WASHOE COUNTY
HEALTH DISTRICT
ENHANCING QUALITY OF LIFE

Washoe County, Nevada
Air Quality Trends (2008-2017)

June 1, 2018

Public Health
Prevent. Promote. Protect.

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Glossary

AQI	Air Quality Index
AQMD	Washoe County Health District - Air Quality Management Division
AQS	Air Quality System
BAM	Beta Attenuation Monitor
CARB	California Air Resources Board
CFR	Code of Federal Regulations
$CH_3COO_2NO_2$	Peroxyacetyl nitrate, or PAN
CO	Carbon Monoxide
EPA	U.S. Environmental Protection Agency
FEM	Federal Equivalent Method
FRM	Federal Reference Method
GAL	Galletti
HA 87	Hydrographic Area 87
HC	Hydrocarbons
HNO_2	Nitrous Acid
HNO_3	Nitric Acid
INC	Incline
LEM	Lemmon Valley
$\mu g/m^3$	Micrograms per cubic meter
NAAQS	National Ambient Air Quality Standards
NCore	National Core Multi-Pollutant Monitoring Station
N_2O_5	Nitrogen Pentoxide
NO	Nitric Acid
NO_2	Nitrogen Dioxide
NO_3	Nitrate
NO_x	Oxides of Nitrogen
NO_y	Reactive Oxides of Nitrogen
O_3	Ozone
PLM	Plumb-Kit
PM	Particulate Matter
$PM_{2.5}$	Particulate Matter less than or equal to 2.5 microns in aerodynamic diameter
PM_{10}	Particulate Matter less than or equal to 10 microns in aerodynamic diameter
PM_{coarse}	PM_{10} minus $PM_{2.5}$
ppb	Parts per billion
ppm	Parts per million
RNO	Reno
RTIA	Reno-Tahoe International Airport
SIP	State Implementation Plan
SLAMS	State and Local Air Monitoring Station
SO_2	Sulfur Dioxide
SO_3	Sulfur Trioxide
SO_x	Oxides of Sulfur
SPK	Sparks

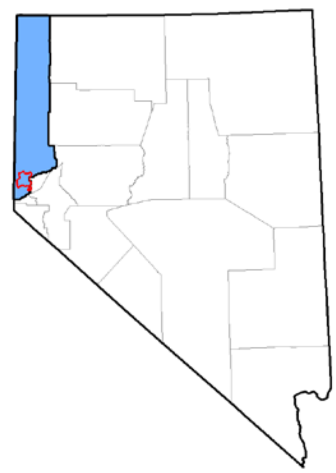
Glossary (continued)

SPM	Special Purpose Monitoring
SPS	Spanish Springs
SRN	South Reno
STN	Speciation Trends Network
SUN	Sun Valley
TOL	Toll
TSP	Total Suspended Particulates
USG	Unhealthy for Sensitive Groups
VOC	Volatile Organic Compounds

Introduction

Washoe County is located in the northwest portion of Nevada and bounded by California, Oregon, and the Nevada counties of Humboldt, Pershing, Storey, Churchill, Lyon, and Carson City (Figure 1). The Truckee Meadows is approximately 200 square miles in size and situated in the southern portion of Washoe County. It's geographically identified as Hydrographic Area 87 (HA 87) as defined by the State of Nevada Division of Water Resources. Most of Washoe County's urban population lives in the Truckee Meadows. Anthropogenic activities, such as automobile use and residential wood combustion, are also concentrated here.

Figure 1
Washoe County, Nevada



The U.S. Environmental Protection Agency (EPA) has set health and welfare based National Ambient Air Quality Standards (NAAQS) for the following pollutants: ozone (O_3), particulate matter less than or equal to 2.5 microns in aerodynamic diameter ($PM_{2.5}$), particulate matter less than or equal to 10 microns in aerodynamic diameter (PM_{10}), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and lead (Pb).

The mission of the Washoe County Health District, Air Quality Management Division (AQMD) Monitoring Program is "To monitor and assure the scientific accuracy of the ambient air quality data collected for the determination of compliance with the National Ambient Air Quality Standards (NAAQS) as defined by the EPA". The AQMD has established a monitoring network throughout the Health District to collect ambient air data. The network is reviewed annually to ensure it reflects the actual air quality of the county and that it is measuring for the pollutants of highest concern.

This document summarizes the ambient air data collected between 2008 and 2017 from the AQMD's monitoring network. These data were submitted to the EPA's Air Quality System (AQS), and are available for public review on EPA's AirData website. Long-term monitoring data can reveal trends in ambient air pollution and the subsequent need for control strategies.

Pollutants

The following describes the six criteria pollutants, their primary sources, and associated health effects.

Ozone (O_3)

Ozone is a gas composed of three oxygen atoms. It is not usually emitted directly into the air, but, at ground-level, it is created by a chemical reaction between oxides of nitrogen (NO_x) and volatile organic compounds (VOC) in the presence of sunlight. Ozone has the same chemical structure whether it occurs miles above the earth or at ground-level and can be "good" or "bad", depending on its location in the atmosphere. "Good" O_3 occurs naturally in the stratosphere approximately 10 to 30 miles above the earth and forms a layer that protects life on earth from the sun's harmful rays.

In the lower atmosphere, ground-level O_3 is considered "bad". Breathing ground-level O_3 can trigger a variety of health problems including chest pain, coughing, throat irritation, and congestion. It can worsen bronchitis, emphysema, and asthma. Ground-level O_3 can also reduce lung function and inflame the linings of the lungs. Repeated exposure may permanently scar lung tissue. People with lung disease, children, older adults, and physically active people may be affected when O_3 levels are unhealthy. Numerous scientific studies have linked ground-level O_3 exposure to a variety of problems including: airway irritation, coughing, and pain when taking a deep breath; wheezing and breathing difficulties during exercise or outdoor activities; inflammation, which is much like a sunburn on the skin; aggravation of asthma and increased susceptibility to respiratory illnesses like pneumonia and bronchitis; and permanent lung damage with repeated exposures.

Motor vehicle exhaust and industrial emissions, gasoline vapors, and chemical solvents as well as natural sources emit NO_x and VOC that help form O_3. Ground-level O_3 is the primary constituent of smog. Sunlight and hot weather cause ground-level O_3 to form in harmful concentrations. As a result, it is known as a summertime air pollutant. Many urban areas tend to have high levels of "bad" O_3, but even rural areas are also subject to increased O_3 levels because wind carries O_3 and pollutants that form it hundreds of miles away from their original sources.

Particulate Matter (PM_{10}, $PM_{2.5}$, and PM_{coarse})

Particulate matter, also known as particle pollution or PM, is a complex mixture of extremely small particles and liquid droplets. Particle pollution is made up of a number of components, including acids (such as nitrates and sulfates), organic chemicals, metals, and soil or dust particles.

The size of particles is directly linked to their potential for causing health problems. Of concern are particles that are 10 micrometers in diameter or smaller because those are the particles that generally pass through the throat and nose and enter the lungs. Once inhaled, these particles can affect the heart and lungs and cause serious health effects. EPA groups particle pollution into two categories:

- "Inhalable coarse particles" (PM_{10} and PM_{coarse}), such as those found near roadways and dusty industries, are between 2.5 and 10 micrometers in diameter.
- "Fine particles" ($PM_{2.5}$), such as those found in smoke and haze, are 2.5 micrometers in diameter and smaller. These particles can be directly emitted from sources such as forest fires, or they can form when gases emitted from power plants, industries, and automobiles react in the air.

Particle pollution, especially fine particles, contains microscopic solids or liquid droplets that are so small that they can get deep into the lungs and cause serious health problems. Numerous scientific studies have linked particle pollution exposure to a variety of problems, including: increased respiratory symptoms, such as irritation of the airways, coughing, or difficulty breathing, for example; decreased lung function; aggravated asthma; development of chronic bronchitis; irregular heartbeat; nonfatal heart attacks; and premature death in people with heart or lung disease.

People with heart or lung diseases, children and older adults are the most likely to be affected by particle pollution exposure. However, even healthy people may experience temporary symptoms from exposure to elevated levels of particle pollution.

Carbon Monoxide (CO)

Carbon monoxide is a colorless, odorless gas that is formed when carbon in fuel is not burned completely. It is a component of motor vehicle exhaust, which contributes about 56% of all CO emissions nationwide. Other non-road engines and vehicles (such as construction equipment and boats) contribute about 22% of CO emissions nationwide. Higher concentrations generally occur in areas with heavy traffic congestion. In 2011, 70% of CO emissions within Washoe County came from the exhaust of mobile sources.[1] Other sources include industrial processes (i.e., metals processing and chemical manufacturing), residential wood burning, and natural sources such as forest fires. The highest ambient levels of CO typically occur during the colder months of the year when temperature inversions are more frequent. The air pollution becomes trapped near the ground beneath a layer of warm air.

Carbon monoxide can cause harmful health effects by reducing oxygen delivery to the body's organs (i.e., heart and brain) and tissues. The health threat from lower levels of CO is most serious for those who suffer from heart disease, like angina, clogged arteries, or congestive heart failure. For a person with heart disease, a single exposure to low levels of CO may cause chest pain and a reduced ability to exercise. Repeated exposures may contribute to other cardiovascular effects. Even healthy people can be affected by high levels of CO. Exposure to high levels can result in vision problems, reduced ability to work or learn, reduced manual dexterity, and difficulty performing complex tasks. At extremely high levels, CO is poisonous and can cause death.

[1] Washoe County Health District, Air Quality Management Division; "2011 Periodic Emissions Inventory"; Figure 1-2; November 2012.

Nitrogen Dioxide (NO_y and NO_2)

NO_y (total reactive nitrogen) is defined as the sum of NO_x plus the compounds produced from the oxidation of NO_x that include nitric acid. NO_y component species include NO (nitric oxide), NO_2 (nitrogen dioxide), NO_3 (nitrate), HNO_3 (nitric acid), N_2O_5 (nitrogen pentoxide), $CH_3COO_2NO_2$ (Peroxyacetyl nitrate, or PAN), and particulate nitrate.

Nitrogen dioxide is one of a group of highly reactive gasses known as "oxides of nitrogen", or "nitrogen oxides (NO_x)". Other nitrogen oxides include nitrous acid (HNO_2) and nitric acid (HNO_3). While EPA's NAAQS covers this entire group of NO_x, NO_2 is the component of greatest interest and the indicator for the larger group of NO_x. Nitrogen dioxide forms quickly from emissions from cars, trucks and buses, power plants, and off-road equipment. In addition to contributing to the formation of ground-level O_3 and fine particle pollution, NO_2 is linked with a number of adverse effects on the respiratory system.

Current scientific evidence links short-term NO_2 exposures, ranging from 30 minutes to 24 hours, with adverse respiratory effects including airway inflammation in healthy people and increased respiratory symptoms in people with asthma. Also, studies show a connection between breathing elevated short-term NO_2 concentrations, and increased visits to emergency rooms and hospital admissions for respiratory issues, especially asthma.

NO_2 concentrations in vehicles and near roadways are appreciably higher than those measured at monitors in the current network. In fact, in-vehicle concentrations can be 2 to 3 times higher than measured at nearby area-wide monitors. Near-roadway (within about 50 meters) concentrations of NO_2 have been measured to be approximately 30 to 100% higher than concentrations away from roadways.

Individuals who spend time on or near major roadways can experience short-term NO_2 exposures considerably higher than measured by the current network. Approximately 16% of US housing units (approximately 48 million people) are located within 300 feet of a major highway, railroad, or airport. NO_2 exposure concentrations near roadways are of particular concern for susceptible individuals, including people with asthma, children, and the elderly.

NO_x react with ammonia, moisture, and other compounds to form small particles. These small particles penetrate deeply into sensitive parts of the lungs and can cause or worsen respiratory disease, such as emphysema and bronchitis, and can aggravate existing heart disease, leading to increased hospital admissions and premature death. Ozone is formed when NO_x and VOC react in the presence of heat and sunlight. Children, the elderly, people with lung diseases such as asthma, and people who work or exercise outdoors are at risk for adverse effects from O_3. These include reduction in lung function and increased respiratory symptoms as well as respiratory-related emergency room visits, hospital admissions, and possibly premature deaths.

Emissions that lead to the formation of NO_2 generally also lead to the formation of other NO_x. Emissions control measures leading to reductions in NO_2 can generally be expected to reduce population exposures to all gaseous NO_x. This may have the important co-benefit of reducing the formation of O_3 and fine particles, both of which pose significant public health threats.

Sulfur Dioxide (SO_2)

Sulfur dioxide is one of a group of highly reactive gasses known as "oxides of sulfur". The largest sources of SO_2 emissions are from fossil fuel combustion at power plants (66%) and other industrial facilities (29%). Smaller sources of SO_2 emissions include industrial processes such as extracting metal from ore, and the burning of high sulfur-containing fuels by locomotives, large ships, and non-road equipment. SO_2 is linked with a number of adverse effects on the respiratory system.

Current scientific evidence links short-term exposures to SO_2, ranging from 5 minutes to 24 hours, with an array of adverse respiratory effects including bronchoconstriction and increased asthma symptoms. These effects are particularly important for asthmatics at elevated ventilation rates (i.e., while exercising or playing.). Studies also show a connection between short-term exposure and increased visits to emergency rooms and hospital admissions for respiratory illnesses, particularly in at-risk populations including children, the elderly, and asthmatics.

EPA's SO_2 NAAQS is designed to protect against exposure to the entire group of sulfur oxides (SO_x). SO_2 is the component of greatest concern and is used as the indicator for the larger group of SO_x. Other gaseous sulfur oxides (i.e., sulfur trioxide (SO_3)) are found in the atmosphere at concentrations much lower than SO_2.

Emissions leading to high concentrations of SO_2 generally also lead to the formation of other SO_x. Control measures that reduce SO_2 can generally be expected to reduce people's exposures to all gaseous SO_x. This may have the important co-benefit of reducing the formation of fine sulfate particles, which pose significant public health threats.

SO_x can react with other compounds in the atmosphere to form small particles. These particles penetrate deeply into sensitive parts of the lungs and can cause or worsen respiratory disease, such as emphysema and bronchitis, and can aggravate existing heart disease, leading to increased hospital admissions and premature death. EPA's PM NAAQS are designed to provide protection against these health effects.

Lead (Pb)

Lead is a metal found naturally in the environment as well as in manufactured products. The major sources of Pb emissions have historically been motor vehicles (such as cars and trucks) and industrial sources. As a result of EPA's efforts to remove Pb from gasoline, ambient Pb levels decreased 94% between 1980 and 1999. Today, elevated levels of Pb in air are usually found near lead smelters, waste incinerators, utilities, lead-acid battery manufacturers, and can be found in emissions of non-road mobile sources such as piston-propelled aircraft.

In addition to exposure to Pb in air, other major exposure pathways include ingestion of Pb in drinking water and lead-contaminated food as well as incidental ingestion of lead-contaminated soil and dust. Lead-based paint remains a major exposure pathway in older homes.

Once taken into the body, Pb distributes throughout the body in the blood and is accumulated in the bones. Depending on the level of exposure, Pb can adversely affect the nervous system, kidney function, immune system, reproductive and developmental systems and the cardiovascular system. Lead exposure also affects the oxygen carrying capacity of the blood. The effects most commonly encountered in current populations are neurological effects in children and cardiovascular effects (i.e., high blood pressure and heart disease) in adults. Infants and young children are especially sensitive to even low levels of Pb, which may contribute to behavioral problems, learning deficits, and lowered IQ.

National Ambient Air Quality Standards

The Clean Air Act requires the EPA to establish NAAQS for pollutants considered harmful to public health and the environment. Two types of NAAQS have been established; primary and secondary standards. Primary standards set limits to protect public health, especially that of sensitive populations such as asthmatics, children, and seniors. Secondary standards set limits to protect public welfare, including protections against decreased visibility, damage to animals, crops, and buildings.

The EPA has set NAAQS for seven principal pollutants, which are called "criteria" pollutants. They are listed in Title 40 of the Code of Federal Regulations (CFR) Part 50 and summarized in Table 1 below. The units of measure for the standards are parts per million (ppm) or billion (ppb), or micrograms per cubic meter of air ($\mu g/m^3$).

Table 1
National Ambient Air Quality Standards (as of December 31, 2017)

Pollutant	Primary Standard		Secondary Standard		Form
	Averaging Time	Level	Averaging Time	Level	
O_3	8-hour	0.070 ppm	Same as primary		Fourth highest daily maximum concentration, averaged over 3 years
$PM_{2.5}$	24-hour	35 $\mu g/m^3$	Same as primary		98th percentile of daily max, averaged over 3 years
	Annual	12.0 $\mu g/m^3$	Annual	15.0 $\mu g/m^3$	Annual mean, averaged over 3 years
PM_{10}	24-hour	150 $\mu g/m^3$	Same as primary		Not to be exceeded more than once per year on average over 3 years
CO	1-hour	35 ppm	None		Not to be exceeded more than once per year
	8-hour	9 ppm	None		
NO_2	1-hour	100 ppb	None		98th percentile, averaged over 3 years
	Annual	53 ppb	Same as primary		Annual Mean
SO_2	1-hour	75 ppb	3-hour	0.5 ppm	1°: 99th percentile of daily maximum concentration, averaged over 3 years
					2°: not to be exceeded more than once per year
Pb	Rolling 3-month average	0.15 $\mu g/m^3$	Same as primary		Not to be exceeded

Current Design Values and Attainment Status

Table 2 summarizes Washoe County's current design values. Design values are the statistic used to compare ambient air monitoring data against the NAAQS to determine designations for each NAAQS. Designations are also codified in 40 CFR 81.329.

Table 2
Design Values and Attainment Status (as of December 31, 2017)

NAAQS		Design Value	Designations	
Pollutant (Averaging Time)	Level		Unclassifiable/ Attainment , or Maintenance	Non-Attainment (classification)
O_3 (8-hour)	0.070 ppm	0.070 ppm	All HA's	---
$PM_{2.5}$ (24-hour)	35 µg/m^3	24 µg/m^3	All HA's	---
$PM_{2.5}$ (Annual)	12.0 µg/m^3	7.6 µg/m^3	All HA's	---
PM_{10} (24-hour)	150 µg/m^3	0.3 Expected Exceedances	All HA's	---
CO (1-hour)	35 ppm	3.0 ppm	All HA's	---
CO (8-hour)	9 ppm	2.3 ppm	All HA's	---
NO_2 (1-hour)	100 ppb	49 ppb	All HA's	---
NO_2 (Annual Mean)	53 ppb	12 ppb	All HA's	---
SO_2 (1-hour)	75 ppb	5 ppb	All HA's	---
Pb (Rolling 3-month average)	0.15 µg/m^3	n/a	All HA's	---

Ambient Air Monitoring Network

The AQMD began monitoring ambient air quality in Washoe County in the 1960's, and the monitoring network has grown and evolved since that time. This trends report provides a summary of data collected from ambient air monitoring sites in Washoe County that the AQMD operated and maintained between 2008 and 2017 to measure O_3, $PM_{2.5}$, PM_{10}, CO, NO_2, and SO_2.

Each monitoring site is classified into one of two major categories - SLAMS (State and Local Air Monitoring Station) and SPM (Special Purpose Monitoring). SLAMS consist of a network of monitoring stations, the size and distribution of which is largely determined by the monitoring requirements for NAAQS comparison. SLAMS in the AQMD's network can be further classified as NCore (National Core monitoring network) or STN (Speciation Trends Network).

The AQMD's monitoring stations are sited in accordance with 40 CFR 58 and utilize equipment designated as reference or equivalent methods.[2] In addition, the network is reviewed annually[3] to ensure it meets the monitoring objectives defined in 40 CFR 58, Appendix D. Ambient air monitoring data are collected, quality assured,[4] and recorded in AQS. Appendix A of this document provides a detailed summary of the ambient air monitoring data for 2017. All data summarized in Appendix A has been provided by reports retrieved from AQS. The data provided by AQS reports were certified on April 24, 2018 as "complete to the best of our knowledge and ability". Figure 2 displays the ambient air monitoring sites operated between 2008 and 2017. For specific details regarding the ambient air monitoring network, refer to the AQMD's "2017 Ambient Air Monitoring Network Plan" and "2015 Ambient Air Monitoring Network Assessment".

[2] 40 CFR 53.
[3] 40 CFR 58.10.
[4] 40 CFR 58.

Figure 2
Washoe County Ambient Air Monitoring Sites (2008-2017)

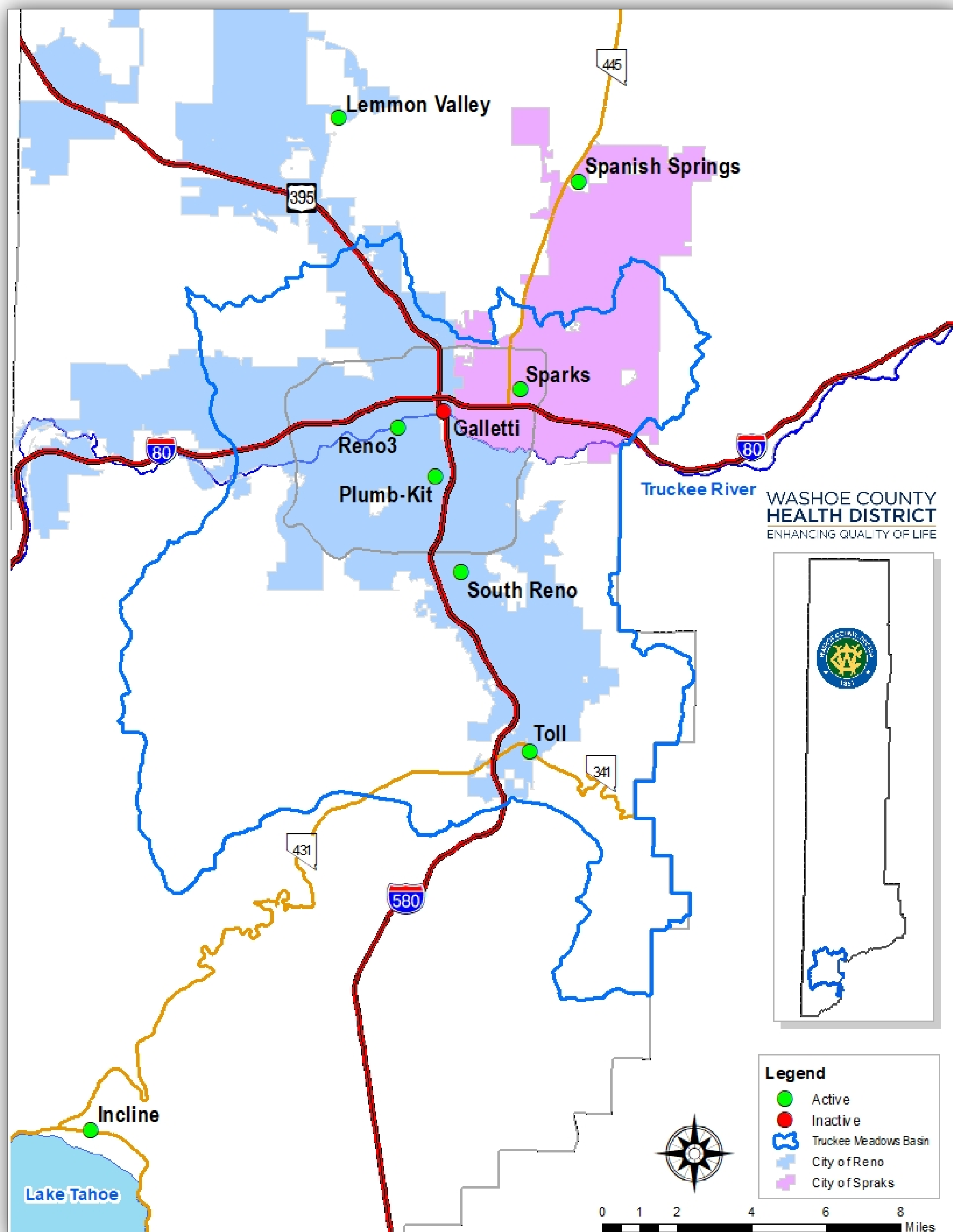


Table 3 Monitoring Stations in Operation and Pollutants Monitored in 2017

Network Type Site SLAMS	O_3	CO	Trace CO	Trace NO	NO_2	NO_x	Trace NOy	Trace SO_2	PM_{10} (manual)	PM_{10} (continuous)	$PM_{2.5}$ (manual)	$PM_{2.5}$ (continuous)	PM_{coarse} (manual)	PM_{coarse} (continuous)	$PM_{2.5}$ Speciation	Meteorology
Incline	✓															
Lemmon Valley	✓	✓														
Plumb-Kit										✓						✓
South Reno	✓									✓						✓
Sparks	✓	✓								✓		✓		✓		✓
Toll	✓	✓								✓						✓
NCore																
Reno3	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
Speciation Trends																
Reno3															✓	
SPM																
Spanish Springs	✓									✓		✓		✓		

<u>Monitoring Stations in Operation and Pollutants Monitored prior to 2017</u>

Ambient air monitoring data have been collected by the AQMD in Washoe County since the 1960’s. A complete historical list of monitoring stations and pollutants monitored is included in Appendix B, “Monitoring Stations in Operation From 1963 to 2017”.

A Review of 2017

The very active winter continued through February with flooding of nearly all Northern Nevada water systems. The water year was the wettest ever recorded. The last week of January through the first week of February resulted in elevated $PM_{2.5}$ and PM_{10} beneath a cold air inversion. This resulted in one red and three yellow burn codes. The highest 24-hour concentration during the burn code season for $PM_{2.5}$ was 35.0 µg/m^3 on January 31 in Sparks.

The first ozone exceedance of the year occurred on May 24. The 8-hour rolling average for O_3 was 0.071 ppm at Lemmon Valley. Elevated ozone affected all of our sites with the more northerly sites having the highest concentrations. This exceedance was out outside of the typical ozone season. Strong westerly winds with partly cloudy conditions that day and high ozone concentrations in the Sacramento Valley the preceding days indicate this to be an interstate transport event.

The active weather pattern continued through the beginning of June. June had drastic temperature changes followed by a record high temperature for Reno of 104 °F on June 19. Critical fire conditions started soon thereafter and didn’t cease until the fall. A total of nine wildfires in Nevada and California affect the Southern Washoe County in July. The Detwiler Fire started on July 16 in Mariposa County, California. It burned over 81,000 acres and sent smoke to Reno/Sparks. On July 19, Reno3 monitored the only exceedance in 2017 for $PM_{2.5}$ with a 24-hour concentration of 45.6 µg/m^3. This also impacted ozone concentrations with exceedances at Toll, Spanish Springs, Sparks, and Reno3. The highest 8-hour rolling average for O_3 was 0.074 ppm at Toll on July 19 and 20.

Figure 3
Detwiler Fire Smoke Obscures Downtown Reno on July 19

Red flag conditions with high heat and low humidity resulted in region wide wildfire activity. Fires near Yosemite brought smoke and haze in Reno and Sparks throughout August and Early September. The smoke from wildfires in Sonoma and Napa Counties affected Northern Nevada in the middle of October. Despite several cold fronts, the region was dry without much precipitation to begin the water year.

Atmospheric rivers with high winds returned in November and provided much needed precipitation. Between storms, prescribed fires were being conducted throughout Nevada and California. December ushered in prolonged periods of high pressure resulting in cold air inversions. Thirteen yellow burn codes and one red burn code were issued. The highest 24-hour concentration for $PM_{2.5}$ was 34.1 µg/m^3 on December 29 at Sparks.

Table 4 summarizes NAAQS exceedances in 2017 by pollutant, averaging period, and dates.

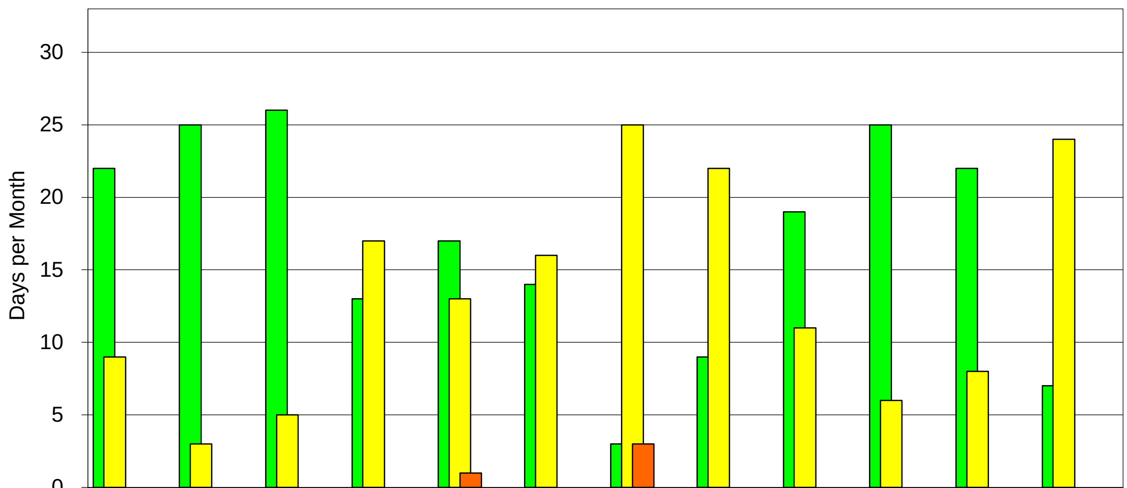
Table 4
2017 NAAQS Exceedances Summary

Pollutant	Averaging Period	Exceedance Dates
O_3	8-hour	May 24; July 1, 19, 20
$PM_{2.5}$	24-hour	Jul 19
PM_{10}	24-hour	None
CO	1-hour	None
	8-hour	None
NO_2	1-hour	None
SO_2	1-hour	None
	3-hour	None
Pb	Rolling 3-month	Not required to monitor based on population size and lack of significant Pb sources.

2017 Air Quality Index Summaries

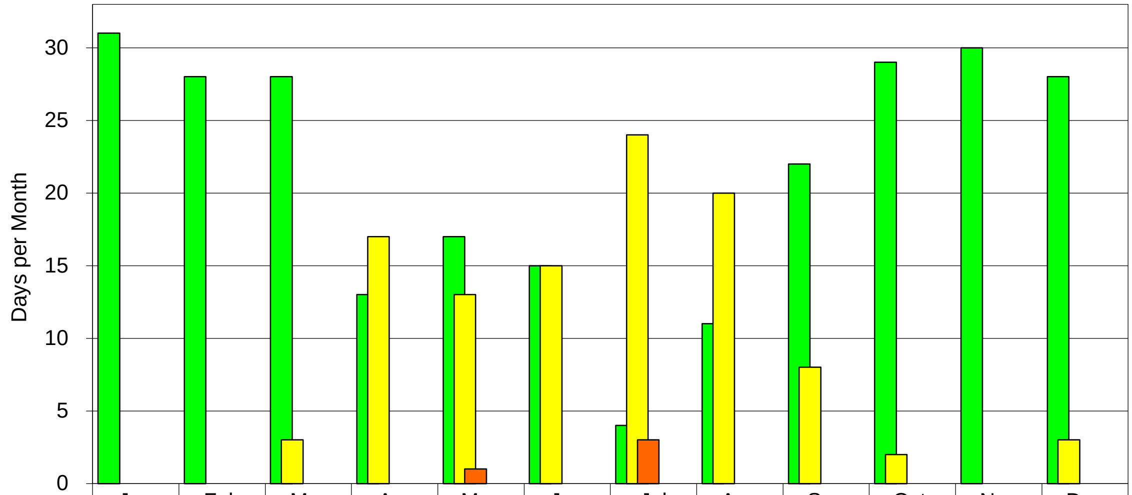
The Air Quality Index (AQI) is an index for reporting daily air quality that has been established by the EPA. It informs the public how clean or polluted the air is, and what associated health effects might be a concern. The AQI is reported to the public via EnviroFlash, social media (Facebook and Twitter), AirNow.gov, and the AQMD's air quality hotline ((775) 785-4110). The email, social media, and hotline are updated daily, and more often during air pollution episodes. The website is updated with the burn code from November through February. PM, CO, NO_2, and SO_2 concentrations are typically higher in the winter months while higher O_3 concentrations are more typical during the summer months. The next six figures are pollutant-specific and summarize Washoe County's air quality for the previous year by pollutant, month, and AQI categories.

Figure 4
Monthly AQI Summary for All Pollutants (2017)



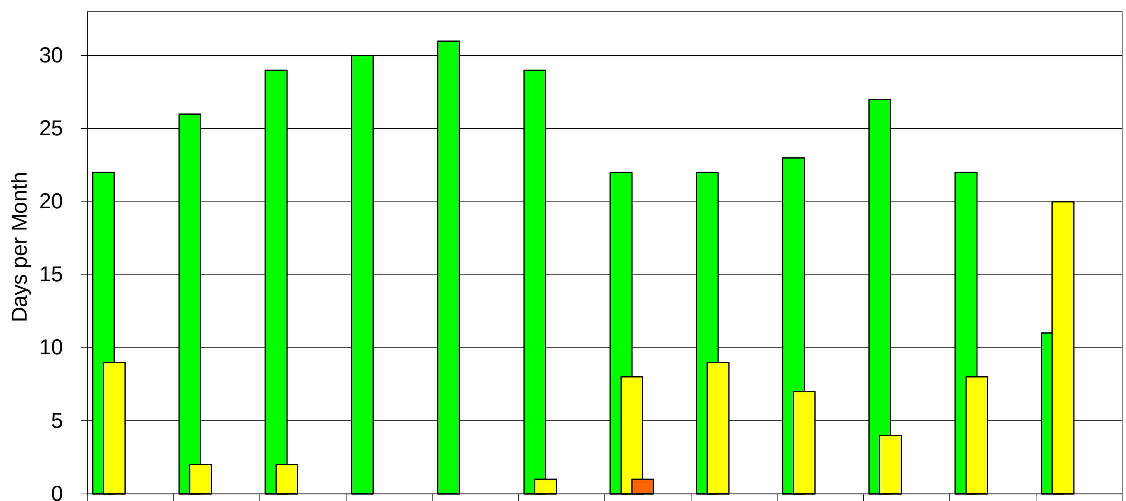
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Good	22	25	26	13	17	14	3	9	19	25	22	7
Moderate	9	3	5	17	13	16	25	22	11	6	8	24
USG	-	-	-	-	1	-	3	-	-	-	-	-
Unhealthy	-	-	-	-	-	-	-	-	-	-	-	-
Very Unhealthy	-	-	-	-	-	-	-	-	-	-	-	-
Hazardous	-	-	-	-	-	-	-	-	-	-	-	-

Figure 5
Monthly AQI Summary of O_3 (2017)



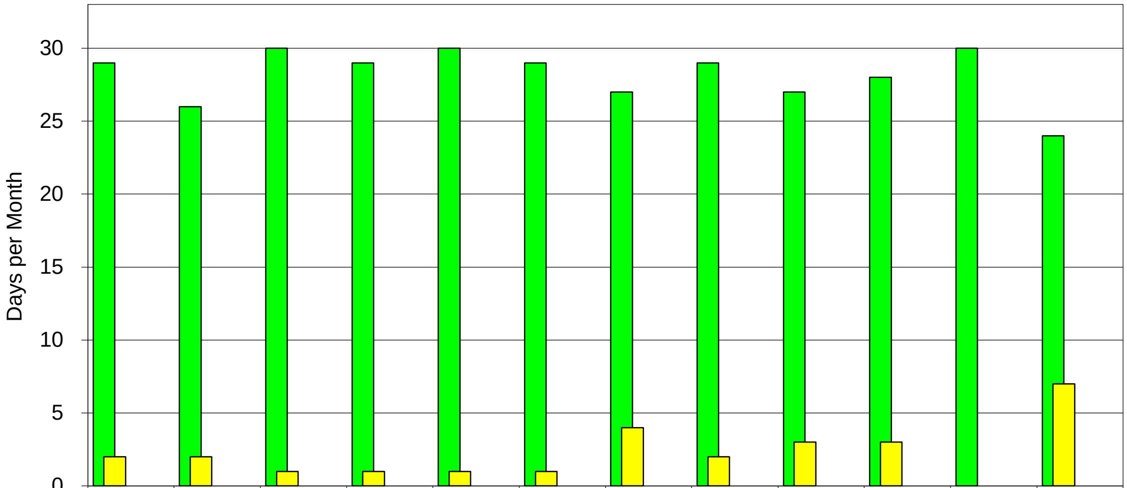
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Good	31	28	28	13	17	15	4	11	22	29	30	28
Moderate	-	-	3	17	13	15	24	20	8	2	-	3
USG	-	-	-	-	1	-	3	-	-	-	-	-
Unhealthy	-	-	-	-	-	-	-	-	-	-	-	-
Very Unhealthy	-	-	-	-	-	-	-	-	-	-	-	-
Hazardous	-	-	-	-	-	-	-	-	-	-	-	-

Figure 6
Monthly AQI Summary of $PM_{2.5}$ (2017)



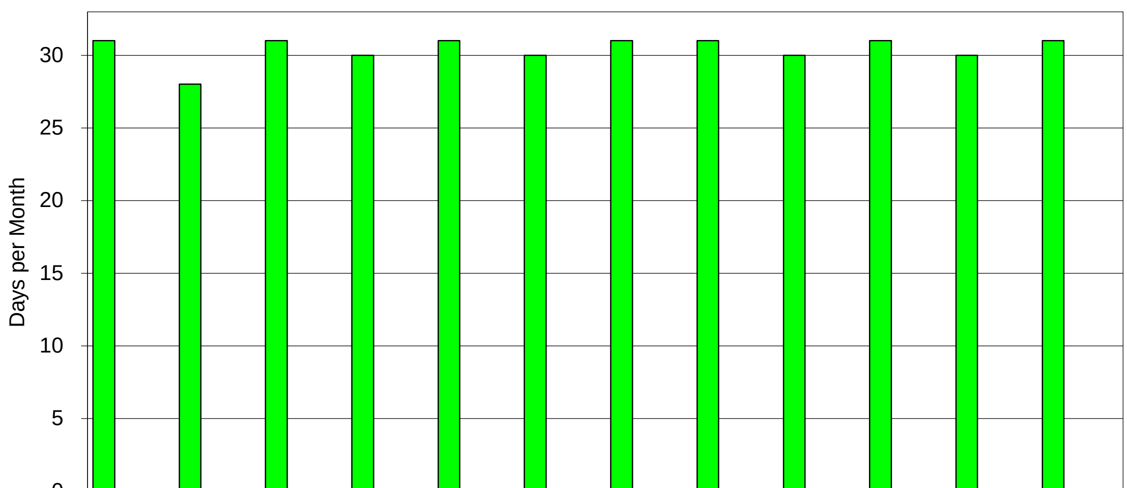
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Good	22	26	29	30	31	29	22	22	23	27	22	11
Moderate	9	2	2	-	-	1	8	9	7	4	8	20
USG	-	-	-	-	-	-	1	-	-	-	-	-
Unhealthy	-	-	-	-	-	-	-	-	-	-	-	-
Very Unhealthy	-	-	-	-	-	-	-	-	-	-	-	-
Hazardous	-	-	-	-	-	-	-	-	-	-	-	-

Figure 7
Monthly AQI Summary of PM_{10} (2017)



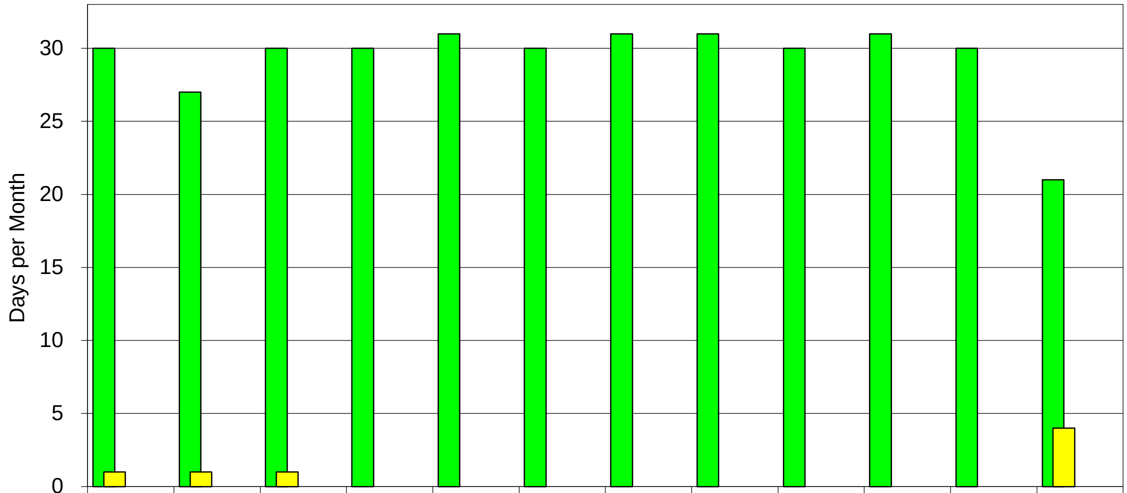
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Good	29	26	30	29	30	29	27	29	27	28	30	24
Moderate	2	2	1	1	1	1	4	2	3	3	-	7
USG	-	-	-	-	-	-	-	-	-	-	-	-
Unhealthy	-	-	-	-	-	-	-	-	-	-	-	-
Very Unhealthy	-	-	-	-	-	-	-	-	-	-	-	-
Hazardous	-	-	-	-	-	-	-	-	-	-	-	-

Figure 8
Monthly AQI Summary of CO (2017)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Good	31	28	31	30	31	30	31	31	30	31	30	31
Moderate	-	-	-	-	-	-	-	-	-	-	-	-
USG	-	-	-	-	-	-	-	-	-	-	-	-
Unhealthy	-	-	-	-	-	-	-	-	-	-	-	-
Very Unhealthy	-	-	-	-	-	-	-	-	-	-	-	-
Hazardous	-	-	-	-	-	-	-	-	-	-	-	-

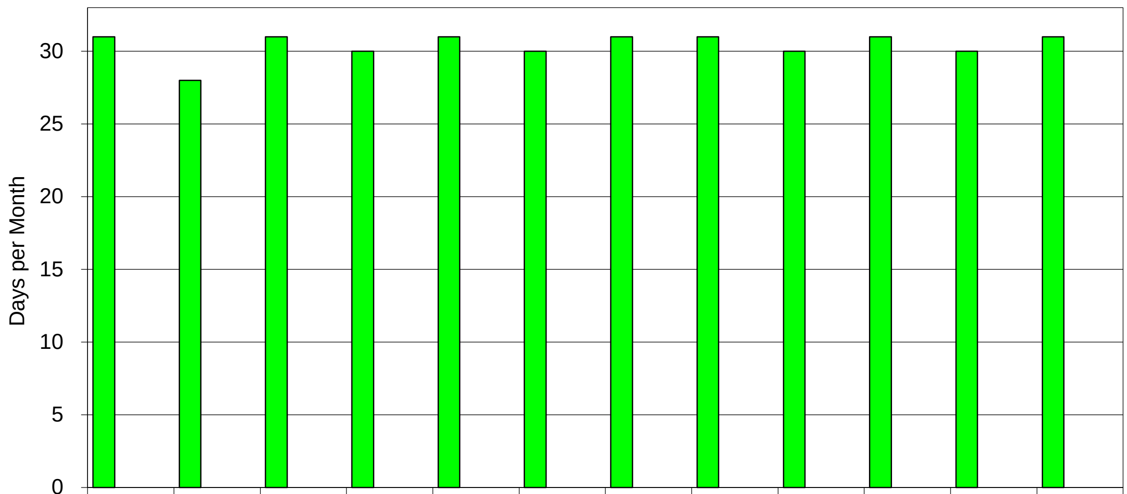
Figure 9
Monthly AQI Summary of NO_2 (2017)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec*
Good	30	27	30	30	31	30	31	31	30	31	30	21
Moderate	1	1	1	-	-	-	-	-	-	-	-	4
USG	-	-	-	-	-	-	-	-	-	-	-	-
Unhealthy	-	-	-	-	-	-	-	-	-	-	-	-
Very Unhealthy	-	-	-	-	-	-	-	-	-	-	-	-
Hazardous	-	-	-	-	-	-	-	-	-	-	-	-

* Month(s) with AQI total less than days in a month due to invalid day(s)

Figure 10
Monthly AQI Summary of SO_2 (2017)

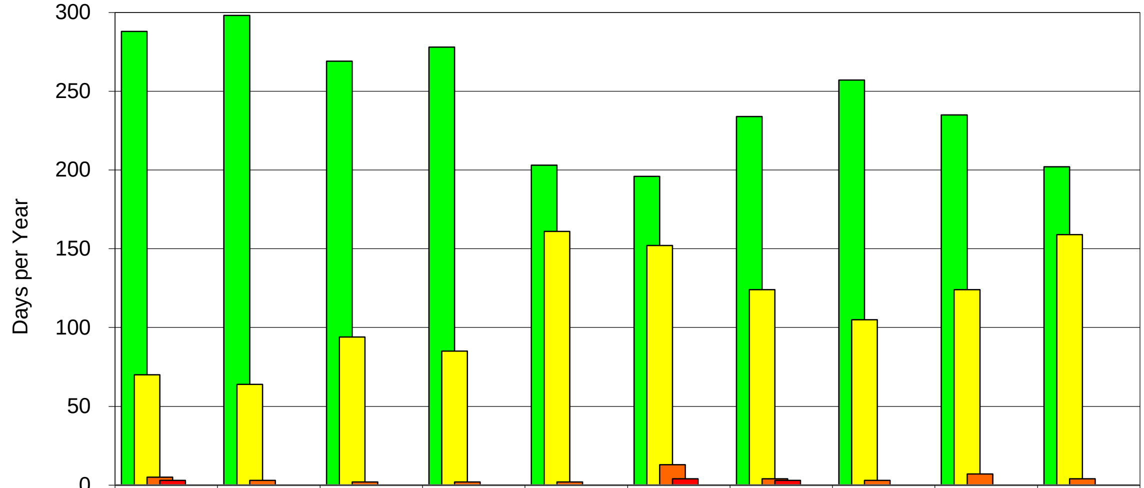


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Good	31	28	31	30	31	30	31	31	30	31	30	31
Moderate	-	-	-	-	-	-	-	-	-	-	-	-
USG	-	-	-	-	-	-	-	-	-	-	-	-
Unhealthy	-	-	-	-	-	-	-	-	-	-	-	-
Very Unhealthy	-	-	-	-	-	-	-	-	-	-	-	-
Hazardous	-	-	-	-	-	-	-	-	-	-	-	-

Ten-Year Air Quality Trend

Figure 11 summarizes the ten-year trend in AQI between 2008 and 2017. NAAQS revisions in 2008, 2012, and 2015 resulted in changes to AQI category ranges and the number of days per year within those ranges.

Figure 11
AQI Trend (2008-2017)



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Good	288	298	269	278	203	196	234	257	235	202
Moderate	70	64	94	85	161	152	124	105	124	159
USG*	5	3	2	2	2	13	4	3	7	4
Unhealthy	3	-	-	-	-	4	3	-	-	-
Very Unhealthy	-	-	-	-	-	-	-	-	-	-
Hazardous	-	-	-	-	-	-	-	-	-	-

* Unhealthy for Sensitive Groups

<u>Notes</u>
2008: 8-hour O_3 NAAQS strengthened from 0.08 to 0.075 ppm.
2012: Annual $PM_{2.5}$ NAAQS strengthened from 15.0 to 12.0 µg/m^3.
2015: 8-hour O_3 NAAQS strengthened from 0.075 to 0.070 ppm.

Burn Code Seasons

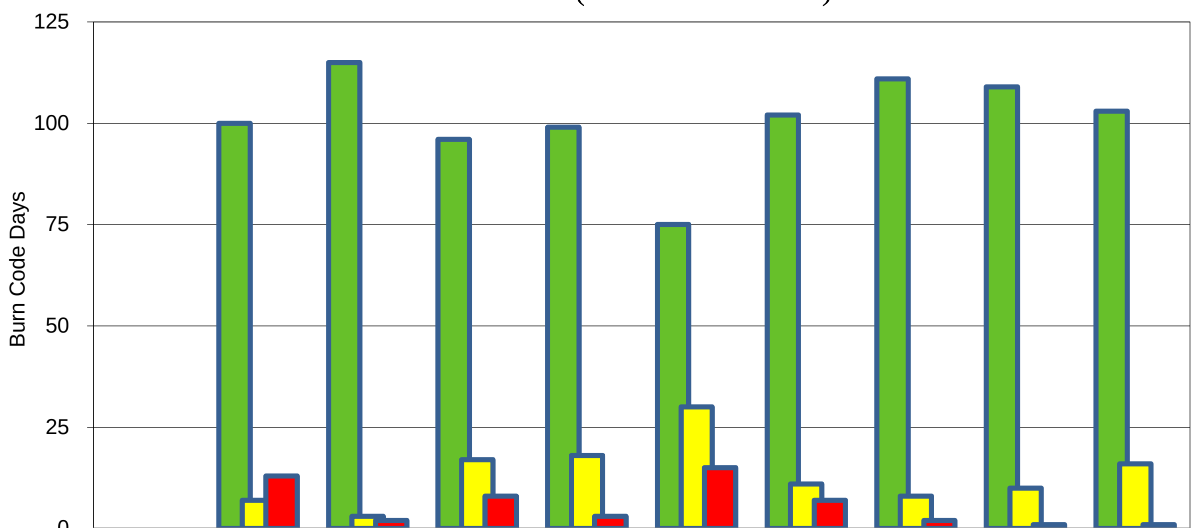
The Burn Code program has been in place since the 1980's. It begins November 1 and ends on the last day of February. During this wintertime period, the burn code curtails PM_{10}, $PM_{2.5}$, and CO emissions from residential and commercial solid fuel burning devices such as wood stoves, pellet stoves, and fireplaces.

Green: Issued when $PM_{2.5}$ levels are low and are not expected to be approaching the 24-hour $PM_{2.5}$ NAAQS. It is legal for residents and businesses to use their solid fuel burning device.

Yellow: Issued when $PM_{2.5}$ levels are approaching the 24-hour $PM_{2.5}$ NAAQS. It is legal for residents and businesses to use their solid fuel burning device, but it is encouraged to reduce or stop burning.

Red: Issued when $PM_{2.5}$ levels are above or expected to be above the $PM_{2.5}$ NAAQS. It is illegal for residents to use their solid fuel burning device except residents that have a sole source exemption. It is also illegal for businesses to burn solid fuel at a 24-hour average of $55\mu g/m^3$ for $PM_{2.5}$.

Figure 12
Burn Code Seasons (2008/09 - 2017/18)



	2008/09*	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
Green	-	100	115	96	99	75	102	111	109	103
Yellow	-	7	3	17	18	30	11	8	10	16
Red	-	13	2	8	3	15	7	2	1	1

* Burn code data for the 2008/09 season is not available.

Design Values

The next subsection includes data that the AQMD has flagged as "exceptional" due to events such as wildfires, high winds, and transport. The design values will include these "exceptional" data until EPA determines concurrence with AQMD's exceptional events demonstrations submitted to EPA for Reno3 O_3 in 2008 and for Reno3 $PM_{2.5}$ in 2008, 2013, and 2014. Ozone exceptional events for the Reno3 monitoring site in 2015 and 2016 were concurred by EPA Region 9 on May 30, 2017.[5]

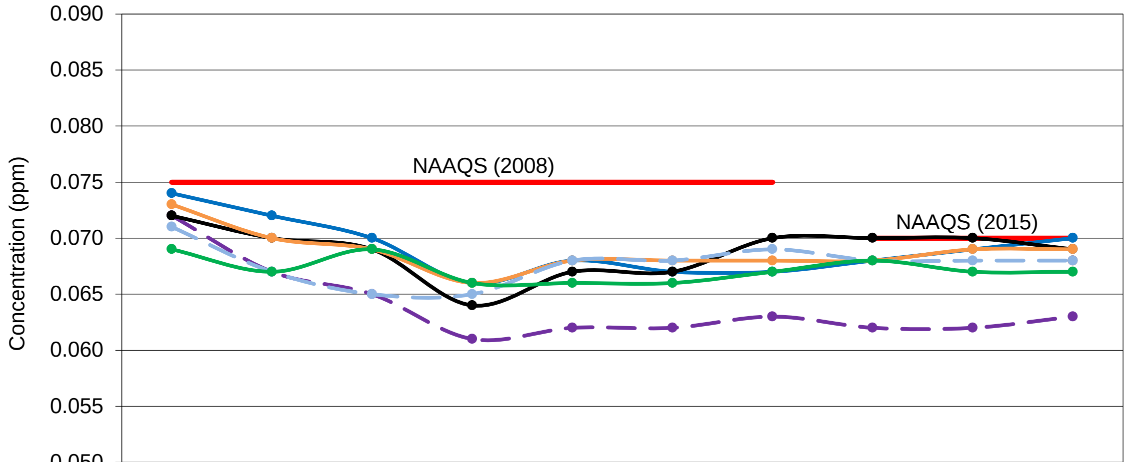
[5] "Exceptional Events Document Ozone - Washoe, NV." (**www.epa.gov/air-quality-analysis/exceptional-events-documents-ozone-washoe-nv**), EPA.gov. United States Environmental Protection Agency, 9 June 2017. Web. 10 May 2018

O_3 (8-hour) Design Values

<u>NAAQS Level</u>: 0.070 ppm
<u>Design Value (2015-17)</u>: 0.070 ppm (LEM)
<u>Current Designation</u>: Attainment/Unclassifiable (Entire County)

<u>2017 Exceedances</u>: 4
<u>2017 First High</u>: 0.073 ppm (Jul 19 - TOL)
<u>2017 Fourth High</u>: 0.069 ppm (Sep 1 - LEM)

Figure 13
O_3 (8-hour) Design Values



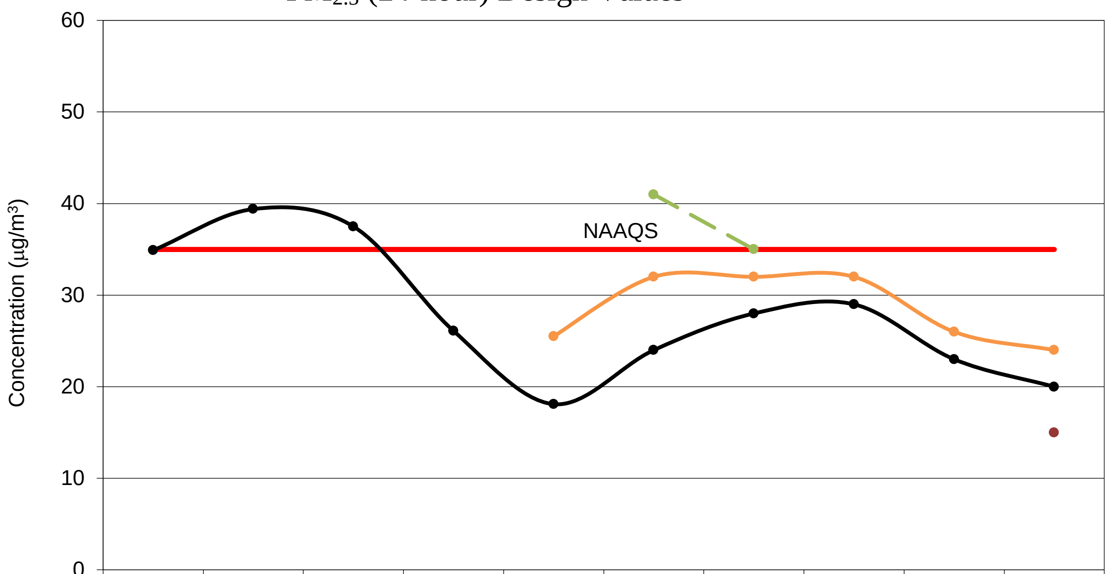
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
NAAQS	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.070	0.070	0.070
INC (2002)	0.072	0.067	0.065	0.061	0.062	0.062	0.063	0.062	0.062	0.063
LEM (2009)	0.074	0.072	0.070	0.066	0.068	0.067	0.067	0.068	0.069	0.070
RNO (0016)	0.072	0.070	0.069	0.064	0.067	0.067	0.070	0.070	0.070	0.069
SPK (1005)	0.073	0.070	0.069	0.066	0.068	0.068	0.068	0.068	0.069	0.069
SPS (1007)										0.068
SRN (0020)	0.071	0.067	0.065	0.065	0.068	0.068	0.069	0.068	0.068	0.068
TOL (0025)	0.069	0.067	0.069	0.066	0.066	0.066	0.067	0.068	0.067	0.067

$PM_{2.5}$ (24-hour) Design Values

<u>NAAQS Level</u>: 35 µg/m^3
<u>Design Value (2015-17)</u>: 24 µg/m^3 (SPK)
<u>Current Designation</u>: Attainment/Unclassifiable (Entire County)

<u>2017 Exceedances</u>: 1
<u>2017 First High</u>: 45.6 µg/m^3 (Jul 19 - RNO)
<u>2017 98th Percentile</u>: 24.2 µg/m^3 (Jan 29 - SPK)

Figure 14
$PM_{2.5}$ (24-hour) Design Values



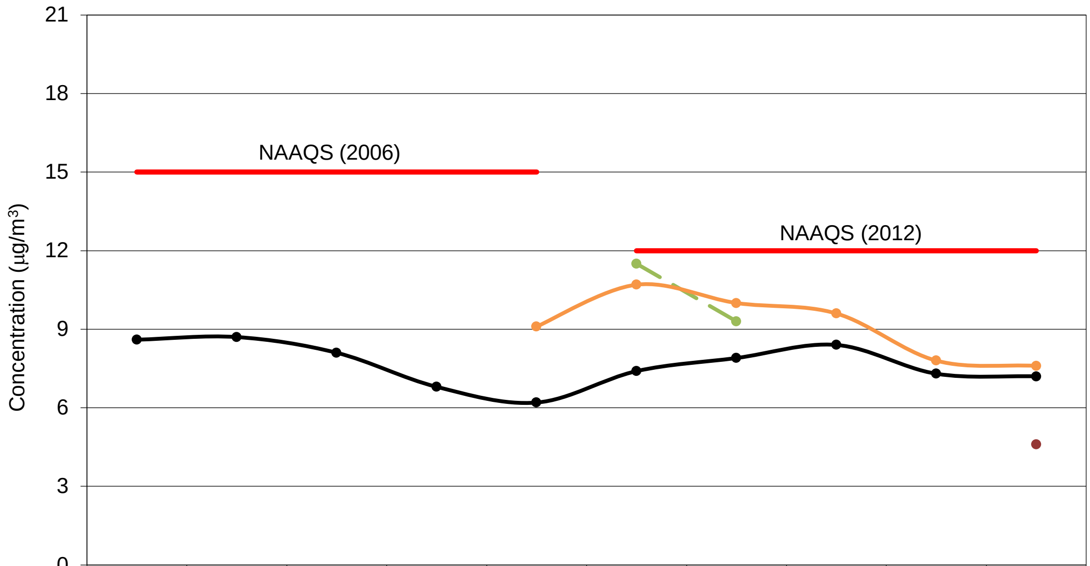
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
NAAQS	35	35	35	35	35	35	35	35	35	35
GAL (0022)						41	35			
RNO (0016)	35	39	38	26	18	24	28	29	23	20
SPK (1005)					26	32	32	32	26	24
SPS (1007)										15

PM$_{2.5}$ (Annual) Design Values

<u>NAAQS Level</u>: 12.0 µg/m^3
<u>Design Value (2015-17)</u>: 7.6 µg/m^3 (SPK)
<u>Current Designation</u>: Attainment/Unclassifiable (Entire County)

<u>2017 Annual Weighted Mean</u>: 8.0 µg/m^3 (SPK)

Figure 15
PM$_{2.5}$ (Annual) Design Values



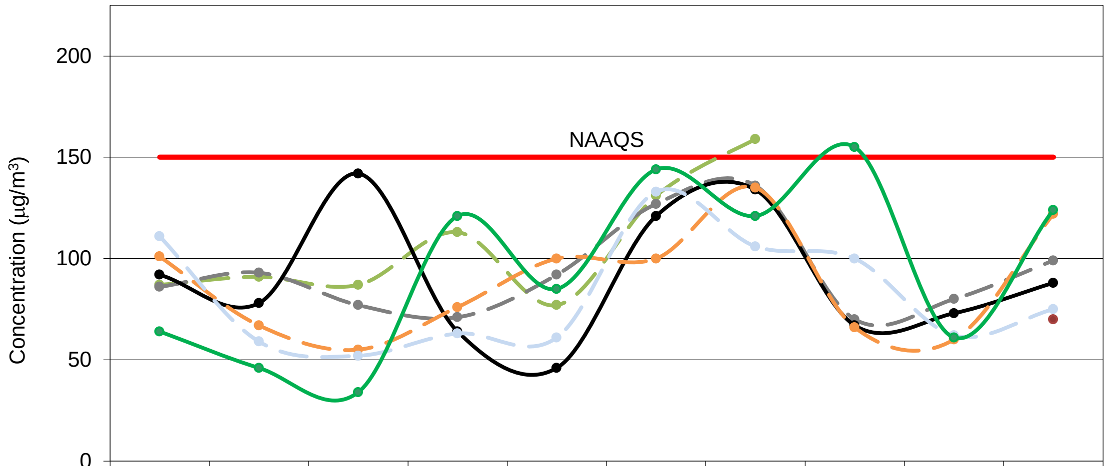
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
NAAQS	15.0	15.0	15.0	15.0	15.0	12.0	12.0	12.0	12.0	12.0
GAL (0022)						11.5	9.3			
RNO (0016)	8.6	8.7	8.1	6.8	6.2	7.4	7.9	8.4	7.3	7.2
SPK (1005)					9.1	10.7	10.0	9.6	7.8	7.6
SPS (1007)										4.6

PM_{10} (24-hour) First Highs

NAAQS Level: 150 µg/m^3
Design Value (2015-17): 0.3 expected exceedances (TOL)
Current Designation: Attainment (HA 87); Attainment/Unclassifiable (Remainder of County)

2017 Exceedances: 0
2017 Expected Exceedances: 0.3 (TOL)
2017 First High: 124 µg/m^3 (Dec 19 - TOL)

Figure 16
PM_{10} (24-hour) First Highs



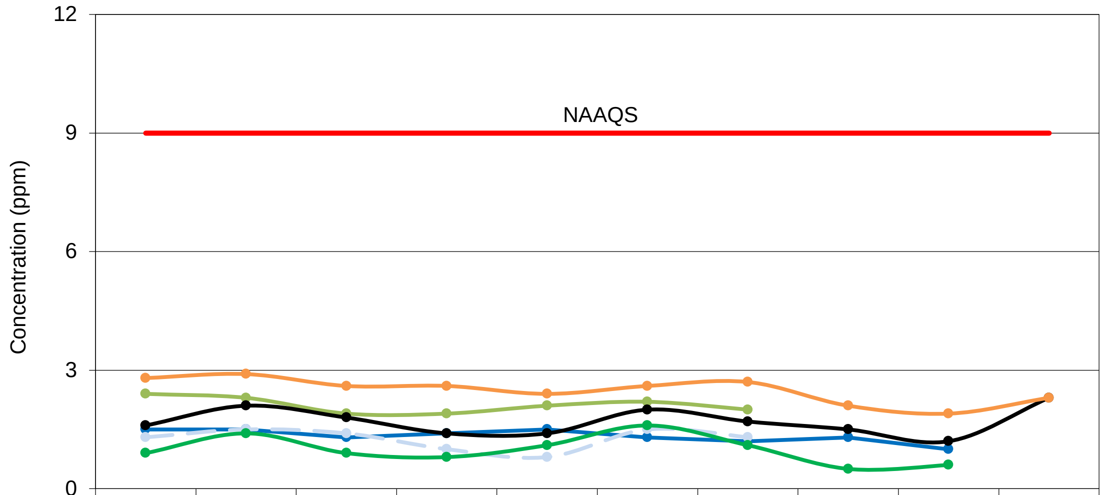
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
NAAQS	150	150	150	150	150	150	150	150	150	150
GAL (0022)	87	91	87	113	77	131	159			
PLM (0030)	86	93	77	71	92	127	136	70	80	99
RNO (0016)	92	78	142	64	46	121	134	67	73	88
SPK (1005)	101	67	55	76	100	100	135	66	60	122
SPS (1007)										70
SRN (0020)	111	59	52	63	61	133	106	100	62	75
TOL (0025)	64	46	34	121	85	144	121	155	61	124

CO (8-hour) Design Values

<u>NAAQS Level</u>: 9 ppm
<u>Design Value</u>: 2.3 ppm (SPK)
<u>Current Designation</u>: Attainment (HA 87); Attainment/Unclassifiable (Remainder of County)

<u>2017 Exceedances</u>: 0
<u>2017 First High</u>: 2.3 ppm (Dec 29 - SPK)
<u>2017 Second High</u>: 2.2 ppm (Dec 29 - SPK)

Figure 17
CO (8-hour) Design Values

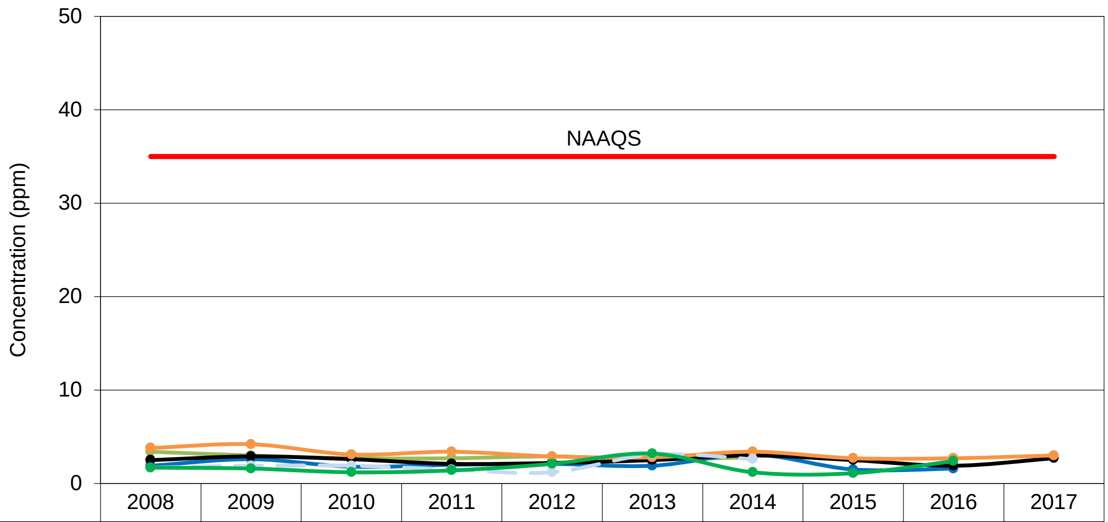


	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
NAAQS	9	9	9	9	9	9	9	9	9	9
GAL (0022)	2.4	2.3	1.9	1.9	2.1	2.2	2.0			
LEM (2009)	1.5	1.5	1.3	1.4	1.5	1.3	1.2	1.3	1.0	
RNO (0016)	1.6	2.1	1.8	1.4	1.4	2.0	1.7	1.5	1.2	2.3
SPK (1005)	2.8	2.9	2.6	2.6	2.4	2.6	2.7	2.1	1.9	2.3
SRN (0020)	1.3	1.5	1.4	1.0	0.8	1.5	1.3			
TOL (0025)	0.9	1.4	0.9	0.8	1.1	1.6	1.1	0.5	0.6	

<u>NAAQS Level</u>: 35 ppm
<u>Design Value</u>: 3.0 ppm (SPK)
<u>Current Designation</u>: Attainment/Unclassifiable (Entire County)

<u>2017 Exceedances</u>: 0
<u>2017 First High</u>: 3.0 ppm (Dec 29 - SPK)
<u>2017 Second High</u>: 2.7 ppm (Dec 29 - SPK)

Figure 18
CO (1-hour) Design Values



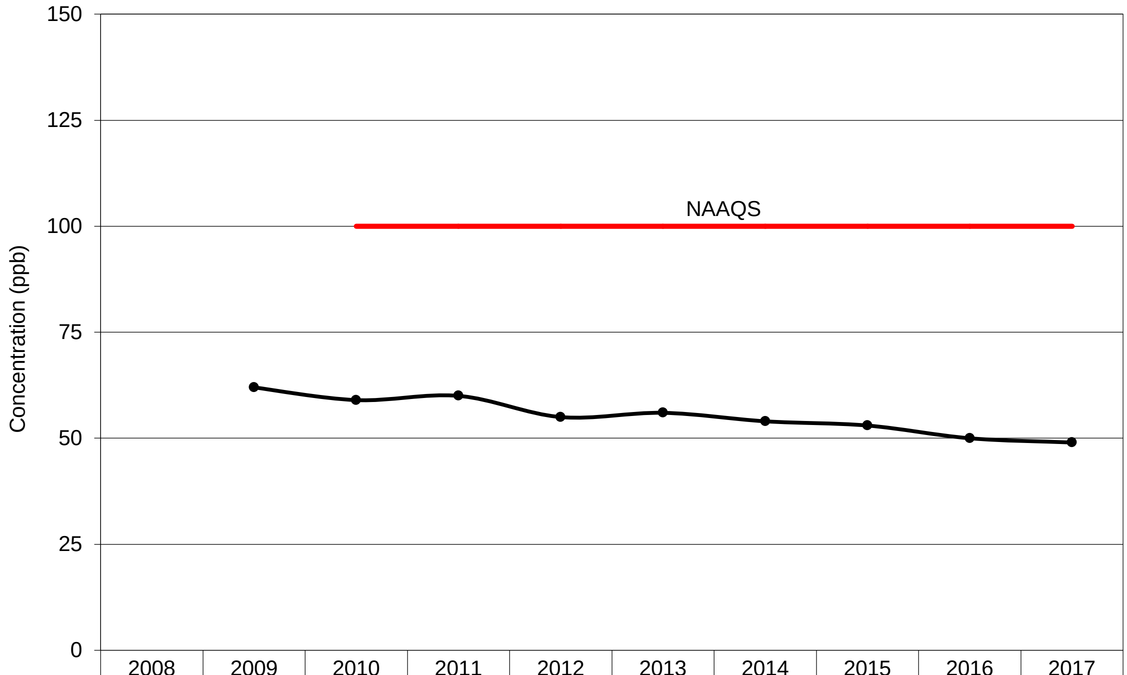
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
NAAQS	35	35	35	35	35	35	35	35	35	35
GAL (0022)	3.4	3.0	2.7	2.7	2.9	2.6	2.8			
LEM (2009)	1.9	2.6	1.8	2.0	2.1	1.9	3.1	1.5	1.6	
RNO (0016)	2.5	2.9	2.6	2.1	2.2	2.5	3.0	2.5	1.9	2.7
SPK (1005)	3.8	4.2	3.1	3.4	2.9	2.8	3.4	2.7	2.7	3.0
SRN (0020)	1.7	1.9	1.9	1.5	1.2	3.1	2.6			
TOL (0025)	1.7	1.6	1.2	1.4	2.1	3.2	1.2	1.1	2.4	

NO_2 (1-hour) Design Values

<u>NAAQS Level</u>: 100 ppb
<u>Design Value (2015-17)</u>: 49 ppb (RNO)
<u>Current Designation</u>: Attainment/Unclassifiable (Entire County)

<u>2017 Exceedances</u>: 0
<u>2017 First High</u>: 89.3 ppb (Dec 29 - RNO)
<u>2017 98th Percentile</u>: 51.8 ppb (Oct 16 - RNO)

Figure 19
NO_2 (1-hour) Design Values



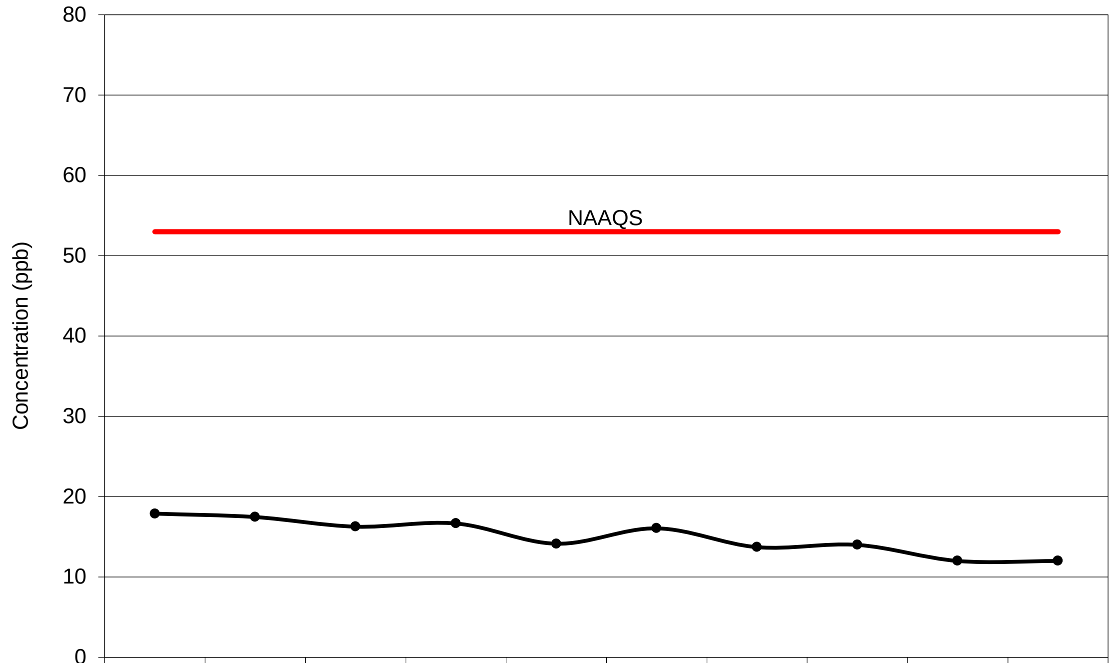
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
NAAQS			100	100	100	100	100	100	100	100
RNO (0016)		62	59	60	55	56	54	53	50	49

NO_2 (Annual) Design Values

<u>NAAQS Level</u>: 53 ppb
<u>Design Value (2017)</u>: 12 ppb (RNO)
<u>Current Designation</u>: Attainment/Unclassifiable (Entire County)

<u>2017 Annual Mean</u>: 12 ppb (RNO)

Figure 20
NO_2 (Annual) Design Values



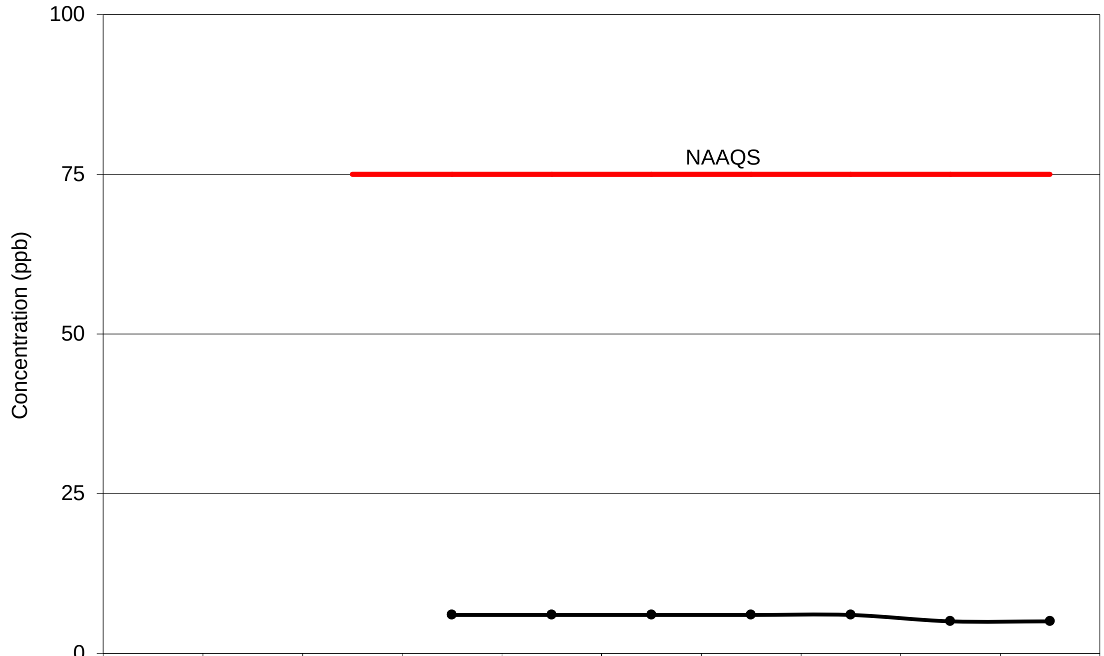
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
NAAQS	53	53	53	53	53	53	53	53	53	53
RNO (0016)	18	17	16	17	14	16	14	14	12	12

SO_2 (1-hour) Design Values

<u>NAAQS Level</u>: 75 ppb
<u>Design Value (2017)</u>: 5 ppb (RNO)
<u>Current Designations</u>: Attainment/Unclassifiable (Entire County)

<u>2017 First High</u>: 9.7 ppb (Dec 29 - RNO)
<u>2017 99^{th} Percentile</u>: 5.3 ppb (Dec 29 - RNO)

Figure 21
SO_2 (1-hour) Design Values



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2016
NAAQS			75	75	75	75	75	75	75	75
RNO (0016)				6	6	6	6	6	5	5

Appendix A

Detailed Summary of Ambient Air Monitoring Data

Exceedances highlighted in Yellow

Violations highlighted in Red

NAAQS Exceedances (2015 - 2017)

Pollutant	Averaging Period	Exceedance Dates		
		2015	2016	2017
O_3	8-hour	None	Jul 2-4, 13, 25; Aug 15, 28	May 24; July 1, 19, 20
$PM_{2.5}$	24-hour	Aug 21; Sep 13	None	Jul 19
PM_{10}	24-hour	Feb 6	None	None
CO	1-hour	None	None	None
CO	8-hour	None	None	None
NO_2	1-hour	None	None	None
SO_2	1-hour	None	None	None
Pb	Rolling 3-month	n/a - Pb was not monitored		

OZONE

8-Hour Ozone Averages (ppm)
(2017)

Rank	INC (2002)		LEM (2009)		RNO (0016)		SRN (0020)		SPK (1005)		SPS (1007)		TOL (0025)	
	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date
1	0.069	07/19	0.071	05/24	0.071	07/20	0.068	07/19	0.071	07/19	0.071	07/20	0.074	07/19
2	0.067	07/20	0.070	06/06	0.070	07/19	0.067	07/20	0.071	07/20	0.070	05/24	0.074	07/20
3	0.065	07/01	0.069	07/20	0.069	09/01	0.067	08/03	0.069	07/21	0.068	06/06	0.071	07/01
4	0.064	06/06	0.069	09/01	0.067	07/01	0.066	07/01	0.069	08/03	0.068	07/19	0.068	07/21
5	0.063	06/07	0.067	06/07	0.067	08/01	0.064	09/01	0.068	07/01	0.067	06/07	0.067	08/03
6	0.062	05/24	0.067	06/30	0.067	08/03	0.063	06/06	0.067	05/24	0.067	06/30	0.066	05/24
7	0.062	12/02	0.066	07/19	0.066	05/24	0.062	05/24	0.067	09/01	0.066	07/03	0.065	06/06
8	0.060	07/21	0.065	07/21	0.066	06/06	0.062	07/21	0.066	06/30	0.065	07/21	0.065	06/07
9	0.060	09/03	0.064	06/02	0.066	06/30	0.062	08/01	0.066	07/03	0.065	06/02	0.065	07/03
10	0.059	05/26	0.064	07/01	0.066	07/21	0.061	06/30	0.065	06/06	0.065	06/20	0.064	09/01

4th High 8-Hour Ozone Averages (2015-2017)
and Design Values (ppm)

Year	INC (2002)		LEM (2009)		RNO (0016)		SRN (0020)		SPK (1005)		SPS (1007)		TOL (0025)	
	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date
2015	0.062	06/08	0.072	06/09	0.073	08/21	0.070	06/16	0.070	06/08	n/a	n/a	0.069	06/16
2016	0.063	08/27	0.069	07/02	0.073	08/15	0.068	07/25	0.069	07/25	n/a	n/a	0.065	07/13
2017	0.064	06/06	0.069	09/01	0.067	07/01	0.066	07/01	0.069	08/03	0.068	07/19	0.068	07/21
DV*	0.063		0.070		0.069**		0.068		0.069		0.068		0.067	

* Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years

** Design value excludes measurements with regionally concurred exceptional event flags

$PM_{2.5}$

24-Hour $PM_{2.5}$ Averages (µg/m^3) (2017)

Rank	RNO (0016)		SPK (1005)		SPS (1007)	
	Value (%ile)	Date	Value (%ile)	Date	Value (%ile)	Date
1	45.6	07/19	35.0	01/31	23.6	07/19
2	25.5	12/29	34.1	12/29	20.3	09/01
3	25.2	09/01	33.4	07/19	16.7	01/31
4	23.2	07/20	27.2	01/30	15.4	12/15
5	21.5	11/19	25.4	12/28	14.9	08/04
6	21.5	01/31	24.8	12/11	14.7	01/30
7	20.0 (98)	01/30	24.5	12/10	14.6	09/03
8	19.4	09/03	24.2 (98)	01/29	14.6 (98)	10/11
9	18.7	12/28	23.6	09/01	14.2	07/05
10	18.5	07/11	22.6	12/26	13.8	09/16

98^{th} Percentiles of 24-Hour $PM_{2.5}$ Averages (2015-2017) and Design Values (µg/m^3)

Year	RNO (0016)	SPK (1005)	SPS (1007)
2015	20.2	25.7	n/a
2016	18.9	20.6	n/a
2017	20.0	24.2	14.6
Design Value*	20	24	15

* 98^{th} percentile, averaged over 3 years

$PM_{2.5}$ (continued)

Annual $PM_{2.5}$ Means (2015-2017) and Design Values (µg/m^3)

Year	RNO (0016)	SPK (1005)	SPS (1007)
2015	7.6	7.8	n/a
2016	6.5	7.0	n/a
2017	7.4	8.0	4.6
Design Value*	7.2	7.6	4.6

* Annual mean, averaged over 3 years

PM_{10}

24-Hour PM_{10} Averages ($\mu g/m^3$)
(2017)

Rank	PLM (0030)		RNO (0016)		SRN (0020)		SPK (1005)		SPS (1007)		TOL (0025)	
	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date
1	99	12/29	88	01/31	75	01/31	122	01/31	70	09/05	124	12/19
2	94	01/31	75	12/29	65	01/30	88	12/29	60	10/19	101	10/19
3	81	02/01	73	02/01	61	12/29	75	01/30	47	10/11	89	04/06
4	70	01/30	64	07/19	56	07/19	68	02/01	46	01/31	80	02/16
5	67	10/19	57	01/30	52	02/01	67	10/19	44	07/19	72	12/20
6	65	05/25	56	12/28	50	12/15	64	12/28	44	09/01	67	07/19
7	62	12/28	52	12/19	47	10/19	58	12/11	38	08/04	63	03/03
8	61	12/13	52	12/22	45	09/01	57	07/19	38	09/03	60	01/31
9	59	12/15	48	02/15	45	10/11	57	12/15	38	11/26	57	06/08
10	58	07/19	48	10/19	42	09/05	55	09/01	37	07/31	57	09/05

24-Hour PM_{10} Highs ($\mu g/m^3$)
(2015-2017)

Year	PLM (0030)		RNO (0016)		SRN (0020)		SPK (1005)		SPS (1007)		TOL (0025)	
	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date	Value	Date
2015	70	01/09	67	12/17	100	01/11	66	08/21	n/a	n/a	155	02/06
2016	80	11/15	73	02/11	62	02/15	60	02/11	n/a	n/a	61	06/15
2017	99	12/29	88	01/31	75	01/31	122	01/31	70	09/05	124	12/19

PM_{10} (continued)

PM_{10} Expected Exceedances (2015-2017) and Design Values (expected exceedances)

Year	PLM (0030)	RNO (0016)	SRN (0020)	SPK (1005)	SPS (1007)	TOL (0025)
2015	0	0	0	0	0	1
2016	0	0	0	0	0	0
2017	0	0	0	0	0	0
Design Value*	0	0	0	0	0	0.3

* Expected exceedances averaged over three years

CARBON MONOXIDE (CO)

8-Hour CO Averages (ppm)
(2017)

Rank	RNO (0016)		SPK (1005)	
	Value	Date	Value	Date
1	2.3	12/29	2.3	12/29
2	1.5	12/19	2.2	12/29
3	1.3	12/28	2.0	12/28
4	1.1	01/31	2.0	12/30

1-Hour CO Averages (ppm)
(2017)

Rank	RNO (0016)		SPK (1005)	
	Value	Date	Value	Date
1	2.7	12/29	3.0	12/29
2	2.6	12/29	2.7	12/29
3	2.5	12/29	2.7	12/29
4	2.4	12/29	2.7	12/29

NITROGEN DIOXIDE (NO_2)

1-Hour NO_2 Averages (ppb)
(2017)

Rank	RNO (0016)	
	Value (%ile)	Date
1	89.3	12/29
2	60.7	01/31
3	58.5	12/30
4	58.3	12/27
5	57.8	03/15
6	56.5	02/01
7	56.2	12/19
8	51.8 (98)	10/16
9	51.8	12/28
10	50.9	03/04

98^{th} Percentiles of 1-Hour NO_2 Averages
(2015-2017) and Design Value (ppb)

Year	RNO (0016)
	Value
2015	50.6
2016	45.9
2017	51.8
Design Value*	49

* 98^{th} percentile, averaged over 3 years

NITROGEN DIOXIDE (continued)

NO_2 Annual Mean (2017) and Design Value (ppb)

	RNO (0016)
Annual Mean	12
Design Value*	12

* Annual Mean

SULFUR DIOXIDE (SO_2)

1-Hour SO_2 Averages (ppb) (2017)

Rank	RNO (0016)	
	Value (%ile)	Date
1	9.7	12/29
2	7.4	12/19
3	5.6	12/28
4	5.3 (99)	03/15
5	5.2	12/13
6	4.9	02/01
7	4.8	12/15
8	4.7	11/08
9	4.7	12/30
10	4.5	10/19

99^{th} Percentiles of 1-Hour SO_2 Averages (2015-2017) and Design Value (ppb)

Year	RNO (0016)
	Value
2015	5**
2016	5
2017	5
Design Value*	5

* 99^{th} percentile of 1-hour daily maximum concentrations, averaged over 3 years

** Annual value does not meet completeness criteria.

Appendix B

Monitoring Stations in Operation from 1963 to 2017

Monitoring Stations in Operation from 2008 to 2017

AQS Site Name (AQS Site ID)	Ozone	$PM_{2.5}$	PM_{10}	TSP	HC	CO	NO_2	SO_2	Lead
Incline (32-031-2002)	93-17		99-02						
Lemmon Valley (32-031-2009)	87-17		87			87-16			
Reno (32-031-0016)	82-17	99-17	88-17	85-87		83-17	84-17	11-17	
Plumb-Kit (32-031-0030)			06-17						
South Reno (32-031-0020)	88-17					88-14			
Sparks (32-031-1005)	79-17	12-17	88-17	85-87		80-17			
Galletti (32-031-0022)		13-14	88-14			88-14			
Toll (32-031-0025)	02-17		02-17			02-16			

Monitoring Stations in Operation from 1963 to 2007

AQS Site Name (AQS Site ID)	Ozone	$PM_{2.5}$	PM_{10}	TSP	HC	CO	NO_2	SO_2	Lead
Health - Kirman (32-031-0001)				63-89					
Sparks - Greenbrae ES (32-031-0002)			85-90	68-90					
Reno - Cal-Neva (32-031-0003)				68-89					
Reno - Veterans ES (32-031-0004)				68-69					
Reno - Harrah's (32-031-0005)	76-82					72-81	72-85		
Reno - Jesse Beck ES (32-031-0006)				72-89					
Reno - Airport (32-031-0007)				72-89					
Reno - Fairgrounds (32-031-0008)				72-74					

AQS Site Name (AQS Site ID)	Ozone	$PM_{2.5}$	PM_{10}	TSP	HC	CO	NO_2	SO_2	Lead
Reno - Fish & Game (32-031-0009)				74-89					
Reno - Kings Row ES (32-031-0010)				77-89					
Reno - Stead (32-031-0011)				77					
Reno - Huffaker ES (32-031-0014)				80-89					
Reno - Center Street (32-031-0015)						82-85	82-90		
Sparks - Fire (32-031-1001)				68-69					
Verdi - ES (32-031-1002)				68-89					
Sparks - Nugget (32-031-1003)				72-80					
Sparks - TMWRF (32-031-1004)				74-89					
Sparks - Victorian (32-031-1006)			88	80-89					
Incline - Pump (32-031-2001)				72-89					
Wadsworth - Fire (32-031-2003)				73-75					
Empire - School (32-031-2005)				76-77					
Reno - Sun Valley (32-031-2006)			88-05	80-89					