Utah Division of Air Quality
2014 Annual Report

Courtesy Fox 13 News

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Acronyms

AO	Approval Order
AHERA	Asbestos Hazard Emergency Response Act
ATLAS	Air Toxics, Lead-Based Paint, and Asbestos Section
AMS	Air Monitoring Section
BACT	Best Available Control Technology
CAA	Clean Air Act
CAP	Compliance Advisory Panel
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CNG	Compressed Natural Gas
DAQ	Division of Air Quality
DEQ	Department of Environmental Quality
EPA	Environmental Protection Agency
GHG	Green House Gas
HAPs	Hazardous Air Pollutants
MACT	Maximum Available Control Technology
$\mu g/m^3$	Micrograms Per Cubic Meter
Micron	One Millionth of a Meter
NAAQS	National Ambient Air Quality Standards
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NOI	Notice of Intent
NO_2	Nitrogen Dioxide
NOV	Notice of Violation
NO_x	Nitrogen Oxides
NSPS	New Source Performance Standard
NSR	New Source Review
O_3	Ozone
PM	Particulate Matter
PM10	Particulate Matter Smaller Than 10 Microns in Diameter
PM2.5	Particulate Matter Smaller Than 2.5 Microns in Diameter
PPB	Parts Per Billion
PPM	Parts Per Million
SBEAP	Small Business Environmental Assistance Program
SCAN	Source Compliance Action Notice
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
SO_x	Sulfur Oxides
TSCA	Toxic Substances Control Act
TSP	Total Suspended Particles
UCAIR	Utah Clean Air Initiative
UAC	Utah Administrative Code
UBWOS	Uinta Basin Wintertime Ozone Study
VOC	Volatile Organic Compounds

NOTE

THIS REPORT IS INTENDED TO PROVIDE AN OVERVIEW OF UTAH'S AIR QUALITY. THIS REPORT IS PUBLISHED BEFORE END-OF-YEAR DATA CAN BE AUDITED AND MAY BE SUBJECT TO CHANGE.

Introduction

The mission of the Utah Division of Air Quality (DAQ) is to protect public health and the environment from the harmful effects of air pollution. It is the responsibility of DAQ to ensure that the air in Utah meets health and visibility standards established under the federal Clean Air Act (CAA). To fulfill this responsibility, DAQ is required by the federal government to ensure compliance with the U.S. Environmental Protection Agency's (EPA) National Ambient Air Quality Standards (NAAQS) statewide and visibility standards at national parks. DAQ enacts rules pertaining to air quality standards, develops plans to meet the federal standards when necessary, issues preconstruction and operating permits to stationary sources, and ensures compliance with state and federal air quality rules.

The DAQ allocates a large portion of its resources to implementing the CAA. The Utah Air Conservation Act empowers the Utah Air Quality Board to enact rules pertaining to air quality issues. The DAQ staff supports the Board in its policy-making role. Board membership provides representation from industry, local government, environmental groups, and the public, and includes the Executive Director of the Department of Environmental Quality. The board members have diverse interests, are knowledgeable in air pollution matters, and are appointed by the Governor with consent of the Senate. The Director of DAQ is the Board's Executive Secretary.

The Utah Air Quality Rules define the Utah air quality program. Implementation of the rules requires DAQ interaction with industry, other government agencies and the public. The state air quality program is responsible for the implementation of the federal standards under the CAA as well as state rules for pollution sources not regulated by the CAA.

2014 Synopsis

Generally speaking, emissions for criteria air pollutants either stayed the same or continued their downward trends in 2014.

The Division of Air Quality (DAQ) accomplished much in 2014 towards fulfilling our mission to safeguard human health and quality of life through improving the air quality throughout the state. With an increasing population and industrial base and more stringent federal air quality standards, it has been a challenge to meet air quality objectives; however, 2014 proved to be a year in which we made great strides to ensure cleaner air in the years to come.

The following is a brief list of notable air quality achievements from 2014:

- The Air Quality Board adopted several new rules and amended many more (30 rulemakings in total) to control the emissions of harmful pollutants into Utah's atmosphere. Perhaps most notable among them was the adoption of four new oil and gas rules, applicable state-wide, that establish general operating provisions, establish control requirements that are highly cost-effective, and ensure that existing air pollution control equipment operates effectively.

- The multi-agency study to understand and improve wintertime ozone in the Uinta Basin continued, and valuable information was collected on emissions inventories and sources. The results of this study are outlined in this report.
- The DAQ implemented several new programs and initiatives to encourage residents, businesses, and local governments to take actions to reduce emissions, including the Clean Air Retrofit Replacement, and Off-Road Technology (CARROT) Program and the Sole Source Heat Conversion Program.

Air Quality Standards

The Clean Air Act (CAA) as last amended in 1990 requires EPA to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. The CAA established two types of air quality standards: primary and secondary standards. Primary standards are set to protect public health, including the health of sensitive populations such as asthmatics, children, and the elderly. Secondary standards are set to protect public welfare, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

Standards are composed of a numerical value and a form (See Table 2). The form may be a statistical value, such as the 98th percentile calculation or a rolling average over a designated period of time that is then compared against the numerical value.

The EPA has established health-based NAAQS for six pollutants known as criteria pollutants. These are carbon monoxide, nitrogen dioxide, ozone, particulate matter, sulfur dioxide, and lead. Each of these pollutants is addressed in greater detail later in this chapter. Table 1 provides a brief description of each criteria pollutant and Table 2 provides a brief description of each criteria pollutant's primary and secondary NAAQS. The primary health standards are established by EPA after considering both the concentration level and the duration of exposure that can cause adverse health effects. Pollutant concentrations that exceed the NAAQS are considered unhealthy for some portion of the population. While the general public is not expected to be affected by the pollutant at concentrations between 1.0 and 1.5 times the standard, the most sensitive portion of the population may be adversely affected. However, at levels above 1.5 times the standard, even healthy people will see adverse effects.

The Division of Air Quality monitors each of these criteria pollutants, as well as several non-criteria pollutants for special studies at various monitoring sites throughout the state.

Table 1. EPA Designated Criteria Pollutants

Name	Sources	Health Effects	Welfare Effects
Carbon Monoxide (CO); a clear, colorless, odorless gas	Burning of gasoline, wood, natural gas, coal, oil, etc.	Reduces the ability of blood to transport oxygen to body cells and tissues. May be particularly hazardous to people who have heart or circulatory (blood vessel) problems and people who have damaged lungs or breathing passages.	
Nitrogen Dioxide (NO_2) (one component of NO_x); smog-forming chemical	Burning of gasoline, natural gas, coal, oil, and other fuels; Cars are also an important source of NO_2.	Can cause lung damage, illnesses of breathing passages and lungs (respiratory system).	Ingredient of acid rain (acid aerosols), which can damage trees, lakes, flora and fauna. Acid aerosols can also reduce visibility.
Ozone (O_3) (ground-level ozone is the principal component of smog)	Chemical reaction of pollutants; VOCs and NO_x.	Can cause breathing problems, reduced lung function, asthma, irritated eyes, stuffy noses, and reduced resistance to colds and other infections. It may also speed up aging of lung tissue.	Can damage plants and trees; smog can cause reduced visibility.
Particulate Matter (PM10, PM2.5); dust, smoke, soot	Burning of gasoline, natural gas, coal, oil and other fuels; industrial plants; agriculture (plowing or burning fields); unpaved roads, mining, construction activities. Particles are also formed from the reaction of VOCs, NO_x, SO_x and other pollutants in the air.	Can cause nose and throat irritation, lung damage, bronchitis, and early death.	Main source of haze that reduces visibility.
Sulfur Dioxide (SO_2)	Burning of coal and oil (including diesel and gasoline); industrial processes.	Can cause breathing problems and may cause permanent damage to lungs.	Ingredient in acid rain (acid aerosols), which can damage trees, lakes, flora and fauna. Acid aerosols can also reduce visibility.
Lead (Pb)	Paint (houses, cars), smelters (metal refineries); manufacture of lead storage batteries; note: burning leaded gasoline was the primary source of lead pollution in the US until unleaded gasoline was mandated by the federal government.	Damages nervous systems, including brains, and causes digestive system damage. Children are at special risk. Some lead-containing chemicals cause cancer in animals.	Can harm wildlife.

Table 2. Ambient Air Quality Standards for Criteria Air Pollutants

Ambient Air Quality Standards				
Pollutant	**Averaging Time**	**Primary/ Secondary**	**Standard**	**Form**
Ozone	8 Hour	Primary and Secondary	0.075 ppm	Annual fourth-highest daily maximum 8-hr concentration, averaged over three years
Respirable Particulate Matter (PM10)	24 Hour	Primary and Secondary	150 µg/m^3	Not to be exceeded more than once per year on average over three years
Fine Particulate Matter (PM2.5)	24 Hour	Primary and Secondary	35 µg/m^3	98th percentile, averaged over three years
	Annual	Primary	12 µg/m^3	Annual mean, averaged over three years
		Secondary	15 µg/m^3	Annual mean, averaged over three years
Carbon Monoxide (CO)	1 Hour	Primary	35 ppm	Not to be exceeded more than once per year
	8 Hour	Primary	9 ppm	Not to be exceeded more than once per year
Nitrogen Dioxide (NO2)	1 Hour	Primary and Secondary	100 ppb	98th percentile, averaged over three years
	Annual	Primary and Secondary	53 ppb	Annual Mean
Sulfur Dioxide (SO2)	1 Hour	Primary	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over three years
	3 Hour	Secondary	50 ppb	Not to be exceeded more than once per year
Lead	Rolling 3 month average	Primary and Secondary	0.15 µg/m^3	Not to be exceeded

Ambient Air Quality in Utah

Utah's Air Monitoring Network

The Air Monitoring Section operates a network of monitoring stations throughout Utah. The monitors are situated to measure air quality in open areas, neighborhoods and industrial areas. Table 3 shows the monitoring station locations and monitored constituents for stations operated in 2014.

Table 3. Utah Monitoring Network Stations

Station	City	Address	CO	NO_2	Hg	O_3	PM10	PM2.5	SO_2	Pb	Met.
Air Monitoring Center	SLC	2861 W. Parkway Blvd.			X						
Antelope Island	None	North end of island									X
Badger Island	None	On Island									X
Beach	Lake Point	1200 S. 12100 W.				X			X		X
Bountiful	Bountiful	200 W. 1380 N.		X		X	X	X			X
Brigham City	Brigham City	140 W. Fishburn				X		X			X
Harrisville	Harrisville	425 W. 2250 N.				X					X
Hawthorne	SLC	1675 S. 600 E.	X	X		X	X	X	X	X	X
Herriman	Riverton	14058 Mirabella Dr.		X		X					X
Hurricane	Hurricane	150 N. 870 W.		X		X	X	X			X
Lindon	Lindon	30 N. Main St.					X	X			X
Logan	Logan	125 W. Center St.		X		X	X	X			X
Magna	Magna	2935 S. 8560 W.					X	X	X	X	X
North Provo	Provo	1355 N. 200 W.	X	X		X	X	X			X
Ogden #2	Ogden	228 East 32nd St.	X	X		X	X	X			X
Price #2	Price	351 S. Weasel Run Rd.		X		X					X
Roosevelt	Roosevelt	290 S. 1000 W.		X		X		X			X
Rose Park	SLC	1354 W. Goodwin Ave.						X			
Saltaire	None	6640 W. 1680 N.									X
Spanish Fork	Spanish Fork	312 W. 2050 N.				X		X			X
Syracuse	Syracuse	4700 W. 1700 S.									X
Tooele	Tooele	434 N. 50 W.				X		X			X
Vernal	Vernal	6200 S 4500 W		X		X		X			X
West Jordan	West Jordan	4540 W. 8700 S.									X

NAAQS Nonattainment & Maintenance Areas

Areas that are not in compliance with the NAAQS are referred to as nonattainment areas. Figure 1 contains maps of the current nonattainment areas within the state. A maintenance area (also shown in Figure 2) is an area that was once designated as nonattainment, and which subsequently demonstrated to EPA statistically that it will attain and maintain a particular standard for a period of 10 years. EPA must approve the demonstration.

Figure 1. Utah Nonattainment Areas

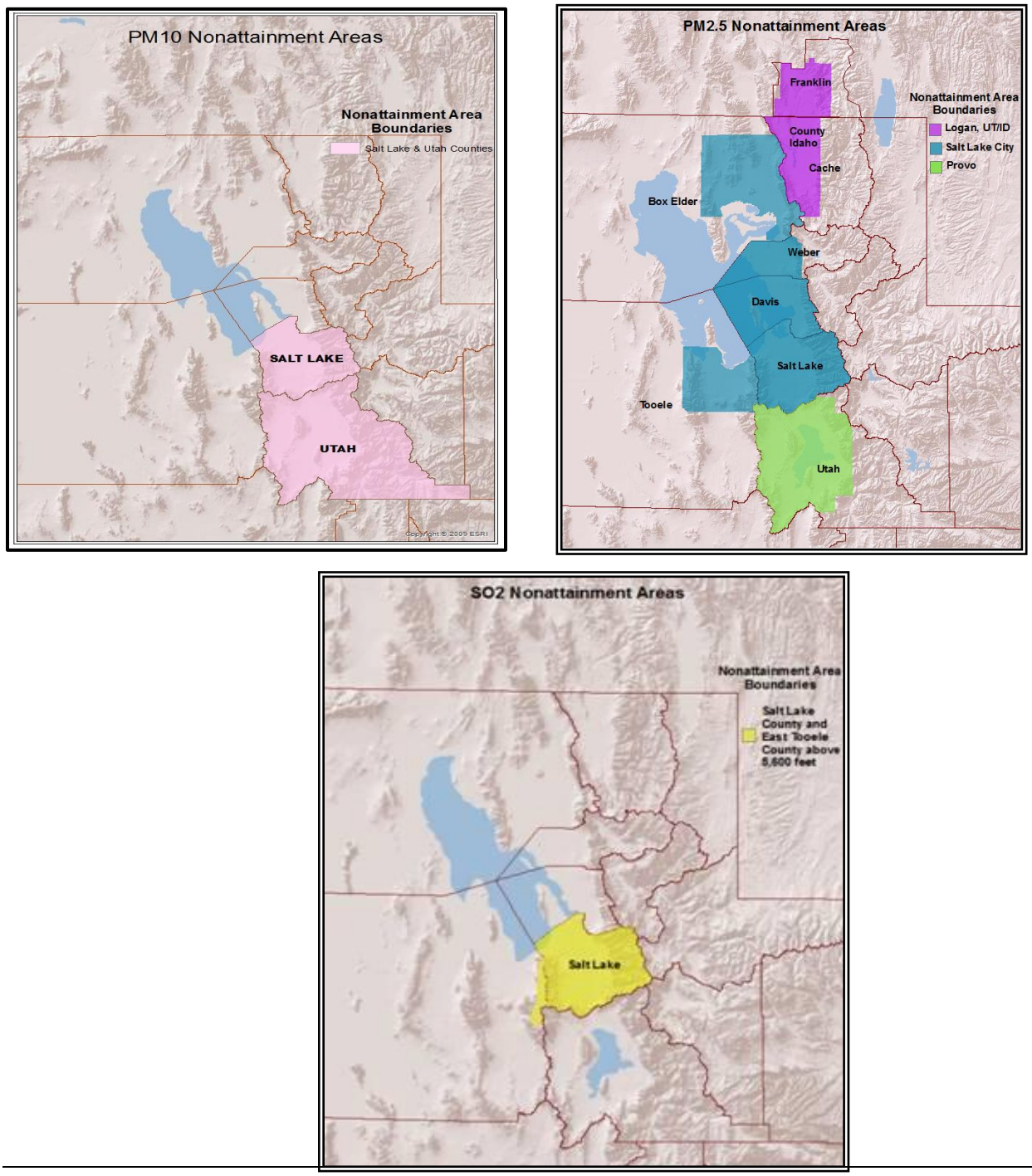
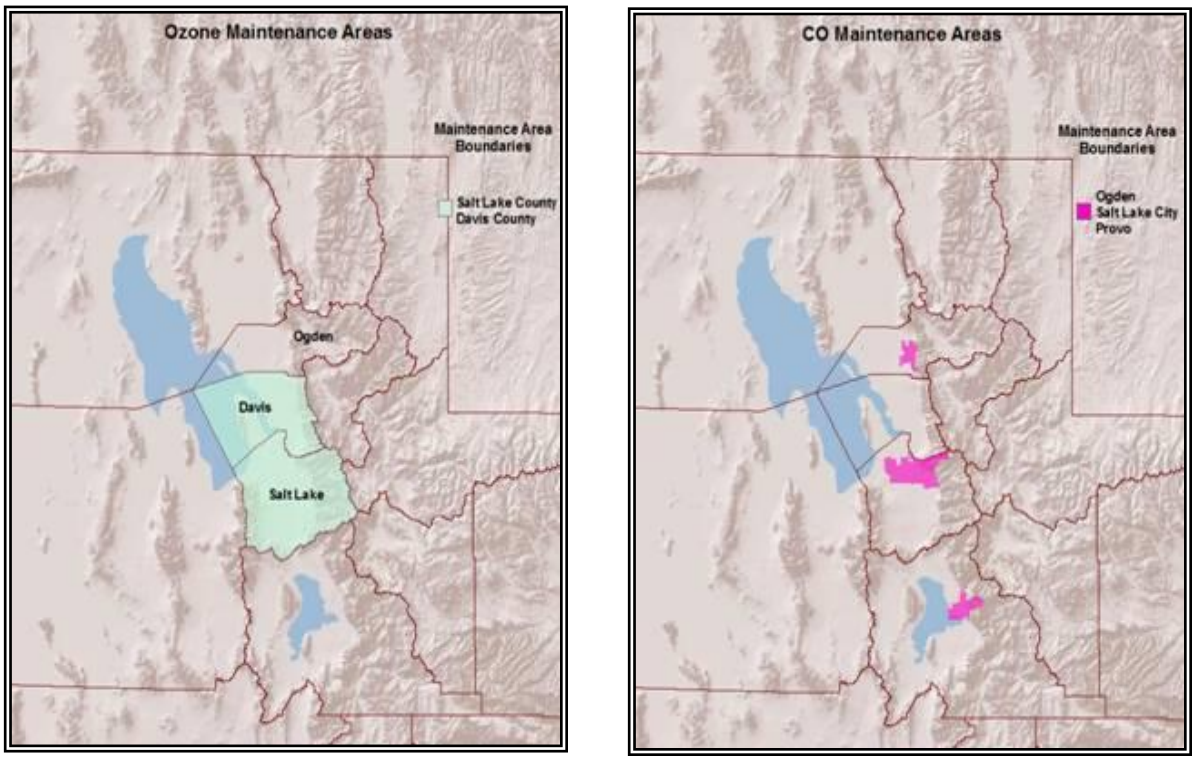


Figure 2. Utah Maintenance Areas



Criteria Air Pollutants

Carbon Monoxide (CO)

Carbon monoxide is a colorless and odorless gas formed by the incomplete combustion of carbon-based fuel. Carbon monoxide is primarily produced from on-road motor vehicle emissions. Other significant sources of CO emissions are wood burning stoves and fireplaces. The remaining emissions come from industrial facilities, construction equipment, miscellaneous mobile sources and other types of space heating.

Because motor vehicle emissions are a major source of CO, the highest concentrations occur during morning and evening rush hours near high-traffic areas. The worst problems occur when there are large numbers of slow-moving vehicles in large parking lots, busy intersections, and traffic jams. Historically, as exhibited in the CAA, it was EPA's presumption that all elevated CO levels were the result of mobile source emissions, and a state had to go through a rigorous demonstration to prove otherwise. In Utah, areas of elevated CO concentrations were always found near roadways. Carbon monoxide problems are greater in winter due to several factors: cold weather makes motor vehicles run less efficiently, wood burning and other space heating takes place in the winter, and cold weather temperature inversions trap CO near the ground.

Standards

EPA has developed two national standards for CO. They are 35 ppm of CO averaged over a one-hour period and 9 ppm of CO averaged over an eight-hour period. A violation of the NAAQS occurs with the second exceedance of either standard at a single location in a calendar year. Once a location measures a second exceedance of either standard, it is considered to be in violation and becomes designated as a "nonattainment area." Three cities in Utah (Salt Lake City, Ogden, and Provo) were at one time designated nonattainment areas for CO. Due primarily to improvements in motor vehicle technology, Utah has been in compliance with the CO standards since 1994. Salt Lake City, Ogden, and Provo were successfully re-designated to attainment status in 1999, 2001, and 2006, respectively.

Figure 3. Carbon Monoxide Second Highest 1-Hour Concentration

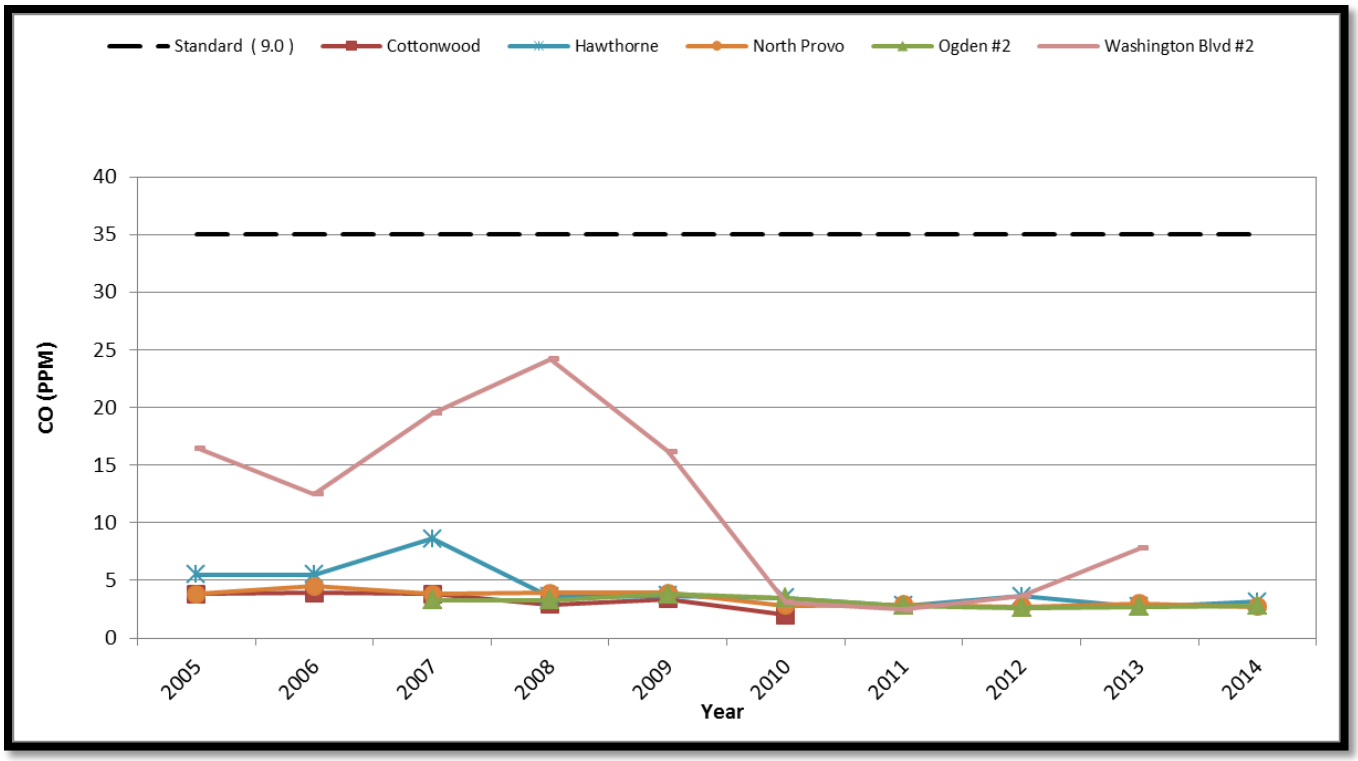
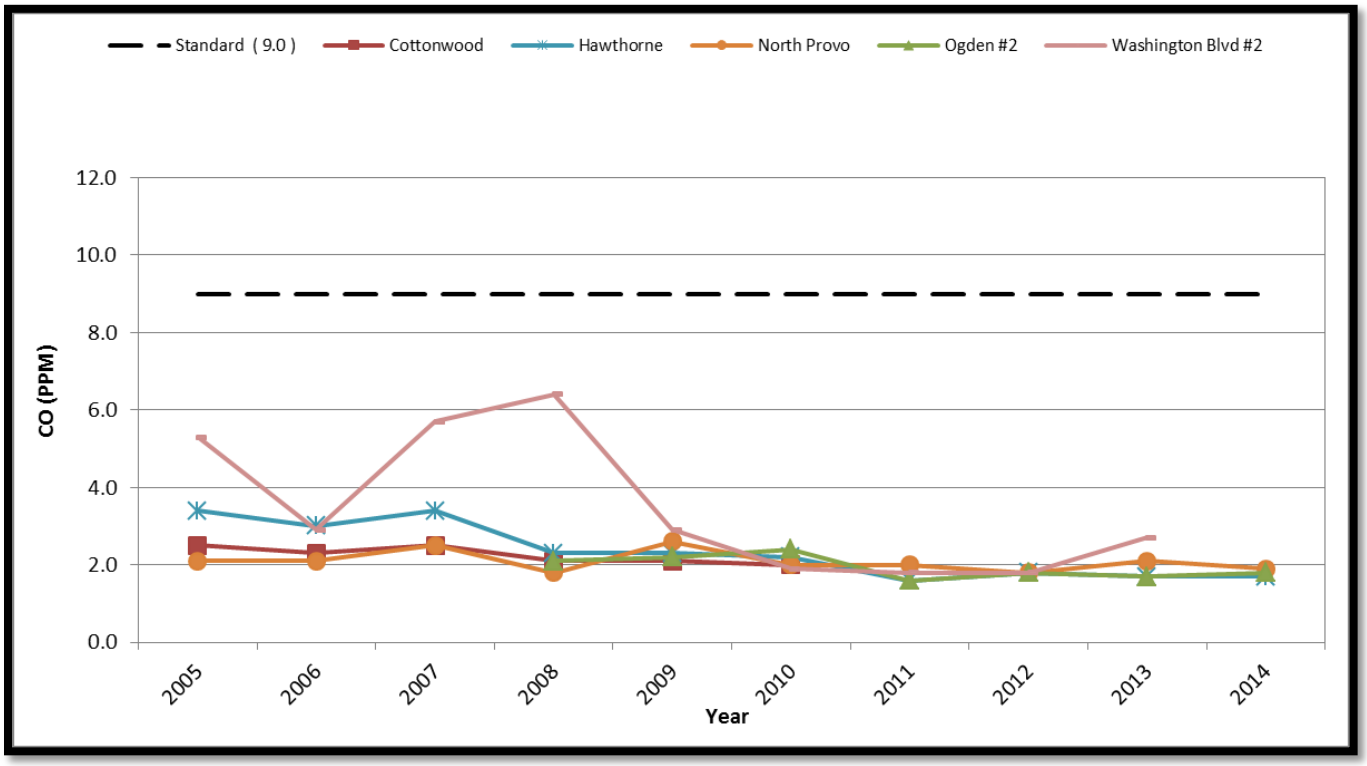


Figure 4. Carbon Monoxide Second Highest 8-Hour Concentration



Nitrogen Dioxide (NO_2)

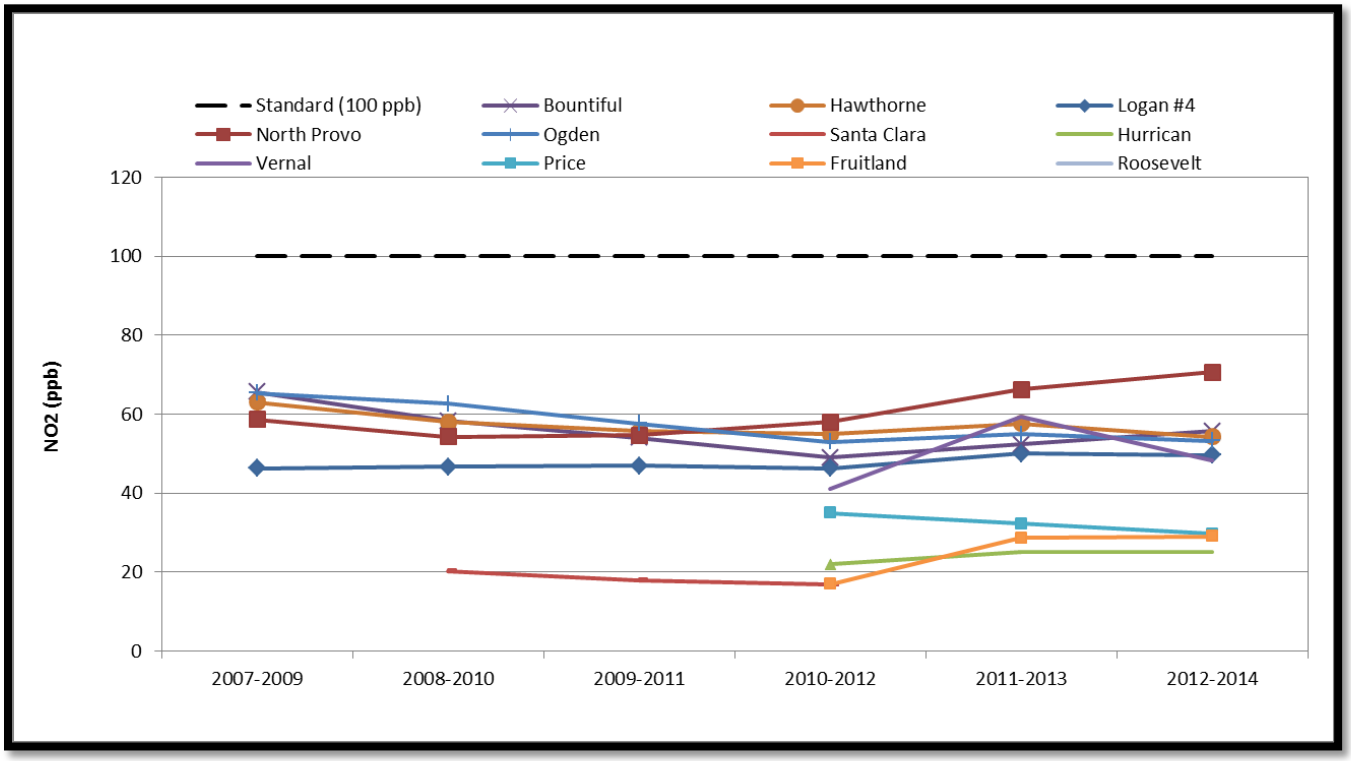
During high temperature combustion, nitrogen in the air reacts with oxygen to produce various oxides of nitrogen, or NO_x, a reddish-brown gas. One of the oxides of nitrogen, NO_2, is a criteria pollutant.

Oxides of nitrogen react with other air contaminants to form other criteria pollutants. In the summer along the Wasatch Front, and in the winter in the Uinta Basin, photochemical reactions between NO_2 and volatile organic compounds lead to the formation of ground-level ozone. In the winter, NO_2 reacts with ammonia to form fine particulate matter ($PM_{2.5}$). Both of these seasonal scenarios can result in increased pollution. Utah continues to struggle with both the ozone and particulate matter standards; and because of this, the Division of Air Quality (DAQ) is mindful of the trend in NO_2 emissions illustrated in Figure 5.

Standard

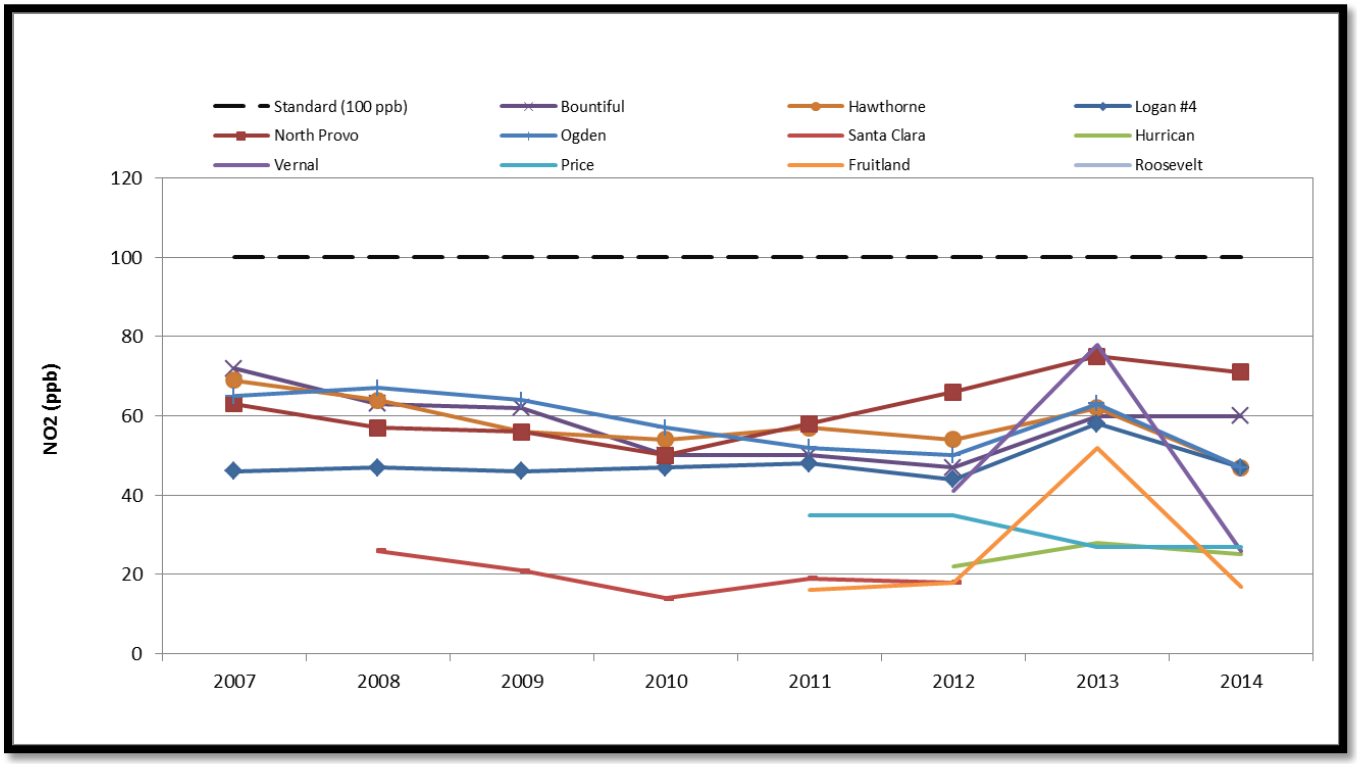
EPA has developed two national standards for NO_2—an hourly standard and an annual standard. The hourly standard is set at 100 ppb measured as the three-year average of the 98th percentile of the annual distribution of daily maximum one-hour average concentrations. Utah has never exceeded this standard.

Figure 5. Three year average Nitrogen Dioxide Hourly Averages (PPB)



The annual NO_2 standard of 0.53 ppm is expressed as an annual arithmetic mean (average). DAQ monitors the concentrations of NO_2 at various locations throughout the state and has never observed a violation of the annual standard.

Figure 6. Nitrogen Dioxide Annual Averages



Ozone (O_3)

Ozone is a clear, colorless gas composed of molecules of three oxygen atoms. Ground level ozone can be inhaled and is considered a pollutant. Ground-level ozone should not be confused with the stratospheric ozone layer that is located approximately 15 miles above the earth's surface. It is this layer that shields the earth from cancer-causing ultraviolet radiation. Ground level ozone is formed by a complex chemical reaction involving volatile organic carbon compounds (VOCs) and oxides of nitrogen in the presence of sunlight.

Ozone production is a year-round phenomenon. However, the highest ozone levels generally occur during the summer when strong sunlight, high temperatures, and stagnant meteorological conditions combine to drive the chemical reactions and trap the air within a region for several days. There are unique circumstances where high ozone levels can occur during the wintertime. In Utah, wintertime ozone is associated with temperature inversions and

snow cover. Research is on-going to better understand the chemical processes that lead to wintertime ozone production.

Some major sources for VOCs and NOx are vehicle engine exhaust, emissions from industrial facilities, gasoline vapors, chemical solvents, oil and gas production and biogenic emissions from natural sources such as vegetative growth.

Standard

The current NAAQS for ozone is 75 ppb, based on a three-year average of the annual 4th highest daily eight-hour average concentration. On November 25, 2014 EPA proposed to strengthen the ozone standard to within a range of 65 to 70 ppb and is expected to finalize the standard by October 2015.

Figure 7 shows the annual 4th highest eight-hour ozone concentrations, and Figure 8 shows how each area compares to the NAAQS with the three-year average of the 4th highest eight-hour ozone concentration. The heavy red dashed lines indicate the current standard of 0.075 ppm while the heavy black dashed lines represent the former standard of 0.084 ppm. All ozone monitors operated by the Division of Air Quality (DAQ) were below the level of the NAAQS in 2014; however, one tribal monitor in Uintah County exceeded the NAAQS during the month of January. If the standard is strengthened as proposed by EPA, a significant portion of Utah could exceed the new standard. The emission reduction strategies that were recently adopted to reduce wintertime particulate pollution in northern Utah should also reduce summertime ozone pollution. DAQ is working with the Ute Tribe and the Environmental Protection Agency to develop emission reduction strategies in Eastern Utah through EPA's Ozone Advance Program to improve wintertime ozone values in the Uinta Basin.

Figure 7. Ozone 4th Highest 8-Hour Concentration

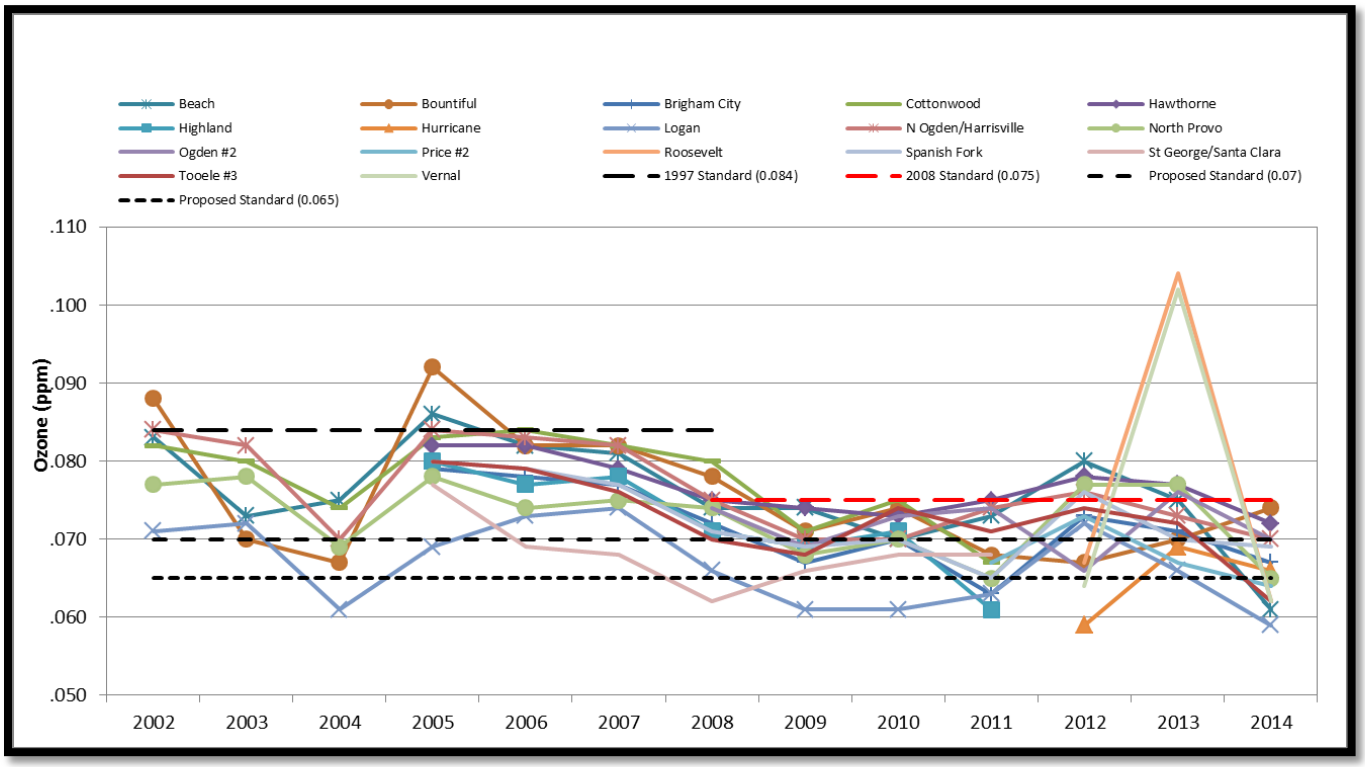
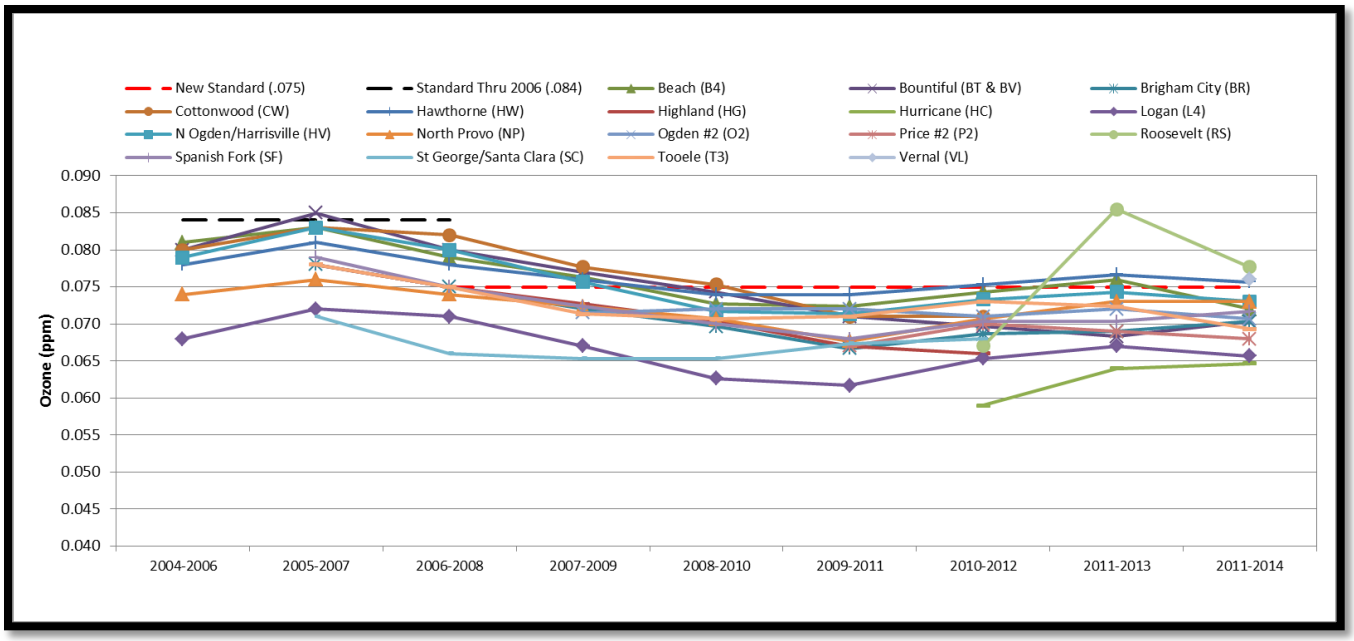


Figure 8. 3-Year Average 4th Highest 8-Hour Ozone Concentration



Particulate Matter

Regulated particulate matter is a complex mixture of extremely tiny particles of solid or semi-solid material suspended in the atmosphere and is divided into two categories: PM_{10} and $PM_{2.5}$.

PM_{10} is particulate less than 10 micrometers in diameter, which is about one-seventh the width of a strand of human hair. $PM_{2.5}$, or fine particulate, is a subset of PM_{10} that measures 2.5 micrometers in diameter or less. The coarse fraction of PM_{10}, that which is larger than 2.5 microns, is typically made up of "fugitive dust" (sand and dirt blown by winds from roadways, fields, and construction sites) and contains large amounts of silicate (sand-like) material. Primary $PM_{2.5}$ is directly emitted into the atmosphere from combustion sources and includes fly ash from power plants, carbon black from cars and trucks, and soot from fireplaces and woodstoves. These particles are so small that they can become imbedded in human lung tissue, exacerbating respiratory diseases and cardiovascular problems. Other negative effects are reduced visibility and accelerated deterioration of buildings.

The majority of Utah's $PM_{2.5}$ is called secondary aerosol, meaning that it is not emitted directly as a particle, but is produced when gasses such as SO_2, NOx, and volatile organic compounds (VOC) react with other gasses in the atmosphere, such as ammonia, to become tiny particles. Wintertime temperature inversions not only provide ideal conditions for the creation of secondary aerosols, they also act to trap air in valleys long enough for concentrations of $PM_{2.5}$ to build up to levels that can be unhealthy. The smallest of particles that make up $PM_{2.5}$ are major contributors to visibility impairment in both urban and rural areas. Along the Wasatch Front, the effects can be seen as the thick brownish haze that lingers in our northern valleys, particularly in the winter. The Division of Air Quality (DAQ) currently operates PM_{10} and $PM_{2.5}$ monitors throughout the state to assess the ambient air quality with respect to the standards for both PM_{10} and $PM_{2.5}$.

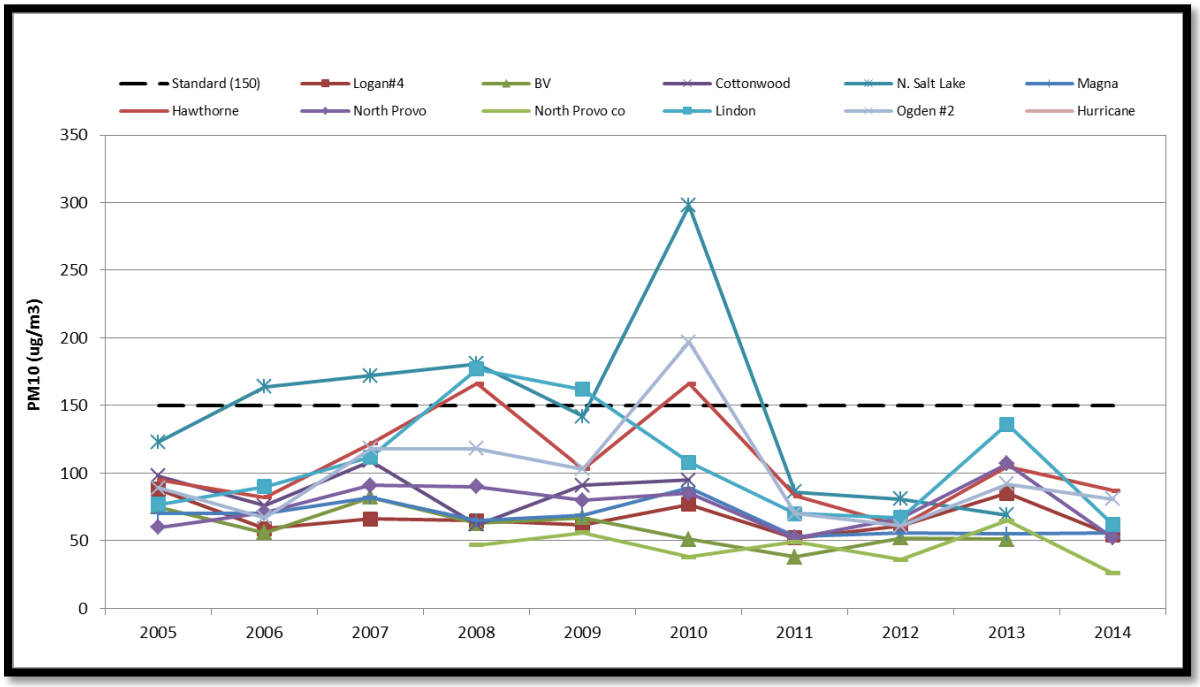
Standards – PM_{10}

The 24-hour air quality standard for PM_{10} was established by the EPA in July 1987 and was set at 150 $\mu g/m^3$. The standard is met when the probability of exceeding the standard is no greater than once per year for a three-year averaging period. In other words, four exceedances within a three-year period would constitute a violation. Utah and Salt Lake counties are officially designated as PM_{10} nonattainment areas because of past difficulty with the 24-hour standard. Control strategies contained in the State Implementation Plan promulgated in 1991 are responsible for the marked decrease in concentrations observed in the early 1990s. Ogden was also designated as a nonattainment area due to one year of high concentrations (1992), but was determined to be attaining the standard in January 2013.

High monitoring values sometimes result from exceptional events such as dust storms and wildfires, as is the case for 2010 when Utah experienced an exceptional dust storm on March 30 which resulted in very high PM_{10} values across the network. Data collected during exceptional events incurred from 2008 through 2011 have been flagged by DAQ and are currently under review for exclusion per the EPA Exceptional Event Rule. There were no exceptional events for high-wind or fire in 2012, 2013 or 2014. Figure 9 shows the second

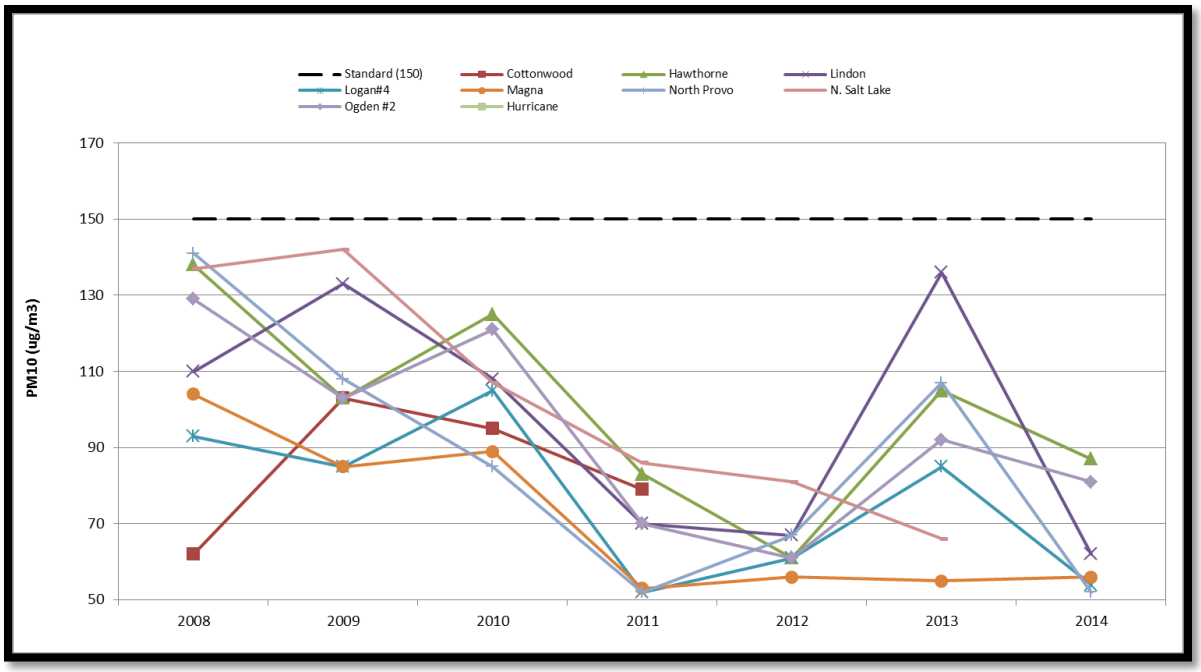
highest 24-hour PM_{10} concentrations recorded at each station since 2000. The heavy dashed line indicates the NAAQS. The following graph excludes the values influenced by exceptional events.

Figure 9. PM10 Second Highest 24-Hour Concentration



Excepting data impacted by exceptional events, Utah has been in compliance with the PM_{10} NAAQS, as demonstrated in Figure 10.

Figure 10. PM10 Second Highest 24-Hour Excluding Exceptional Events

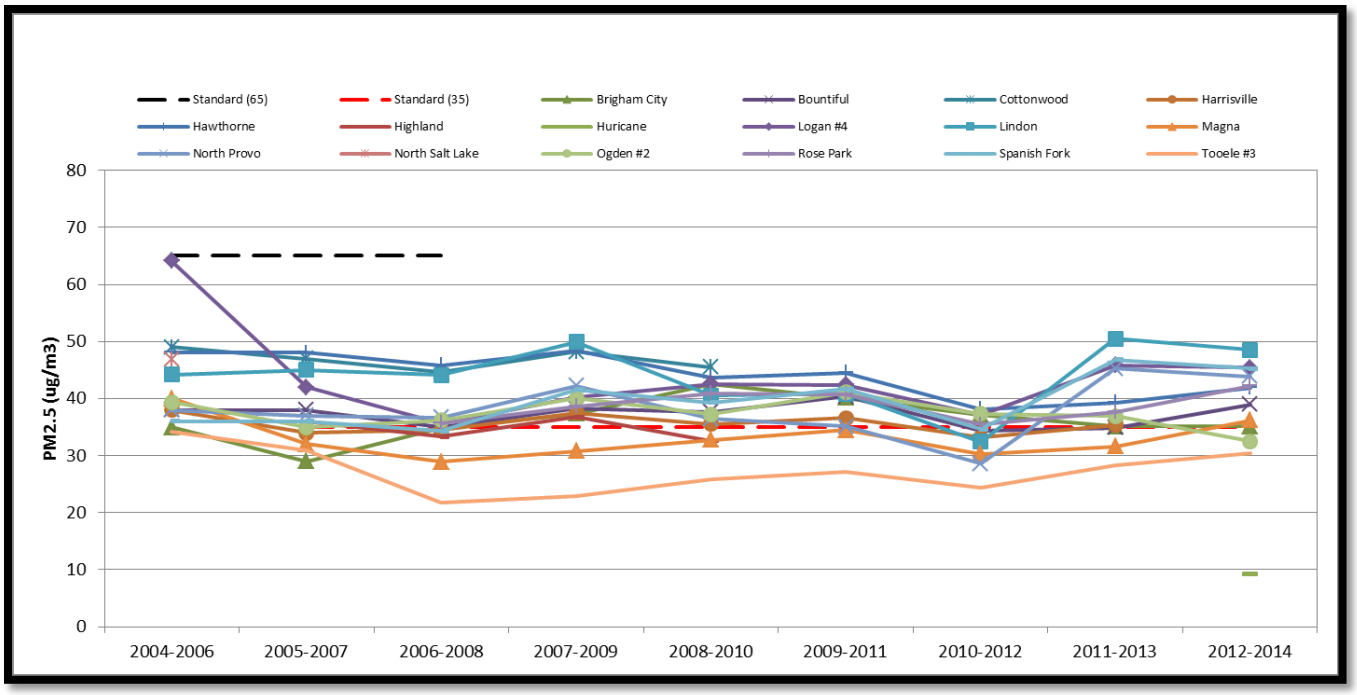


Standards – $PM_{2.5}$

EPA first established standards for $PM_{2.5}$ in 1997 and then revised those standards in December of 2006 and again in December of 2012. In 2006, EPA lowered the 24-hour $PM_{2.5}$ standard from 65 µg/m^3 to 35 µg/m^3. In 2012, EPA lowered the annual standard from 15 µg/m^3 to 12 µg/m^3. Both standards are evaluated by considering monitored data collected during a three-year period. In this way, the effects of meteorological variability are minimized.

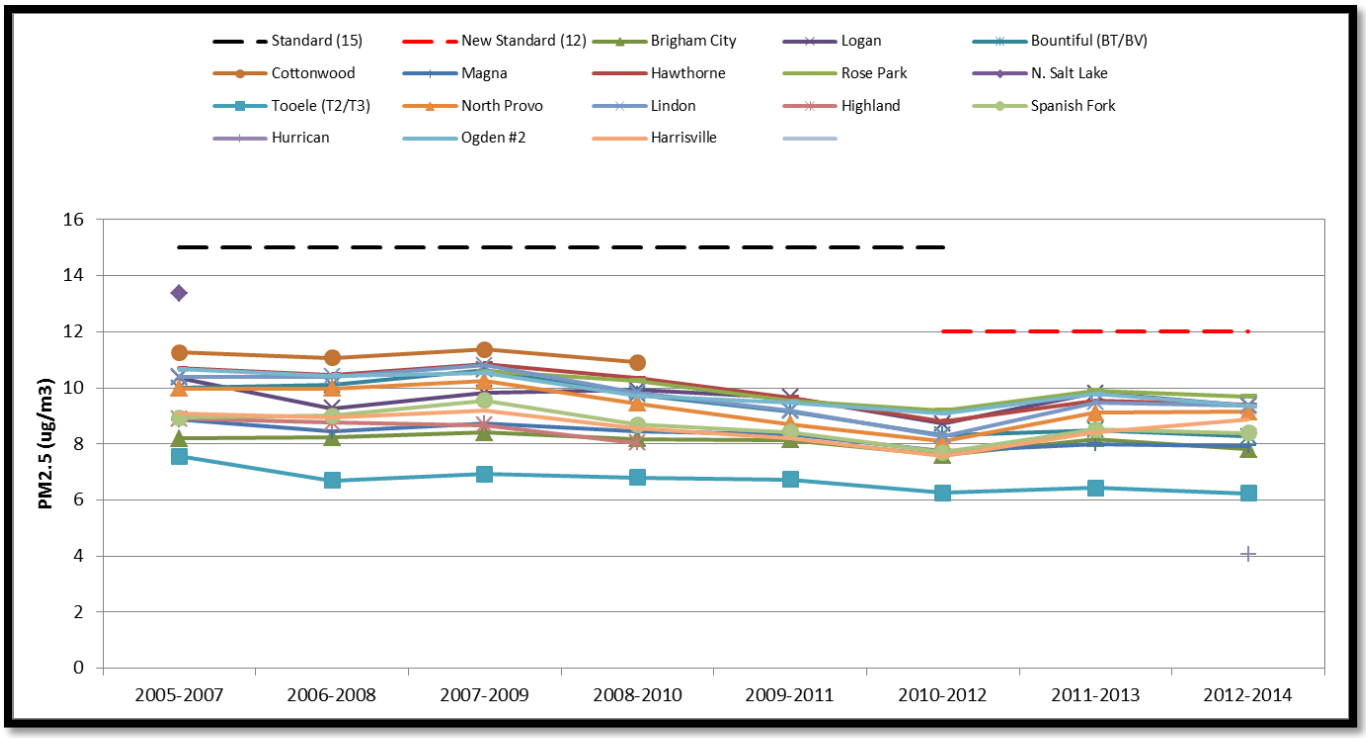
The 24-hour standard is met when the average of 98th percentile values collected for each of the three years is less than or equal to 35 µg/m^3. The 98th percentile concentration for each year is selected from all of the data recorded at a given monitor, such that the values of at least 98 percent of all that data are of a lower concentration. Figure 11 shows the three-year averages of the 98th percentile concentrations at Wasatch Front monitors and that Utah was in compliance with the 1997 standard, but is not in compliance with the revised standard.

Figure 11. PM2.5 3-year Average 98th Percentile 24-Hour Concentration



Figures 12 shows that the three-year averages at all locations are within the annual standard of 12 µg/m3.

Figure 12. 3-Year Average PM2.5 Annual Mean Concentration



Sulfur Dioxide (SO_2)

Sulfur dioxide is a colorless gas with a pungent odor. In the atmosphere, sulfur dioxide is easily converted into sulfates, which are detected as particulates. It is also converted into sulfuric acid, the major acidic component of acid rain. It is emitted primarily from stationary sources that burn fossil fuels (mainly coal and oil) such as power plants and refineries. SO_2 is also a byproduct of copper smelting. Diesel fuel and, to a lesser extent, gasoline contain sulfur and are considered contributors to sulfur dioxide in the atmosphere.

Standards

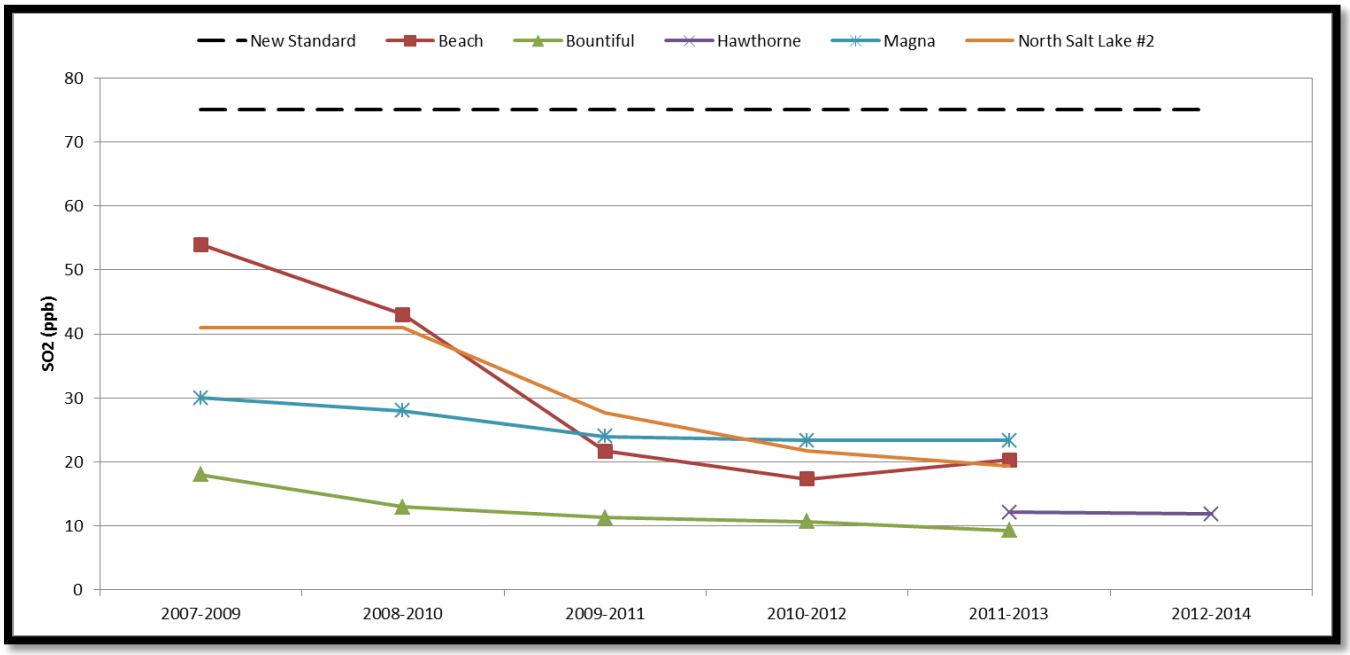
The primary standard for SO_2 is a three-year average of the 99th percentile of the annual distribution of daily maximum one-hour average concentrations for SO_2 at a level of 75 ppb. The secondary standard is a three-hour standard of 50 ppb and is not to be exceeded more than once per year.

Throughout the 1970s, the Magna monitor routinely measured violations of the former 24-hour standard. Consequently, all of Salt Lake County and parts of eastern Tooele County above 5600 feet were designated as nonattainment for SO_2. Two significant technological upgrades at the Kennecott smelter resulted in continued compliance with the SO_2 standard since 1981. In the mid 1990s, Kennecott, Geneva Steel, the five refineries, and several other large sources of SO_2 made dramatic reductions in emissions as part of an effort to curb concentrations of secondary particulate (sulfates) that were contributing to PM_{10} violations. Utah submitted an SO_2 Maintenance Plan and re-designation request for Salt Lake and Tooele Counties to EPA

in April of 2005. Measurements of SO_2 under the former standards and the new standard indicate that Utah's ambient air has been well within the federal health standards for decades.

Figure 13 shows the most current measurements to compare against the primary SO_2 NAAQS of 75 ppb.

Figure 13. 3-Year Average of Sulfur Dioxide 99th Percentile of Daily Max. One-Hour Averages



Lead (Pb)

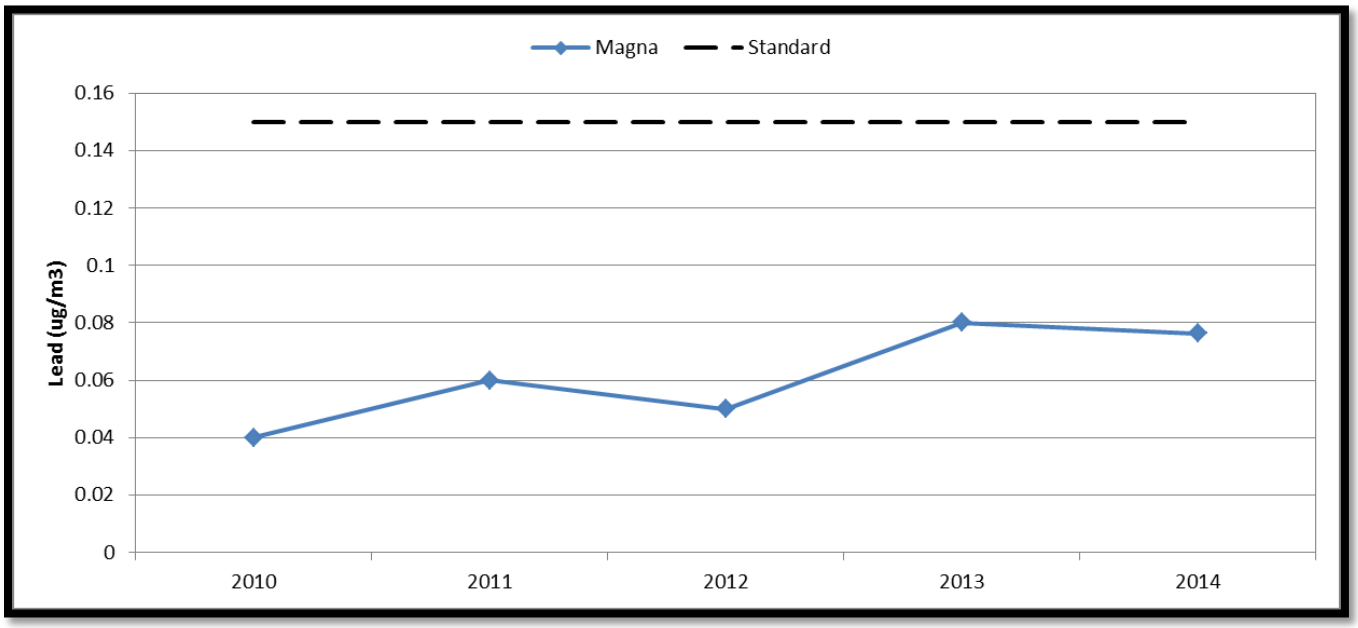
Lead in the ambient air exists primarily as particulate matter in the respirable size range. Historically, the major source of lead emissions came from the burning of gasoline. However, because leaded gasoline for automobiles was completely phased out in the US by the end of 1995, lead from gasoline is no longer a significant problem. Currently, the primary source of lead emissions in Utah is the extraction and processing of metallic ores. Exhaust from small aircraft is another source of lead emissions in the state.

Utah has not exceeded the health standard for lead since the late 1970s, and EPA authorized the discontinuation of lead monitoring in Utah in 2005; however, in both 2008 and 2010, EPA set new monitoring requirements for lead. The Division of Air Quality (DAQ) now monitors for lead at one point source site and one urban non-source monitoring location. Figure 14 shows a downward trend of lead emissions.

Standard

On November 12, 2008, EPA strengthened the NAAQS for lead. The previous standard was a calendar quarter (three-month) average concentration not to exceed 1.5 µg/m^3. The new standard is 0.15 µg/m^3 as total suspended particles (TSP), measured as a three-month rolling average. The new standard included a monitoring requirement, so DAQ began lead monitoring again at the Magna station near the Kennecott copper smelter (See Figure 14). Additional monitoring requirements established by EPA in December 2010 required monitoring for lead starting in 2011 at the Hawthorne monitoring station.

Figure 14. Lead Max Three-Month Average 24-Hour Concentration



Emissions Inventories

Every three years, the Division of Air Quality (DAQ) collects information about the quantity and characteristics of the various air pollutants released by all emission sources in the state. In addition to these triennial inventories, emissions information is also collected annually from the largest industrial sources. Finally, more detailed inventories are prepared as needed for special projects to quantify emissions during specific seasonal air pollution episodes.

Once collected, the inventory information is reviewed, quality assured, analyzed, stored in the DAQ data system, and made available to the public. This emissions information is used by DAQ to review trends over time, as input data for air quality modeling analyses and as an indicator of the effectiveness of existing control strategies. The emissions information is also compiled according to source type to provide billing information for the Title V operating permits program. Both triennial and annual emissions inventory data is uploaded to EPA's National Emissions Inventory (NEI) data system.

Sources of Air Contaminants

Emission inventories are typically organized into three types of sources: Point, Area and Mobile.

Point sources are large stationary industrial or commercial facilities such as power plants, steel mills, and manufacturing facilities that emit more than 100 tons per year of a regulated pollutant or are on a list of sources EPA has determined need to be tracked closely. Air pollutants released from these stationary sources are accounted for on a facility-by-facility basis.

Area sources are generally much smaller stationary sources, and due to their greater number, are generally accounted for as a group. However, as the federal air quality standards become more restrictive, it is becoming necessary to start tracking emissions more closely from smaller industrial sources. In the future, pollution from sources of less than 100 tons per year will be tracked similarly to the large point sources. Home heating, agricultural burning and harvesting, construction, residential and commercial energy generation, wildfires, and biogenics (emissions from vegetation) are examples of other area source categories.

Mobile sources make up the third category in the inventory, and consist of emissions from non-stationary sources such as cars, trains, and aircraft. Mobile emissions are further broken down into on-road mobile and off-road mobile categories. On-road mobile sources primarily consist of personal and commercial cars and trucks, and contribute by far the largest part of the mobile source emissions. Off-Road Mobile sources consist of a diverse group of heavy construction equipment, small engines (lawnmowers and snow blowers), trains, and aircraft. Estimating emissions from mobile sources requires an understanding of the various emission characteristics of the many types of vehicles and model years that make up the fleet, as well as an understanding of how and where they are driven and the distances they travel.

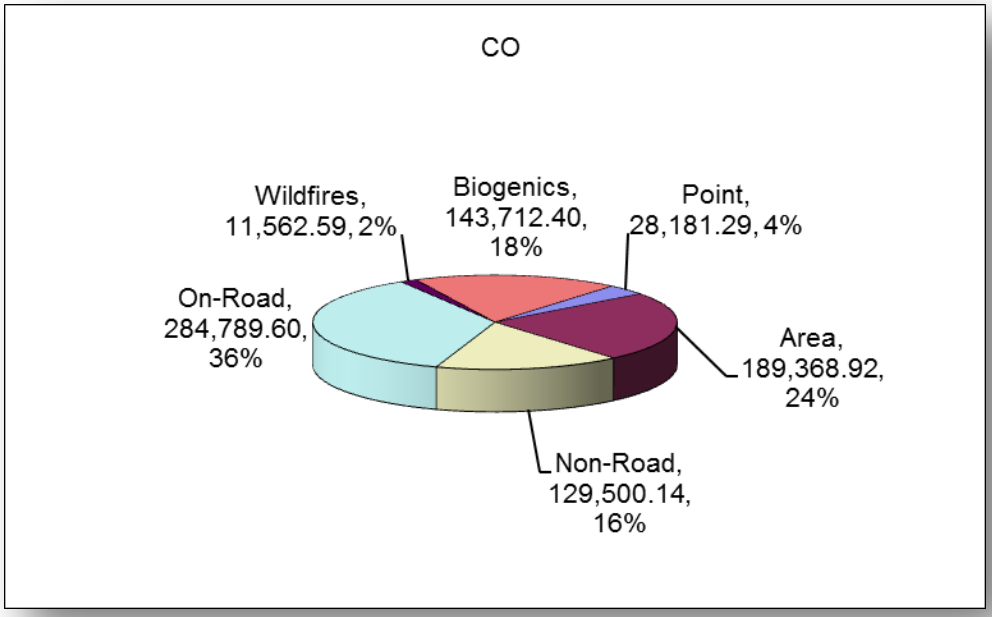
The 2011 triennial inventory is the most recent state-wide inventory available. The 2014 triennial inventory will be made available 2015. The triennial inventory covers over 440 individual point sources, 99 area source categories, and 12 non- and on-road source categories. Table 4 shows total emissions, by county, of the criteria pollutants, CO, NOx, PM_{10}, $PM_{2.5}$, SO_X, and VOCs. Figure 15 shows the updated 2011 triennial emissions inventory in six pie charts, displaying the relative portion of emissions generated within source categories. The figures in the charts are statewide, annual figures and should not be compared to the inventories used in the $PM_{2.5}$ or other SIPs, which are seasonal and area specific. Biogenic and wildfire emissions produced from non-anthropogenic (non-human), natural activity of vegetation and wildfires are usually estimated as segments within the area source category but have been listed separately due to their unique nature and impact.

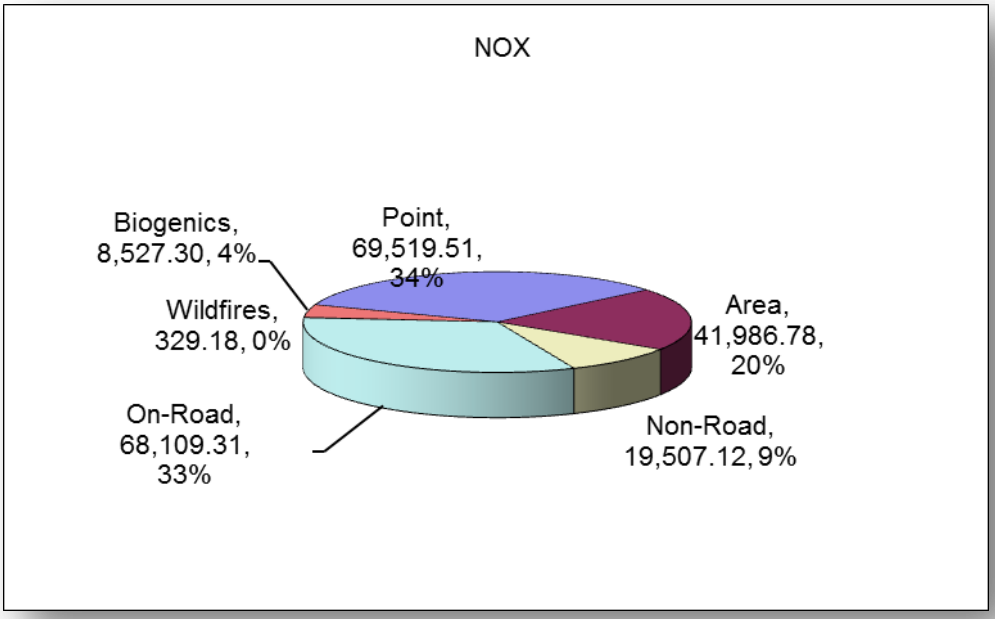
The triennial inventory for 2011 was collected and compiled in 2012. The inventory as reported in this report differs from that of the 2013 report because many of the area source calculations were re-done using new calculations provided by the EPA.

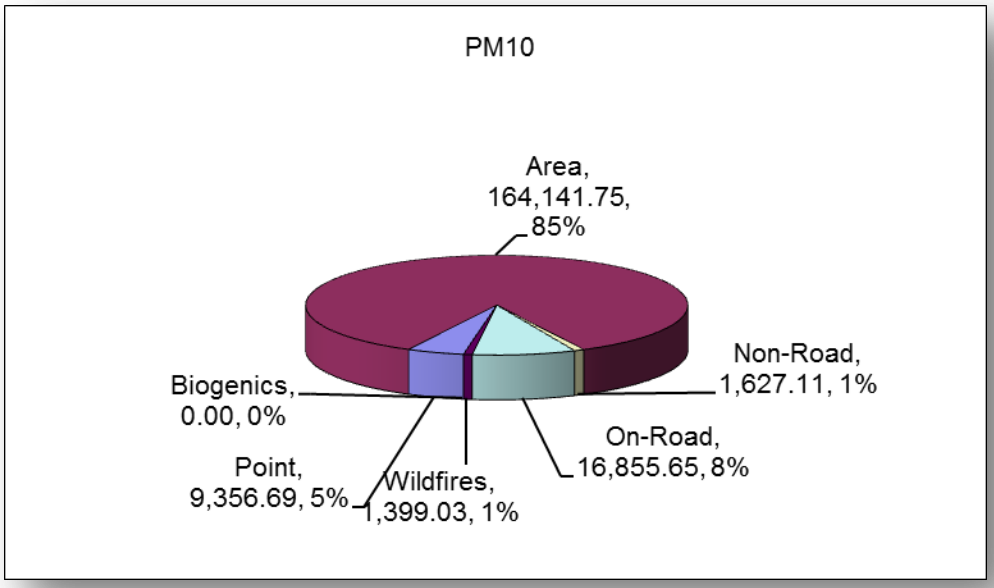
Table 4. 2011 Triennial Inventory (tons/year)

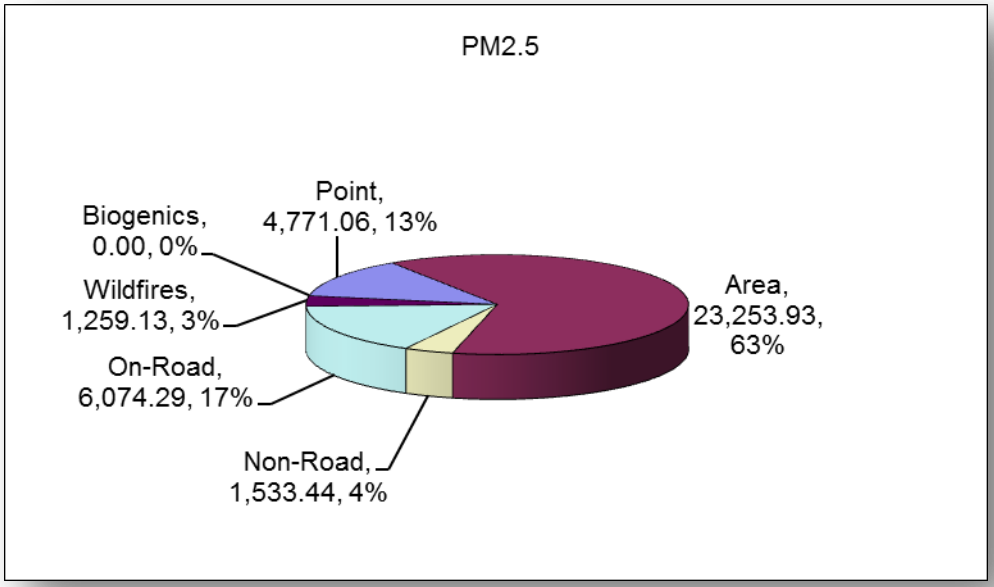
County	CO	NOX	PM10	PM25	SOX	VOC
Beaver	13,876.11	2,078.78	2,654.91	435.75	75.43	26,490.32
Box Elder	40,011.70	7,365.61	10,313.27	2,121.20	163.36	38,770.82
Cache	22,510.87	3,842.06	10,853.50	1,646.53	171.90	13,437.44
Carbon	11,115.87	7,152.88	4,676.13	1,151.84	8,381.46	17,875.37
Daggett	3,858.12	1,324.00	604.13	94.49	2.42	8,386.19
Davis	38,461.71	9,368.20	7,601.20	1,806.84	474.24	12,718.38
Duchesne	19,793.48	11,934.27	6,911.63	1,081.65	144.44	57,798.47
Emery	30,834.95	22,211.84	5,390.12	1,133.08	7,245.87	36,804.91
Garfield	23,180.30	1,056.79	2,717.87	506.42	16.81	44,847.92
Grand	22,148.98	3,124.67	1,831.09	445.87	26.76	37,252.92
Iron	26,642.81	4,254.25	6,178.28	1,177.85	166.82	37,643.98
Juab	18,322.63	3,319.29	2,845.94	567.19	94.11	26,898.15
Kane	22,008.49	1,264.25	2,226.77	358.35	22.42	43,727.23
Millard	35,525.31	33,160.33	7,269.87	1,889.21	5,084.95	51,878.47
Morgan	5,963.71	2,581.89	2,898.26	377.24	385.47	7,401.38
Piute	6,527.57	309.09	838.20	145.77	6.43	8,931.86
Rich	7,018.27	547.32	1,421.66	274.58	8.66	8,961.72
Salt Lake	145,225.46	31,940.71	31,873.80	6,747.42	4,207.51	35,626.08
San Juan	36,430.76	3,051.58	6,673.49	952.28	53.40	85,753.34
Sanpete	10,699.55	1,515.50	5,847.13	790.96	85.02	15,801.64
Sevier	12,780.24	2,092.08	6,756.62	916.45	91.36	18,106.24
Summit	15,065.71	4,465.99	7,736.40	1,144.95	215.35	18,903.71
Tooele	37,605.71	8,243.43	8,057.50	2,359.79	223.87	45,444.17
Uintah	26,282.06	12,347.51	9,546.65	1,419.76	228.44	109,809.23
Utah	63,420.55	14,612.66	12,551.21	3,045.32	426.02	30,939.27
Wasatch	8,704.82	1,448.23	3,688.95	596.57	16.39	12,590.25
Washington	39,317.60	6,026.07	11,644.41	1,697.22	91.64	44,442.68
Wayne	10,747.14	528.52	1,439.57	192.13	25.56	22,362.52
Weber	33,034.45	6,811.43	10,331.65	1,815.10	221.75	12,085.62
Statewide County Totals	**787,114.94**	**207,979.20**	**193,380.23**	**36,891.84**	**28,357.85**	**931,690.27**
Point Source Portables	*162.73*	*393.93*	*86.06*	*37.50*	*60.39*	*39.19*
Total	**787,277.67**	**208,373.14**	**193,466.28**	**36,929.34**	**28,418.24**	**931,729.46**

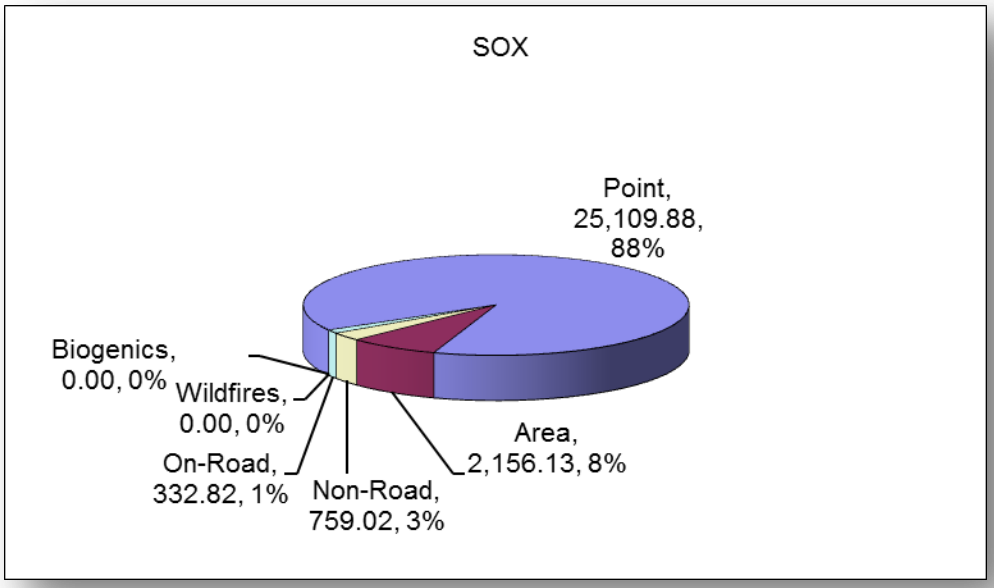
Figure 15. 2011 Triennial Emissions Inventory by Source Category—Statewide, Annual

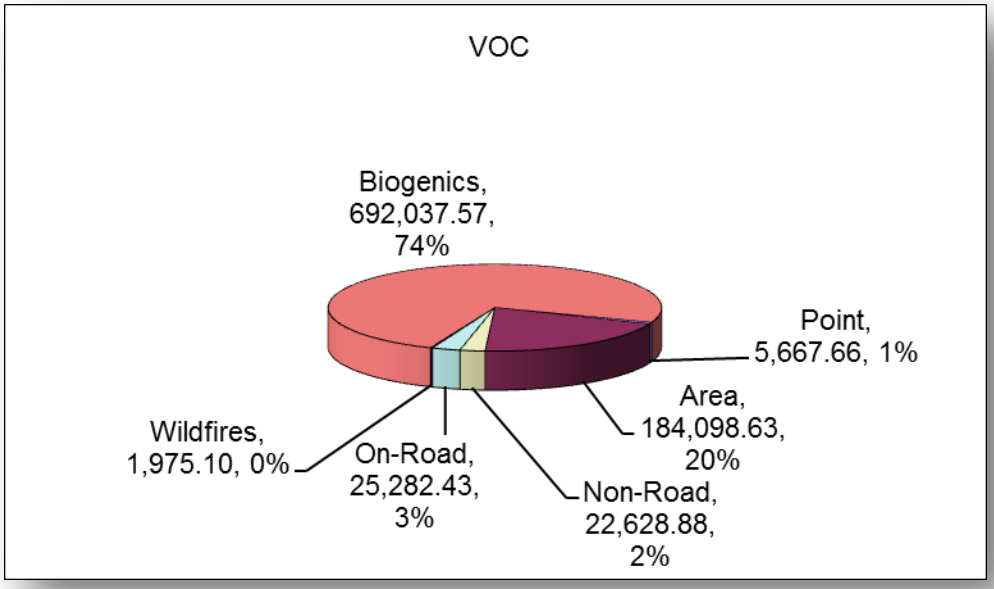





PM10
Area, 164,141.75, 85%
Non-Road, 1,627.11, 1%
Biogenics, 0.00, 0%
On-Road, 16,855.65, 8%
Point, 9,356.69, 5%
Wildfires, 1,399.03, 1%


PM2.5
Point, 4,771.06, 13%
Biogenics, 0.00, 0%
Wildfires, 1,259.13, 3%
Area, 23,253.93, 63%
On-Road, 6,074.29, 17%
Non-Road, 1,533.44, 4%


SOX
Point, 25,109.88, 88%
Biogenics, 0.00, 0%
Wildfires, 0.00, 0%
On-Road, 332.82, 1%
Non-Road, 759.02, 3%
Area, 2,156.13, 8%


VOC
Biogenics, 692,037.57, 74%
Point, 5,667.66, 1%
Area, 184,098.63, 20%
Wildfires, 1,975.10, 0%
On-Road, 25,282.43, 3%
Non-Road, 22,628.88, 2%

Division Organization

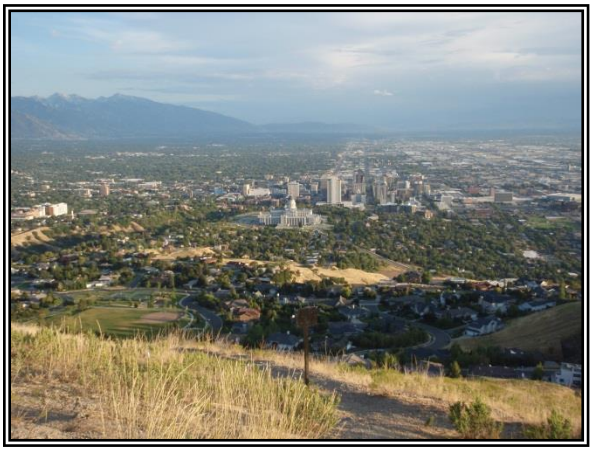
The Division of Air Quality (DAQ) is divided into three separate branches: Planning, Compliance, and Permitting. The *Planning Branch* is responsible for developing comprehensive plans to reduce air pollution and is comprised of three sections: Air Monitoring, Mobile Sources, and Technical Analysis. The Air Monitoring Section is responsible for establishing and operating the monitoring network to gather and analyze data used to determine concentrations of ambient air pollutants. Planning staff in the Mobile Sources and Technical Analysis sections routinely compile emissions inventories in order to understand the origins of the various contaminants detected in the air. They also use computer models to evaluate the impacts of new and existing sources of air pollution and to understand the relationship between the emissions, meteorology, and pollutant concentrations measured in the air. The Planning Branch is also involved in identifying the air quality impacts of transportation issues, which include vehicle inspection and maintenance, clean fuels, and highway construction. This information must be considered in the development of State Implementation Plans in order to ensure that Utah's ambient air remains in compliance with the federal health standards, even as our population and our economy continue to grow. Additionally, the Planning Branch coordinates all of the rule-making activities of the Division.

The *Compliance Branch* has responsibility for ensuring that industries and residents comply with Utah's air quality rules and is comprised of three sections: Major Source Compliance; Minor Source Compliance; and Air Toxics, Lead-Based Paint, Asbestos (ATLAS). The Major and Minor Source Compliance Sections are responsible for ensuring that all Utah air quality regulatory requirements are met. This is done through inspections and enforcement actions. The ATLAS section is responsible for the regulation, under various EPA programs, of toxic air pollutants, also known as Hazardous Air Pollutants (HAPs). HAPs are those pollutants listed in the Federal Register that are known or suspected to cause cancer or other serious health problems. The ATLAS section is also responsible for the enforcement of federal and state regulations for preconstruction asbestos removal and a number of outreach and enforcement programs designed to reduce exposure to lead-based paint.

Through the Small Business Environmental Assistance Program, the Compliance Branch also assists small businesses in complying with state and federal regulations, including New Source Performance Standards (NSPS), National Emission Standards for Hazardous Air Pollutants (NESHAP), new source review (NSR), and Utah's air quality rules. The Small Business Environmental Assistance Program can advise small businesses on permitting requirements, emission calculations, technical issues, and pollution prevention techniques.

The *Permitting Branch* is responsible for issuing construction and operating permits to stationary sources that emit air pollutants and is comprised of three sections: Minor New Source Review (NSR), Major NSR, and Operating Permits. Construction permits are issued to new or modified stationary sources of air pollution through the NSR program. Operating permits are issued on an ongoing basis through Title V of the CAA to "major" stationary sources.

Planning Branch



The *Planning Branch* is responsible for developing State Implementation Plans (SIPs) and administrative rules in order to ensure that Utah's ambient air meets the federal health standards, even as our population and our economy continue to grow. These plans address a variety of air quality issues but most often focus on areas of the state where the monitoring identifies air quality that is unhealthy for one or more of the criteria pollutants.

In addition, the federal Clean Air Act requires transportation planning organizations to prepare information detailing the air quality impacts associated with improvements in the transportation infrastructure. These transportation plans must conform to the mobile source emission budgets used by the DAQ to develop the SIPs.

Status of Projects and Initiatives

PM2.5 SIP Development

One of the six "criteria" pollutants identified for regulation in the original CAA of 1970 was total suspended particulate (TSP). In 1987, EPA defined a size "indicator" of the suspended particles that were of concern to public health. These were "fine" particles with an aerodynamic diameter of ten microns or less, and this regulated subset of TSP was called PM_{10}. It includes a complex mixture of extremely small particles and liquid droplets that can be emitted directly, as in smoke from a fire, or it can form in the atmosphere from reactions of "precursor" gases such as sulfur dioxide (SO2), oxides of nitrogen (NOx), volatile organic compounds (VOC), and ammonia.

Further study of PM_{10} revealed a bi-modal size distribution. There are typically two distinct groups of PM_{10} particles – particles between 2.5 and 10 microns in diameter (PM_{coarse}), and particles 2.5 microns or smaller (PM_{fine}). A growing body of health studies led to the conclusion that it was the group of smaller-size particles that most severely impacts public health. In response to the findings, EPA in 1997 added $PM_{2.5}$ to the regulatory framework as the new indicator of fine particulate matter. $PM_{2.5}$ is inclusive of particles having an aerodynamic diameter of 2.5 microns or less.

The Division of Air Quality (DAQ) has monitored $PM_{2.5}$ since 2000 and found that all areas within the state were in compliance with the 1997 standards. In September of 2006, EPA revised the standards for $PM_{2.5}$. While the annual standard remained unchanged at 15 $\mu g/m^3$, the 24-hour standard was lowered from 65 $\mu g/m^3$ to 35 $\mu g/m^3$. At this new level, all or parts of five counties were immediately out of compliance with the 24-hour health standard. In 2009, the EPA designated three distinct nonattainment areas for $PM_{2.5}$ (See Figure 16), and Utah

was required to prepare comprehensive plans (SIPs) to meet the revised standard in these areas by December of 2012.

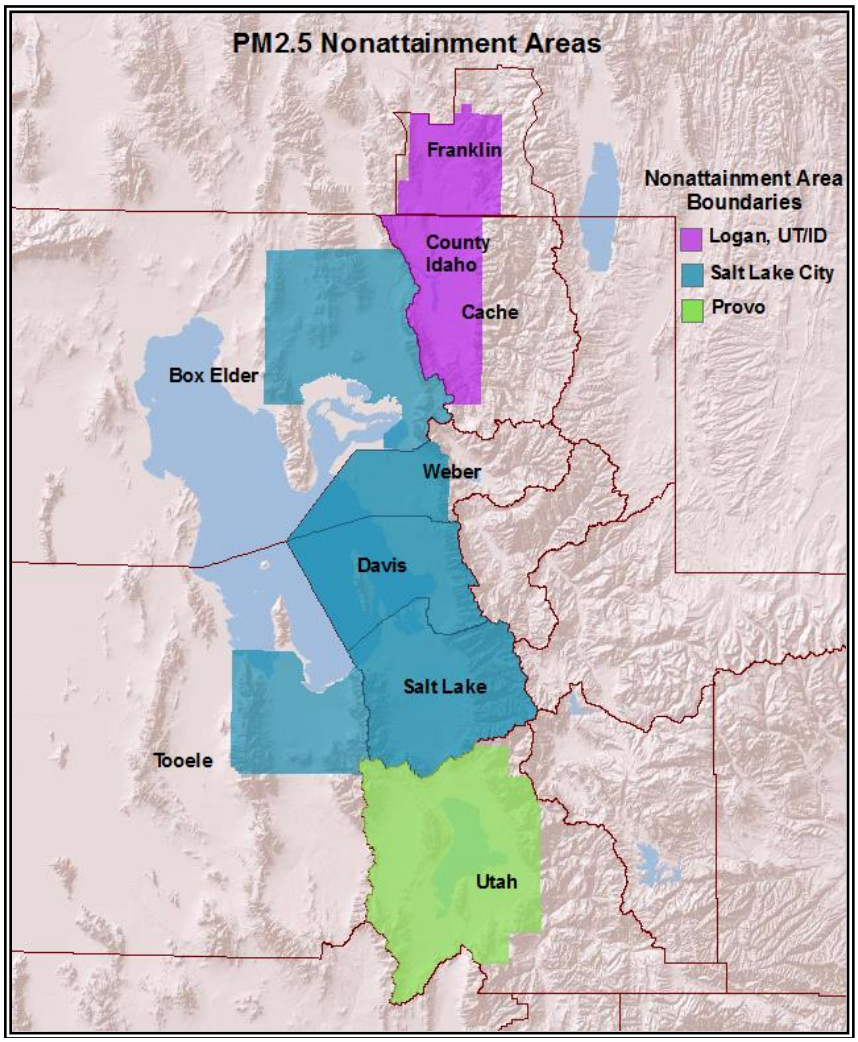
DAQ successfully completed a SIP for the Logan nonattainment area by December of 2012, but completion of SIPs for the Salt Lake City and Provo nonattainment areas proved to be a greater challenge. In January of 2013 the DC Circuit Court held that EPA had acted improperly in interpreting the implementation requirements for the 2006 $PM_{2.5}$ standards. This decision meant that EPA would have to develop a new implementation rule that would establish the requirements for $PM_{2.5}$ SIPs. While awaiting EPA's rule, DAQ worked with EPA to craft SIPs that would continue work towards attaining the new standard. Ultimately, plans for each of these areas were approved by the Utah Air Quality Board in December of 2013.

However, as EPA started determining what their new rule may require, it meant that Utah would immediately have to retailor each of its three SIPs and re-submit them to EPA by December 2014. DAQ and the EPA staff in Denver spent considerable effort on this task throughout the past year, even though EPA has still not yet developed its implementation rule that was required by the Court. All three SIPs were again approved by the Utah Air Quality Board in December, 2014 and submitted to EPA.

Another consequence of the Court's ruling is that any of Utah's three $PM_{2.5}$ nonattainment areas can be re-classified from "moderate" areas to "serious" and be required to meet additional, more onerous planning requirements.

Annual Standard – At the end of 2012 EPA revised the annual standard for $PM_{2.5}$, lowering it from 15 $\mu g/m^3$ to 12 $\mu g/m^3$. As shown in Figure 12 monitoring data shows that all areas in Utah continue to meet the annual standard for $PM_{2.5}$, even at 12 $\mu g/m^3$. DAQ recommended that EPA designate all areas within the state as attaining this new standard. EPA completed its area designations in December of 2014. No new areas of nonattainment resulted from this revision of the annual NAAQS.

Figure 16. PM2.5 Nonattainment Areas



Three-State Pilot Project

The EPA, under the National Environmental Policy Act, is mandated to document current air pollution levels and lessen current and projected adverse impacts through mitigation strategies. Localized monitoring in the three-state area (western Colorado, eastern Utah, and southwestern Wyoming) has revealed degraded air quality in regard to ozone and NO_x, leading federal and state agencies to realize more information is needed as energy development in the region is considered. Because of a common need for a comprehensive set of air quality assessment tools, the stakeholders—EPA Region 8, the Bureau of Land Management, the USDA Forest Service, the National Park Service and the states of Utah, Colorado, and Wyoming are cooperating on the following activities:

- Expanding air quality monitoring in the study area to establish baseline conditions, track air quality trends and evaluate the performance of air quality modeling systems;

- Creating and operating a robust, centralized data warehouse to store, manage and share data among state and federal agencies and industry to support air quality modeling and analyses; and

- Performing regional scale baseline air quality modeling of current conditions against which the impacts from proposed future projects can be evaluated.

Utah has completed three years of air quality data collection at the Price and Fruitland monitoring sites, both funded by the Three-State Pilot Project. Utah is currently under contract to the Three-State Pilot Project to perform quarterly equipment audits at Fruitland and BLM's new monitoring station at Escalante. In addition, air quality data from the Vernal and Roosevelt monitoring sites have been provided to the project. Other activities on the project this year include providing support to the development of emissions inventories, review of the project workplan, and participating in the project Steering Committee meetings. Work conducted under the Three–State Pilot Project will be directly applicable to the ozone studies currently underway in the Uinta Basin.

Uinta Basin Ozone

Since 2005, the National Park Service has been measuring summertime ozone at Dinosaur National Monument located near Vernal and beginning in 2006 at Colorado National Monument located near Grand Junction, CO. In 2009, the EPA began measuring year-round ozone at two sites on the Ute Indian Reservation, located near Redwash and Ouray. Data collected from the two tribal sites during the winter of 2010 indicated that high ozone levels are occurring in the Basin during the middle of winter. This finding was unexpected since ozone is normally an air pollutant that is formed during the summertime when there are high temperatures and bright sunshine.

In the winter of 2010/11, the Uintah Basin Impact Mitigation Special Services District funded a study conducted by Utah State University's Energy Dynamics Lab and the Utah Division of Air Quality (DAQ). Using data collected from 18 temporary and permanent air monitoring stations placed throughout the Basin, researchers found elevated wintertime ozone concentrations

throughout the Basin during temperature inversion events when snow covered the ground. The highest values were found in the central basin area, with many exceeding the ozone NAAQS.

In the winter of 2011/2012, cooperating agencies, including the BLM, EPA, Western Energy Alliance, Uintah Impact Mitigation Special Service District, coordinated by the DAQ, embarked on a multi-winter effort to study and address ozone in the Uinta Basin. The first year's study was called the Uinta Basin Winter Ozone Study 2012 (UBWOS 2012). The goal was to understand how ozone is formed in the Basin during wintertime inversion conditions and to implement appropriate and effective strategies for mitigating high ozone levels in order to avoid nonattainment. Researchers from the National Atmospheric and Oceanic Administration (NOAA), several university research groups, EPA, and DAQ worked together to study ozone formation in the Basin during wintertime inversion conditions. Although no temperature inversion/snow events occurred and ozone levels remained low, much valuable information was collected on emissions inventories and sources. The first year's study concluded that:

- Ozone formation is associated with stable meteorological conditions, snow cover, and sunshine.
- Chemical precursors to ozone formation are NO_x and VOC.
- NO_x comes from hot combustion sources, and the highest levels are in the oil production areas and population centers.
- VOC comes from oil and gas production, with the highest levels in the gas production areas.
- Methanol was measured at concentrations that could significantly enhance ozone formation.
- There is very high year-to-year variation in ozone levels due to variation in meteorological conditions.
- Analysis of historical climatology for meteorological conditions conducive to ozone formation suggests about one in two winters would produce ozone levels higher than the federal standard.

In the winter of 2012/13, ozone concentrations in excess of the current NAAQS were measured in the Uinta Basin during winter inversion periods when the ground was covered by snow. The ongoing UBWOS 2013 involved the same researchers as the prior year's study, and concluded the following:

- Maximum 8-hour average ozone concentrations measured at Ouray reached 142 ppb during the study, exceeding the NAAQS (75 ppb) by 89%. Monitored values in the major population centers were greater than the NAAQS on a total of 22 days at Vernal and 29 days at Roosevelt. These observations are in sharp contrast to the 2012 winter study, when 8-hour average ozone levels did not exceed 63 ppb.
- Elevated ozone coincided with elevated levels of volatile organic compounds (VOC) and nitrogen oxides (NO_x), which are the primary chemical precursors of ozone.

- Reflection of sunlight (albedo effect) from the snow surface significantly increases the total solar radiation in the atmosphere, and thus the rate of ozone formation.
- Complex patterns of light winds within the Basin appear to produce an east-west "sloshing" of air that contributes to intra-basin mixing of ozone and ozone precursors.
- Chemical reactions during these winter episodes differ greatly from summer ozone formation in urban areas.
- Aromatic VOCs such as toluene and xylene contribute to the secondary formation of wintertime ozone pollution in the Basin; therefore, VOC control measures focused on these types of VOCs will be particularly effective.

In the winter of 2013/14, DAQ coordinated the *Uinta Basin 2014 Winter Ozone Study* (UBOS 2014) starting in the month of January and continuing through February when the highest likelihood of temperature inversions, snow cover, and elevated ozone levels were expected. The study focused on quantifying the contribution of nitrous acid (HONO) and formaldehyde (HCHO) to the chemical reactions responsible for ozone formation. Prior studies in the Basin showed that the radical chemistry that drives ozone production is dominated by HONO and formaldehyde. HONO and formaldehyde are unconventional sources for ozone formation compared to the conventional sources (ozone photolysis) in typical summer urban ozone episodes.

Although the final report for UBOS 2014 is not yet final, preliminary findings confirm that:

- Nitrous acid (HONO), based on an improved suite of measurements, does not appear to be a major source of the chemical radicals needed to form ozone during the winter episodes.
- Formaldehyde and other aldehydes are the dominant radical sources needed for ozone formation. These compounds are both directly released from various emission sources and form in the atmosphere from directly emitted VOCs such as those contained in oil and raw natural gas. Aromatic VOCs, including toluene and xylene, while less abundant than other VOC species in the Basin, are also particularly important sources of radicals.
- New "box model" simulations of ozone formation chemistry, based on data collected at the Horsepool study site, confirmed earlier analyses indicating that ozone formation at this location is sensitive to VOC reductions (i.e., VOC reductions would result in ozone reductions). The modeling results also suggest that NOx reductions would lead to ozone reductions at Horsepool. These modeling results are pertinent to the Horsepool location and may not be applicable across the Basin as a whole.

The UBOSs are a joint effort of world-class atmospheric researchers from the National Oceanic and Atmospheric Administration's (NOAA) Chemical Sciences Division, Utah State University, University of Utah, University of Houston, University California at Los Angeles, and DAQ. The UBOSs are by far the largest and most complex air quality studies conducted in the State of Utah.

The UBOS work is broadly supported financially by numerous agencies, including the Uintah Basin Impact Mitigation Special Service District, Western Energy Alliance, Bureau of Land Management - Utah Office, and NOAA. All of the research organizations have also made significant in-kind equipment contributions to this study.

Further information on the UBOS and wintertime ozone in the Uinta Basin can be found on the DAQ web site at: http://www.deq.utah.gov/locations/U/uintahbasin/index.htm

Utah Clean Diesel Program

The Utah Clean Diesel Program, a clean air initiative that started in 2008, has been a successful collaboration between state and federal agencies, county and municipal governments, community and non-profit organizations, and industry groups. Over $10 million in state and federal grants have helped 53 small businesses, 34 school districts, two government entities, and one university purchase cleaner and more fuel efficient equipment for their operations.

The following projects have been completed to date:

- 2008: The Clean Diesel School Bus Project retrofitted over 1,200 diesel-powered school buses throughout the state with emission control devices that are aimed to protect children and operators from harmful air pollutants emitted by the school bus's diesel engine. This project also replaced 27 older buses with new buses that meet a more stringent set of emissions standards.

- 2009: The Clean Diesel Trucking Project installed auxiliary power units on 52 long-haul trucks. These units reduce fuel consumption and diesel emissions by providing climate control and electrical power for the truck's sleeper cab and engine block heater during driver's downtime. These devices use 80-90 percent less fuel than the truck's main engine.

Governor Herbert, Reed Baldwin of L.W. Miller Transportation, and David Creer of Utah

- 2009: The Clean Diesel Agriculture Project installed auxiliary power units on 32 trucks that support farm-based activities. This project also provided partial funding to repower or replace 31 pieces of diesel equipment with cleaner, more fuel efficient machinery.

- 2010: Funding was provided to the City of North Salt Lake for repowering five city maintenance vehicles that are used as snow plows during the inversion season. These vehicles were converted from older, diesel engines to newer, compressed natural gas (CNG) engines.

- 2011: Twenty-three small businesses and one school district were awarded funds to retrofit or replace equipment with upgraded technologies that meet higher emissions standards. Large construction and agriculture equipment were replaced with new, an old box truck used to transport fruit to farmers markets along the Wasatch Front was repowered with a cleaner engine, long-haul trucks were retrofitted with idle-reduction and exhaust control technologies, and school buses were retrofitted with engine pre-heaters that help reduce idle time.

- 2012: Twenty-four state maintenance trucks used as snow plows in Box Elder, Cache, Davis, Salt Lake, Tooele, and Uintah Counties were retrofitted with Diesel Oxidation Catalysts (DOC)s that reduce particulate matter (PM) by 40%, hydrocarbons (HC) by 50%, and carbon monoxide (CO) by 40%. The Utah Clean Diesel Program also assisted Utah State University in replacing an old 1998 diesel shuttle bus with a new 2013 CNG shuttle bus.

- 2013: Twenty additional state-operated snow plows that service Salt Lake and Utah counties were retrofitted with DOCs. Assistance was also provided to C.R. England Global Transport to replace a 2002 short-haul, diesel truck with a 2014 CNG, short-haul truck. The 2002 diesel truck makes local freight deliveries in Davis, Salt Lake, Tooele, and Utah Counties.

- 2014: Thirty state-operated snow plows and three long-haul trucks were retrofitted with DPFs, and an old diesel school bus that operates in Cache County was replaced with a newer, more efficient school bus.

The alliances that have been developed to make these projects successful are a demonstration of the commitment being made to help alleviate the unique air quality challenges we face in Utah and encourage energy- and emission-reduction options that support economic development for small businesses.

Clean Fuels and Vehicle Technology Grant and Loan Program

The Utah Clean Fuels and Vehicle Technology Grant and Loan Program (Grant and Loan Program), funded through the Clean Fuels and Vehicle Technology Fund, provides grants to assist businesses and government entities in covering 50% of the cost for converting vehicles to operate on a clean fuel, 50% of the incremental cost for purchasing Original Equipment Manufacturer (OEM) clean fuel vehicles, and for the purchase of clean fuel refueling equipment.

The Grant and Loan Program also provides loans for the cost of converting vehicles to operate on a clean fuel, the incremental cost to purchase OEM clean fuel vehicles, and the purchase of clean fuel refueling equipment. Repayment schedules are allowed up to 10 years interest free for government entities, whereas rates for private sector vehicles are made at an interest rate equal to the annual return earned in the state treasurer's Public Treasurer's Investment Fund.

The Division of Air Quality (DAQ) solicits applications annually to help promote clean fuel projects statewide. In 2014, the annual grant award limits were raised from a combined total of $250,000 to $500,000, and the dollar amount limits for loan awards were removed. In addition, the limits for individual awards were raised from $100,000 per project to $200,000.

In March 2014, DAQ announced awards for successful projects that include the purchase of five compressed natural gas (CNG) school buses for Jordan School District, eight CNG refuse vehicles, four for Salt Lake City Corporation and four for Wasatch Front Waste and Recycling. One loan award was given to CNG America for $100,000 to purchase CNG refueling equipment.

The application period for the 2015 awards opened in August 2014, and closed October 2014. New enhancements to the program in 2014 brought a diverse pool of applications to choose from. For instance, the process for awarding refueling infrastructure projects was streamlined, making it easier for electric vehicle charging stations or natural gas and propane refueling equipment projects to receive funding. Also, electric-hybrid vehicles are now eligible, and the award limitations were raised so more projects can receive funding. Seventeen applications were received for review. Successful projects will be announced in January 2015.

Since 2008, DAQ has awarded a total $1,416,952 in grants and $366,667 in loans to 18 different entities. Projects have included the conversion of cars, trucks, and shuttle buses to natural gas as well as the purchase of natural gas refuse trucks, freight trucks, transit buses, school buses, street sweepers, aerial truck towers, glass recycling vehicles, and refueling stations.

The Clean Air Retrofit, Replacement, and Off-Road Technology Program

In 2014, the State Legislature enacted the Clean Air Retrofit, Replacement, and Off-Road Technology (CARROT) Program for the Division of Air Quality (DAQ) to encourage individuals, businesses, and local governments to reduce emissions from heavy-duty on-road diesel engines, non-road diesel engines, and small non-road engines. The funding for the program has been divided into two segments—the CARROT Grant Program and the CARROT Lawnmower Exchange Program.

The CARROT Grant Program provides up to $100,000 in grants for aerodynamic kits, diesel retrofits, engine upgrades/repowers, idle-reduction technologies, low-rolling resistance tires, and vehicle or equipment replacements. Applications are due by January 16, 2015, and will be evaluated by the feasibility and practicality of the proposed project, the availability of additional funds, the air quality benefit to the state and local community, and the cost effectiveness of the proposed project. The financial need of the applicant will also be considered. Awards will be announced by January 26, 2015.

Because small non-road engines found in lawn and garden equipment account for a significant source of volatile organic compounds (VOC) and nitrogen oxides (NOx) emissions, the CARROT Lawnmower Exchange Program has been developed to encourage individuals to purchase electric lawnmowers with an additional incentive for those who exchange their gasoline-powered lawnmowers for electric.

Several one-day lawnmower exchange events will occur throughout northern Utah during the spring of 2015, in advance of the summertime ozone challenges the Wasatch Front experiences. Similar programs have been implemented nationwide and have resulted in high levels of success in terms of visibility and popularity as well as significant levels of emissions reductions.

Sole-Source Heat Conversion Program

In order to improve air quality along the Wasatch Front and in Cache Valley, the 2014 Utah State Legislature provided funding to the Division of Air Quality (DAQ) to install central heating systems in homes that are currently heated solely by burning wood or coal and are registered with the DAQ as a “sole source residence.” Using this funding ($500,000) the State will pay the entire cost to install a natural gas, propane or electric central heating system. The homes that qualify for a new central heating system are typically older homes, which results in challenging installation conditions. DAQ has plans for several conversions to be made throughout 2015.

Transportation Conformity

Several Metropolitan Planning Organizations (MPOs) are responsible for developing, producing, and adopting Metropolitan (or Regional) Transportation Plans (MTP or RTP) and Transportation Improvement Programs (TIP) within the state. The MPOs include Cache MPO (CMPO), Dixie MPO, Mountainland Association of Governments (MAG), and the Wasatch Front Regional Council (WFRC). MPOs located in nonattainment and/or maintenance areas have the responsibility to ensure that the current MTP and TIP conform to the Utah SIP through a process known as transportation conformity. The Federal Highway Administration and Federal Transit Administration review the conformity determinations along with the MTP and TIP in consultation with EPA to ensure that the relevant planning and air quality regulations have been adequately addressed.

CMPO, MAG, and WFRC demonstrated conformity to the SIP for the Plans and TIPs for their respective areas.

The CMPO established conformity for the 2035 MTP in June 2011 and the 2015-2020 TIP in August 2014 for the conformity demonstration completed for Cache County, Utah and Franklin County, Idaho $PM_{2.5}$ nonattainment area.

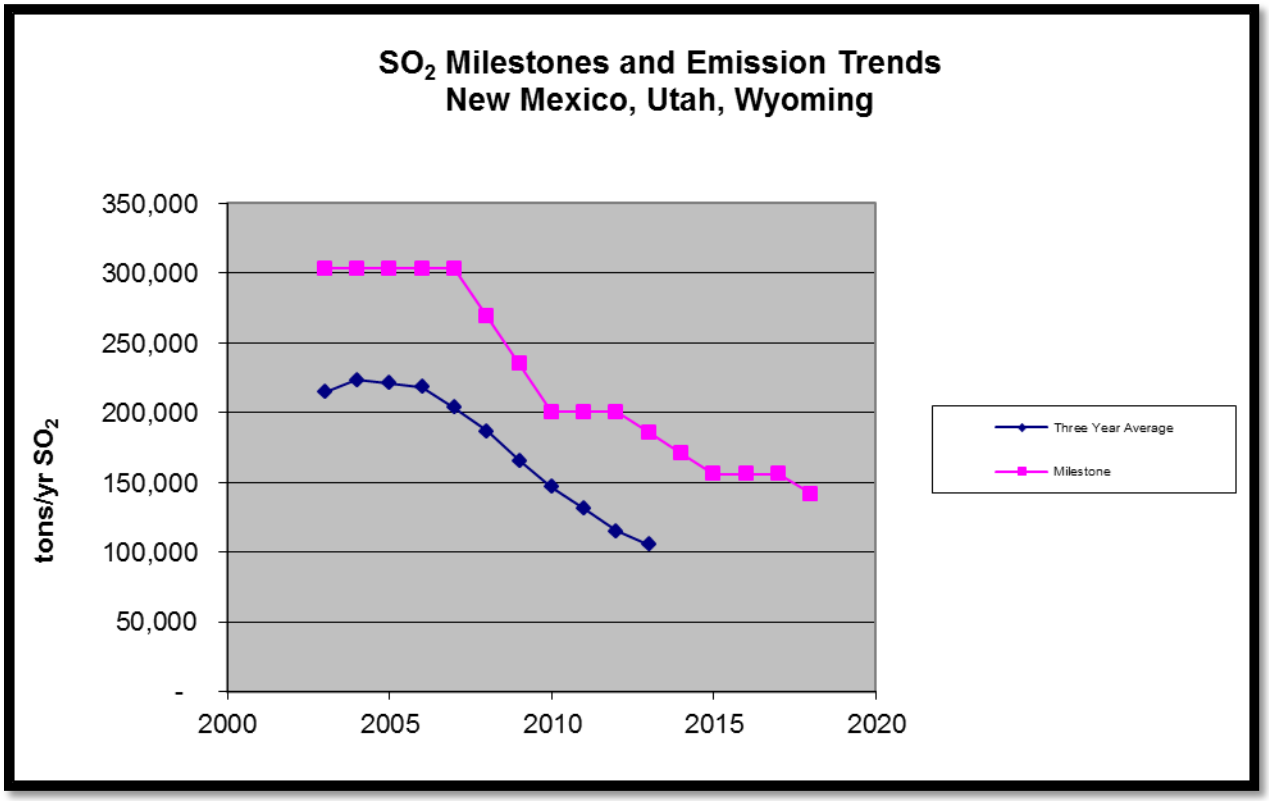
MAG established conformity for the 2040 MTP in June 2011 and the 2014-2017 TIP in July 2011 for the Provo\Orem City CO maintenance area and for the Utah County PM_{10} and $PM_{2.5}$ nonattainment area.

In 2015, MAG will need to establish conformity for the RTP. Because of a change in the EPA emissions model this could be problematic with respect to the PM_{10} budgets. In December of 2014, the Air Quality Board proposed for public comment an emissions trading rule that would alleviate this problem.

WFRC established conformity for the amended 2011-2040 RTP in March 2014 and again in August 2014 for another amended RTP and the 2015-2020 TIP for the Salt Lake City and Ogden City CO maintenance areas, the Salt Lake County and Ogden PM_{10} nonattainment areas, and the Salt Lake $PM_{2.5}$ moderate non-attainment area including all or portions of Box Elder, Davis, Salt Lake, Weber, and Tooele Counties.

Regional Haze SIP

Utah's Regional Haze Plan includes regional targets for SO_2 emissions, with a backstop trading program to ensure that the emission reduction goals are achieved. Each year the states participating in the program compile an inventory of SO_2 emissions and then compare the emissions to the milestones established in the plan. The regional three year average emissions for 2011, 2012, and 2013 were 105,402 tons—43% below the milestone. The emissions are far below the milestone due to the early installation of emission controls at power plants and other emission sources. The 2013 milestone report is under development and will be submitted to EPA in the spring of 2015.



Utah Smoke Management Program

Utah's smoke management program is a key element of the Regional Haze State Implementation Plan that was required under the Clean Air Act and was approved by the Environmental Protection Agency in 2012. Utah is required under the approved plan to manage planned burning in a manner that protects air quality and ascertains air quality impacts locally and regionally. Currently, state and federal land managers must complete multiple forms, depending on the type of planned burn, that require manual processing and approval. That information and subsequent planned burn data must then be transformed into a form suitable for modeling to ascertain air quality.

A project to automate the permitting process through a web-based permitting system has been funded by the Division of Air Quality and state and federal land agencies that conduct planned burns in Utah. Automating the permitting process will eliminate the physical application handling process and the burn data will be in the system in a format that is compatible with the regional fire emissions tracking system and electronically delivered to the modelers for analysis. The development of the automated system is completed and is scheduled to be released in January 2015.

Utah Asthma Task Force

The Utah Asthma Task Force is a multi-agency task force to address the problem of asthma in Utah. The task force meets quarterly and has a number of projects currently underway in addition to the programs initiated under the State Asthma Plan.

Ancillary Programs

Utah Air Quality Public Notifications

The Division of Air Quality (DAQ) provides air quality forecasting on its webpage for the current and next two days. The Air Monitoring Section (AMS) provides air pollution information based on the daily air quality status. The AMS data is used to determine the relationship of existing pollutant concentrations to the NAAQS. There is a three-tiered air quality alert system: unrestricted, voluntary action and mandatory action. This system is used to implement winter and summer controls on the use of solid fuel burning devices, fire places, and motor vehicles. The forecast call determines which restrictions are in place for a given county. In addition, the webpage advises the public as to current air quality conditions using the standard AQI categories: good, moderate, unhealthy for sensitive groups, unhealthy and very unhealthy. Each advisory category listed on the webpage is accompanied by a health protection message that recommends actions affected groups can take to mitigate the effects of pollution on them and links to the AQI web site for further information. The AMS advisory is calculated for five major pollutants: ground-level ozone, particulate pollution (particulate matter), carbon monoxide, sulfur dioxide, and nitrogen dioxide. The outreach program information consolidated in the three day forecast includes the Summer and Winter Control Programs and Choose Clean Air information.

The DEQ is also sponsoring an electronic mail server (Listserv). Subscribers are automatically notified by e-mail when unhealthy air pollution levels are forecast for the Wasatch Front and when action alerts are issued.

The mobile app called Utah Air was developed for DAQ by the Center for Automotive Sciences and Technology at Weber State University and continues to be used. It provides similar information directly on smart phones and other mobile devices. The application is free and can be downloaded from both the Android and Apple app stores. By January 2015, the application was downloaded onto over 21,000 phones.

Choose Clean Air

DEQ continues to emphasize the Choose Clean Air program and has developed an interactive source of information about ways individuals can help improve air quality by making smart choices in their personal lives.

Winter Control Program (unrestricted, voluntary action, mandatory action)

This program originated with the PM_{10} SIP, but was significantly strengthened in December 2012 to be much more proactive and less reactive. Now action alerts are called when the Division of Air Quality meteorologists see that we are in the building stages of an inversion that could lead to unhealthy air. The program runs annually from November through early March. In addition to the burning restrictions, residents are encouraged to drive less and are directed to information on other ways they can reduce pollution.

Summer Control Program (unrestricted, voluntary action, mandatory action)

Action days are announced whenever the probability of exceeding the ozone standard is forecasted to be high. High temperature and stagnant air masses contribute to this probability. Residents are encouraged to minimize driving whenever the ozone or PM standards are approached.

Vehicle Inspection/Maintenance Programs

Inspection/Maintenance (I/M) programs were adopted in the early 1980s as a required strategy to attain the ozone and carbon monoxide NAAQS. These programs were very effective in improving air quality and have played an important role in reducing emissions that contribute to ozone and carbon monoxide. Their continued operation is necessary for the Wasatch Front to remain in attainment of these standards. These programs are administered by the county health departments.

The most recent I/M program to be implemented in Utah is in Cache County. The program was fully implemented on January 1, 2014, and is running smoothly. Cache County's I/M program requires model year 1969 and newer vehicles that are registered in Cache County to be inspected biennially. The program exempts vehicles that are six years old and newer from being inspected. Inspection fees are capped at $15 for an on-board diagnostics inspection and $20 for a two-speed idle inspection.

Smoking Vehicles

Vehicles emitting excessive smoke contribute to poor air quality. To promote clean air, several local health departments operate smoking vehicle education and notification programs. People who spot a vehicle producing excessive smoke can report it through their respective county health departments:

Cache County	435-792-6611
Davis County	801-546-8860
Salt Lake County	385-468-SMOG(7664)
Utah County	801-851-SMOG(7664)
Weber County	801-399-7140

Utah Clean Fuel Tax Credit

The Utah Clean Fuel Tax Credit was established in 1992. The intent of this program is to provide an incentive for taxpayers to buy a clean fuel vehicle or convert their vehicles to run on electricity, natural gas, or propane. In order for a taxpayer to claim this nonrefundable credit, they must completely fill out tax form TC-40V and provide required documentation to the Utah Division of Air Quality (DAQ). DAQ approved the most clean fuel tax credits for tax year 2008, with 1,518 approved credits. Since then, the number has decreased to 514 approved for tax year 2009, 546 for tax year 2010, 597 for tax year 2011, 761 for tax year 2012, 777 for tax year 2013, and as of December 18, 2014, 228 for tax year 2014.

In 2014, the Utah Legislature revised the State's Clean Air and Efficient Vehicle Tax Incentives. The revision made several modifications to the tax credit, including the following:

- Reduced the maximum dollar amount of the tax credit for Original Equipment Manufacturer and converted clean fuel fueled vehicle from $2,500 to $1,500.
- Increased the tax credit for electric vehicles from $605 to $1,500.
- Increased the tax credit for plug-in hybrid vehicles from $605 to $1000.
- Added provision to allow leased eligible vehicles to receive a tax credit on a prorated basis.

Summer Ozone

Special ozone studies during summer 2014 consisted of ozone monitoring at six sites. Ozone monitoring at five sites was conducted to aid Division of Air Quality (DAQ) forecasters during the summer ozone season. These five sites were Saltaire and Syracuse, where DAQ has monitored meterological variables for many years, Thanksgiving Point in Utah County, and two sites in Lakeside on the southwestern shore of the Great Salt Lake. Ozone monitoring around the Great Salt Lake also served as a pilot study to a larger ozone study that will be undertaken in the summer of 2015 in partnership with the University of Utah and Utah State University. The 2015 ozone study will examine the role of the Great Salt Lake in ozone formation along the Wasatch Front. This

study will include both ground-based measurments taken by DAQ staff and mobile measurements taken from vehicles along the surface and remote aircraft or tethersondes to understand vertical profiles of ozone and meteorological variables. A sixth ozone monitoring site was established in Moab in August to understand the relationship between ozone concentrations in Moab to the longer term record of ozone data collected by the National Park Service in Canyonlands National Park.

Permitting Branch

The Division of Air Quality (DAQ) Permitting Branch is responsible for implementing state and federal air permitting programs that are intended to regulate air emissions from new and modified stationary sources that emit air contaminants. Permits are legally enforceable documents that specify construction limitations, emission limits, and how the emissions source must be operated. Permit limits can be emission limitations or surrogate limits such as production rates, hours of operation, fuel consumption or a combination thereof. Opacity, the measure of opaqueness or transparency of emission plumes, is also a common metric used to both limit and measure source emissions.

The branch issues two types of permits. New Source Review (NSR) permits, also known as Approval Orders, are pre-construction-type permits for new and modified sources of air emissions. These are issued by the New Source Review Sections and have been required in Utah since 1969. The Operating Permits Section issues the Title V Operating Permits to the larger “major” stationary sources in the state, as required in Title V of the Federal Clean Air Act. There are approximately 100 of these sources. Operating permits consolidate all air quality related requirements from numerous state and federal air quality programs into a single regulatory document. The purpose of an operating permit is to clarify for the permit holder as well as DAQ compliance inspectors the wide range of requirements applicable to any regulated source by placing those requirements into one consolidated document.

In addition, the branch processes a number of smaller actions such as de minimus determinations for NSR, name changes, tax exemption certificates for pollution control equipment purchases, and soil aeration approvals.

New Source Review

Any new or modified source of air pollution in Utah is required to obtain an Approval Order (AO) before it is allowed to begin construction. For areas that are not in compliance with the NAAQS, NSR assures that air quality is not further degraded from the existing levels by new emission sources. In areas that are in compliance with the NAAQS, NSR assures that new emissions do not significantly worsen air quality. These processes are outlined in both state and federal rules.

The application for an AO, called a notice of intent (NOI), is reviewed to make sure that the source installs appropriate state-of-the-art emission controls. For nonattainment areas, state-of-the-art technology is known as lowest achievable emissions rate (LAER). For areas in attainment of the NAAQS, state-of-the-art controls are known as the best available control technology (BACT). Both LAER and BACT are case-by-case determinations of control technology for a specific source. BACT takes into account both the cost and environmental benefits of the control equipment, while LAER technology takes into account only environmental benefits.

The general public and EPA are given an opportunity to review a proposed approval order before it is issued. The criteria indicating which sources must obtain an approval order are specified in the Utah Air Quality Rules. Potential applicants are encouraged to contact the Division of Air Quality prior to submitting the necessary paperwork. In fiscal year 2014 (7/1/13 to 6/30/14), the NSR section issued 162 AOs along with numerous supporting or other documents.

Operating Permits

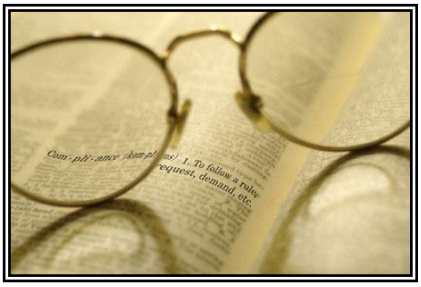
Congress created Title V of the Clean Air Act in 1990. This Title requires states to issue an operating permit to the larger or “major” sources of air pollution within the state. Utah developed and submitted a program in 1994 and received approval from the EPA in 1995. Operating permits are legally enforceable documents issued to air pollution sources after the source has begun to operate. A primary purpose of the permit is to consolidate the applicable requirements from the many and varied air quality programs such as NSR, federal New Source Performance Standards (NSPS), National Emission Standards for Hazardous Air Pollutants (NESHAP), and Maximum Available Control Technology (MACT). Like the approval orders, the general public is given an opportunity to review the draft operating permits before they are issued. In addition, the EPA has up to 45 days to review the proposed operating permit. The criteria indicating which sources must obtain an operating permit are specified in R307-415 of the Utah Administrative Code (UAC). As with the NSR permit or AOs, potential applicants are encouraged to contact Division of Air Quality prior to submitting the necessary paperwork.

Another significant objective of the Title V program is to shift the compliance liability from the regulating agency to the permitted source. Each year the source must certify that it is in compliance with all permit terms and conditions, or indicate non-compliance issues. False reports have criminal implications, beyond the civil liabilities of other violations. In addition, sources must report the results of monitoring at least every six months. Permit provisions for monitoring, record keeping, and reporting are added or enhanced to assure compliance with the permit conditions and limits.

During the last year, the Operating Permits section issued two initial permits and 18 permit modifications coordinating extensively with the NSR Section. The Operating Permit has a life of only five years (as opposed to the AO that does not expire). During 2014, the section issued nine permit renewals. These renewal permits are complex, and care must be taken to ensure that new federal requirements for the Compliance Assurance Monitoring Rule (CAM) and any other new requirements (such as new MACT Standards) are included.

Compliance Branch

The Major Source Compliance, Minor Source Compliance, and the Air Toxics, Lead-Based Paint and Asbestos (ATLAS) sections are responsible for ensuring compliance with all air pollution orders, permits, rules, and standards. This is accomplished through inspections, audits of stack tests and continuous emission monitoring systems (CEMS), plan and report reviews, accreditation and certification programs, compliance assistance/outreach activities, and, when necessary, enforcement actions.



Enforcement Actions

The following enforcement actions may be taken depending on the magnitude of the alleged violation(s) and prior compliance history and degree of cooperation of an alleged violator:

A. Compliance Advisory – a notification describing the alleged violation(s). The recipient is given opportunity to refute and/or provide further details regarding the alleged violation(s) prior to any further enforcement action. A Compliance Advisory is a discovery document and not a declaration of actual violation(s).
B. Warning Letter – a notification sent to violators to resolve minor, first-time violations.
C. Early Settlement Agreement – a less formal resolution of an alleged violation(s) in which the Division of Air Quality (DAQ) and the recipient agree in writing to specific actions taken to correct the alleged violation(s). Any stipulated penalties are discounted by 20% to encourage quick resolution. Supplemental Environmental Projects may be agreed to, to offset a portion of any cash payments for stipulated penalties. All collected penalties become part of the State General Fund.
D. Notice of Violation and Order for Compliance – a formal, traditional declaration of a violation(s) which involves the Attorney General's Office. The cited violation(s) become final after 30-days unless formal appeal procedures are followed.
E. Settlement Agreement - a resolution of a potential violation(s) in which the DAQ and the recipient agree to specific actions taken to correct the potential violation(s). No discounts of stipulated penalties are offered. DAQ legal costs may also be included. Supplemental Environmental Projects may be agreed to, to offset a portion of any cash payments for stipulated penalties. All collected penalties become part of the State General Fund.

Most enforcement actions are resolved through Warning Letters or Early Settlement Agreements. In rare instances, Notices of Violations and Orders for Compliance are used. In the extremely rare instance where the aforementioned enforcement actions fail for resolve a compliance issue, procedures are in place for Air Quality Board hearings/administrative law judge review or formal judicial action. Environmental criminal cases are referred to the appropriate law enforcement agency.

Major and Minor Source Compliance

The Major and Minor Source Compliance Sections are responsible for ensuring compliance at more than 2,000 facilities within the state. The Major Source Compliance Section is responsible for inspections and report/plan reviews for the large facilities, audits of stack tests and CEMS, and any associated enforcement. The Minor Source Compliance Section is responsible for inspections and report/plan reviews at small to medium-sized facilities, audits, stack tests, fugitive dust control, abrasive blasting, residential solid fuel burning, gasoline transport/filling station vapor recovery, open burning, and any associated enforcement.

Table 5. Major and Minor Source Compliance Summary

TASK	2014
Source Inspections	395
On-site Stack Test/CEM Audits	110
Stack Test/CEM Reviews	402
Temporary Relocations Accepted	89
Fugitive Dust Control Plans Accepted	1037
Miscellaneous Inspections	325
Complaints Received	472
VOC Inspections	0
Warning Letters	10
Notices of Violations	2
Compliance Advisories	94
Settlements	42
Total Inspections	830
Penalties Assessed	$2,481,036

Air Toxics, Lead-Based Paint, and Asbestos Section (ATLAS)

The ATLAS section determines compliance with specific regulations involving asbestos, lead-based paint, and area sources of air pollutants that are not required to have Division of Air Quality (DAQ) Approval Orders but are subject to Maximum Achievable Control Technology (MACT) requirements of Title 40 Code of Federal Regulations (40 CFR) Part 63 [See R307-214-2 of the Utah Administrative Code (UAC)].

The following programs are the responsibility of the ATLAS Section:

National Emission Standards for Area Source Categories

Sources that are required to comply with 40 CFR Part 63 Subpart M *National Perchloroethylene Air Emission Standards for Dry Cleaning Facilities MACT* or the 40 CFR Part 63 Subpart N *National Emission Standards for Chromium Emissions from Hard and Decorative Chromium Electroplating and Chromium Anodizing Tanks MACT* and are not required to have DAQ Approval Orders are inspected by the ATLAS Section.

Lead-Based Paint

Toxic Substances Control Act (TSCA) Title IV, 40 CFR Part 745 (R307-840, 841, and 842 of the UAC). Under this program, ATLAS deals with the accreditation of training programs, certification of individuals and firms, work practices for lead-based paint activities, and lead-based paint outreach activities.

Asbestos in Schools

TSCA Title II Asbestos Hazard Emergency Response Act (AHERA), 40 CFR Part 763 (R307-801-4 of the UAC). Under this program, ATLAS deals with the approval of training providers, certification of individuals and companies, inspections of school buildings, and inspections of asbestos abatement in schools.

Asbestos NESHAP and State Asbestos Work Practices

40 CFR Part 61, Subpart M (R307-214-1 and R307-801 of the UAC). Under this program, ATLAS deals with the certification of individuals and companies, review of asbestos project notification forms, review of demolition notification forms for structures, review of alternate work practices, inspection of asbestos abatement projects, demolition of structures, and asbestos outreach activities.

Table 6. ATLAS Activity Summary

TASK	2014
MACT Inspections	26
Asbestos NESHAP Inspections	522
Asbestos AHERA (School) Inspections	487
Asbestos State Rules (Only) Inspections	64
Asbestos Notifications Accepted	1935
Asbestos Telephone Calls	5471
Asbestos Individuals Certifications	969
Asbestos Company Certifications	135
Asbestos Alternate Work Practices	146
Lead-Based Paint Inspections	112
Lead-Based Paint Abatement Notifications	26
Lead-Based Paint Telephone Calls	1108
Lead-Based Paint Letters Prepared & Mailed	824
Lead-Based Paint Courses Reviewed	10
Lead-Based Paint Individual Certifications	267
Lead-Based Paint Firm Certifications	161
Notices of Violations	1
Compliance Advisories	127
Warning Letters	100
Settlement Agreements	20
Penalties Collected	$29,793.61

Small Business Environmental Assistance Program

The Small Business Environmental Assistance Program (SBEAP) helps small businesses understand and comply with state air quality rules. The SBEAP provides “plain language” educational information to help small sources learn about the many air quality requirements. The SBEAP also provides on-site assistance with process evaluation, compliance assistance, and pollution prevention techniques. A toll-free telephone hotline number (1-800-270-4440) provides access to SBEAP services.