP revisions would be brought forward to the DBOH for adoption. If adopted, the SIP would then be formally submitted to EPA for approval. Final approval by EPA may take up to 18 months to complete.
Summary

Washoe County’s oxy-fuel program is successful as demonstrated by the fact that the AQMD has not measured an exceedance of the CO NAAQS since 1991.

Since implementing the oxy-fuel program in 1989, Washoe County’s population has increased 54%\(^3\), vehicle miles traveled has increased 80%\(^4\), and gasoline sales during the oxy-fuel season has increased 23%, from 44.5 million gallons in 1989-1990 to 54.8 million gallons in 2011-2012. This season’s oxy-fuel program accounted for a 7% reduction of CO emissions from on-road mobile sources and a 5% reduction from non-road mobile sources.

The incremental benefits of the oxy-fuel program have been diminishing as fleet turnover leads to a newer and less polluting fleet mix, and national energy policy has resulted in increased concentrations of ethanol in gasoline.

\(^3\) Washoe County Community Development Planning Department.
\(^4\) RTC of Washoe County, Planning Department for 2011 Travel Demand Model run.