UTAH'S AIR QUALITY

2021 ANNUAL REPORT
UTAH DIVISION OF AIR QUALITY

UTAH DEPARTMENT *of*
ENVIRONMENTAL QUALITY
AIR
QUALITY

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Table of Contents

Table of Tables

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Table of Figures

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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
CFR	Code of Federal Regulations
CO	Carbon Monoxide
DAAD	Determination of Attainment by Attainment Date
DAQ	Division of Air Quality
DEQ	Department of Environmental Quality
EPA	Environmental Protection Agency
EVSE	Electric Vehicle Supply Equipment
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
NO_x	Nitrogen Oxides
NSPS	New Source Performance Standard
NSR	New Source Review
O_3	Ozone
PB	Lead
PM	Particulate Matter
PM_{10}	Particulate Matter Smaller Than 10 Microns in Diameter
$PM_{2.5}$	Particulate Matter Smaller Than 2.5 Microns in Diameter
PPB	Parts Per Billion
PPM	Parts Per Million
SBEAP	Small Business Environmental Assistance Program
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
SO_x	Sulfur Oxides
TSCA	Toxic Substances Control Act
TSP	Total Suspended Particles
UAC	Utah Administrative Code
VOCs	Volatile Organic Compounds

NOTE:

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

Introduction

The mission of the Utah Division of Air Quality (DAQ) is to safeguard and improve Utah's air through balanced regulation. The purpose of the DAQ is to achieve and maintain levels of air quality which will protect human health and safety, and to the greatest degree practicable, prevent injury to plant and animal life and property, foster the comfort and convenience of the people, promote the economic and social development of this state, and facilitate the enjoyment of the natural attractions of this state. It is the responsibility of the 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, the 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. The DAQ enacts rules pertaining to air quality standards, develops plans to meet the federal standards when necessary, administers emissions reductions incentive programs, 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 (Utah Code §19-2) delegates rulemaking power to the Utah Air Quality Board (Board) to promulgate rules pertaining to air quality issues. DAQ staff supports the Board in its policy-making role. The Board is made up of nine members representing local government, environmental groups, the public, industry, and 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 the DAQ is the Board's Executive Secretary.

The Utah air quality rules define the Utah air quality program. Implementation of the rules requires the DAQ's 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.

2021 Synopsis

The DAQ accomplished much in 2021 towards fulfilling our mission to safeguard and improve Utah's air. With an increasing population, industrial base, and more stringent federal air quality standards, it has been a challenge to meet air quality objectives; however, 2021 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 2021:

Meeting National Ambient Air Quality Standards

- The EPA finalized redesignation of the Logan $PM_{2.5}$ nonattainment area to attainment on June 18, 2021. This is the culmination of over a decade of work and demonstrates that the emission reductions detailed through the State Implementation Plan (SIP) have been successful and the ambient monitored air now meets the health standard and is cleaner than it was in 2009 when the area was originally designated nonattainment. More information on this accomplishment and other $PM_{2.5}$ areas can be found on page 35 of this report.
- Both Ogden City and Salt Lake City have completed the final maintenance period for violating the 1978 carbon monoxide standard. Transportation conformity requirements are no longer necessary. The Provo area still has approximately four years left in its final maintenance period. Monitored carbon monoxide values continue to be well under the standard across Utah.
- With a changing climate, and increased drought in parts of the Western United States in 2021, there were large wildfires in California, Oregon, Washington, and Western Canada. The smoke from these fires significantly affected air quality in many western states. $PM_{2.5}$ was elevated at many Utah ambient air quality monitors through several of the summer months. Ozone levels were also elevated, although more analysis is required to determine if the elevated ozone was caused or exacerbated by wildfires. DAQ continues to analyze both monitored data and wildfire data to assess smoke impacts, and understand the regulatory significance of these events to continue to meet air quality standards.
- There are three marginal ozone nonattainment areas in Utah. The Southern Wasatch Front will stay classified as marginal. The Northern Wasatch Front will be most likely be reclassified to moderate since the area did not attain by the attainment date, and UDAQ has applied for an attainment extension in the Uinta Basin, as the monitored data has met requirements. The DAQ has begun work in anticipation of the CAA requirements associated with reclassification to moderate, which include an attainment SIP. Meeting the ozone SIP requirements will require a significant amount of work for the DAQ, including all new photochemical modeling for the Uinta Basin and the Wasatch Front. Significant progress has been made in this photochemical modeling effort over the last year, as well as noteworthy improvements in the emission inventories that feed this modeling effort.
- The DAQ submitted a CAA Section 179B(b) demonstration to the EPA for review for the Northern Wasatch Front nonattainment area. Section 179B(b) of the CAA gives states the opportunity to demonstrate that transport of international emissions is resulting in violations of the standard. The DAQ anticipates a response from the EPA in the upcoming

Determination of Attainment by Attainment Date (DAAD), and has worked to further its understanding of international transport and refine its photochemical modeling performance since the submission of the demonstration.

- DAQ scientists partnered with EPA to apply recent scientific findings about air emissions in the Uinta Basin to the Uinta Basin Emissions Inventory. This technical analysis is described in two white papers authored by UDAQ and EPA. This information will be used to update emission inventories in order to improve photochemical modeling for ozone regulatory purposes. More information on this accomplishment can be found at the links below:
  - Uinta Basin VOC Composition Study Impacts on the 2017 Oil and Gas Emissions Inventory
  - Produced Water Disposal Facility Emission Factors & their Impact on the 2017 Oil and Gas Emissions Inventory

Regional Haze

- On December 9th, 2021, DAQ submitted the second planning period regional haze SIP to Federal Land Managers (FLMs) for a statutory 60-day review. The plan considered large haze-contributing stationary sources and required six sources to perform a four-factor analysis, including time for compliance, cost of compliance, non-air environmental benefits, and remaining useful life. Upon responding to FLM comments in the SIP itself, DAQ will ask the Air Quality Board to propose the plan for public comment, with a finalization of the plan and submittal to EPA expected in the summer of 2022.

Air Quality Research Projects

- FY2022 funding included ongoing legislative funding of $500,000 for DAQ to select air quality research projects through a competitive process. This annual research funding helps DAQ improve its knowledge of the unique atmospheric and chemical conditions that contribute to air pollution in Utah. Information regarding the projects funded for FY22 can be found on page 32 of this report.

Compliance

- DAQ major and minor source inspectors conduct over 1,200 compliance inspections throughout the State each year to verify compliance with state and federal air quality rules. This includes full compliance evaluations, partial compliance evaluations, complaint and surveillance inspections. Additionally, our stack testing and Continuous Emission Monitoring compliance programs ensure emissions limits are being met during stack testing. DAQ ATLAS inspectors conduct over 450 inspections throughout the state each year. This includes abatement, renovation, and demolition inspections for asbestos and lead based paint. Annual activities and penalty collection data for the compliance program are summarized in Table 8 and Table 9 of this report.

Permitting

- The DAQ issued 105 permits during 2021, with an average of 155 days to issue the permit from the submission of an application.
- There are currently 76 Title V sources in Utah.
- More information on Permitting can be found beginning on page 58 of this report.

Air Quality Standards

The CAA requires the EPA to set NAAQS for pollutants considered harmful to public health and the environment. The CAA establishes two types of air quality standards: primary and secondary. 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 from decreased visibility and damage to animals, crops, vegetation, and buildings.

Standards are composed of a numerical value and a form (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. The six criteria pollutants 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 standard. The EPA establishes the primary health standards 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. At concentrations between 1.0 and 1.5 times the standard, while the general public is not expected to be adversely affected by the pollutant, the most sensitive portion of the population may be. However, at levels above 1.5 times the standard, even healthy people may see adverse effects.

The DAQ monitors each of these criteria pollutants in the ambient air, as well as meteorological conditions and several non-criteria pollutants for special studies at various monitoring sites throughout the state.

Table 1: EPA Designated Criteria Pollutants

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 NO2	Can cause lung damage, illnesses of breathing passages and lungs (respiratory system).	Ingredient of acid rain (acidaerosols) 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; Volatile Organic Compounds (VOCs) and NO_x	Can cause breathing problems, reduced lung function, asthma, irritated eyes, stuffy nose, and reduced resistance to colds and other infections. It may also speed up aging of lung tissue.	Can damage plans and trees; smog can cause reduced visibility.
Particulate Matter (PM_{10}, $PM_{2.5}$) dust, smoke, soot.	Burning of gasoline, natural gas, coal, oil, and other fuels; industrial plans; 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 of acid rain (acidaerosols) 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 U.S. until the federal government mandated unleaded gasoline.	Damages the nervous systems, including the brain, 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

Table 2: Ambient Air Quality Standards				
Pollutant	***Averaging Time***	***Primary / Secondary***	***Standard***	***Form***
Ozone (O_3)	8 Hour	Primary and Secondary	0.070 ppm	Annual Fourth-highest daily maximum 8-hr concentration, averaged over three years
Respirable Particulate Matter (PM_{10})	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 ($PM_{2.5}$)	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 (NO_2)	1 Hour	Primary and Secondary	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over three years
	Annual	Primary and Secondary	53 ppm	Annual mean
Sulfur Dioxide (SO_2)	1 Hour	Primary	75 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over three years
	3 Hour	Secondary	0.5 ppm	Not to be exceeded more than once per year
Lead (Pb)	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 (AMS) operates a network of monitoring stations throughout Utah. The monitors are situated to measure air quality in both neighborhoods and industrial areas. Table 3 shows the monitoring station locations and monitored constituents for stations operated in 2021.

Table 3: Utah Monitoring Network Stations

Table 3: Utah Monitoring Network Stations									
Station	City	Address	CO	NO_2	O_3	PM_{10}	$PM_{2.5}$	SO_2	Met.
Air Monitoring Center	SLC	240 N. 1950 W.	X	X	X	X	X	X	
Antelope Island	None	North end of island							X
Bountiful	Bountiful	200 W. 1380 N.		X	X		X		X
Copperview	Midvale	8449 S. Monroe St.	X	X	X		X	X	X
Enoch	Enoch	3840 N. 325 E. Minersville Hwy.		X	X		X		X
Erda	Tooele	2163 West Erda Way		X	X		X		X
Escalante	Escalante	755 West Main			X				
Harrisville	Harrisville	425 W. 2250 N.	X	X	X		X		X
Hawthorne	SLC	1675 S. 600 E.	X	X	X	X	X	X	X
Herriman	Riverton	14058 Mirabella Dr.		X	X	X	X		X
Hurricane	Hurricane	150 N. 870 W.		X	X		X		X
Inland Port	SLC	1480 N. 8000 W.		X	X		X		X
Lake Park	West Valley	2782 S. Corporate Park Dr	X	X	X	X	X		X
Lindon	Lindon	30 N. Main St.	X	X	X	X	X		X
Near Road	Murray	4951 S. Galleria Dr.	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	X	X		X	X	X
Saltair	None	6640 W. 1680 N.					X		X
Smithfield	Smithfield	675 W. 220 N.		X	X	X	X		X
Spanish Fork	Spanish Fork	312 W. 2050 N.			X		X		X
Vernal	Vernal	628 N. 1700 W.		X	X		X		X

NAAQS Nonattainment & Maintenance Areas

The CAA has three different designations for areas based on whether or not they meet the NAAQS for each criteria pollutant. Areas in compliance with the NAAQS are designated as attainment areas. Areas where there is no monitoring data are designated as unclassifiable. Lastly, areas that are not in compliance with the NAAQS are designated as nonattainment. A maintenance area is an attainment area that was once designated as nonattainment for a NAAQS, and has since demonstrated to the EPA that it has and will continue to attain that standard for a period of a minimum of 10 years.

Most of the State of Utah has been designated as either attainment or unclassifiable for each of the NAAQS. The maps of Figures 1 and 2 show the current nonattainment areas within the state for ozone. Figure 1 shows the current areas of nonattainment for the Uinta Basin, which exhibits ozone exceedances during winter months. Figure 2 shows the boundaries of the Northern Wasatch Front and Southern Wasatch Front nonattainment areas, which tend to exceed the standard during summer months.

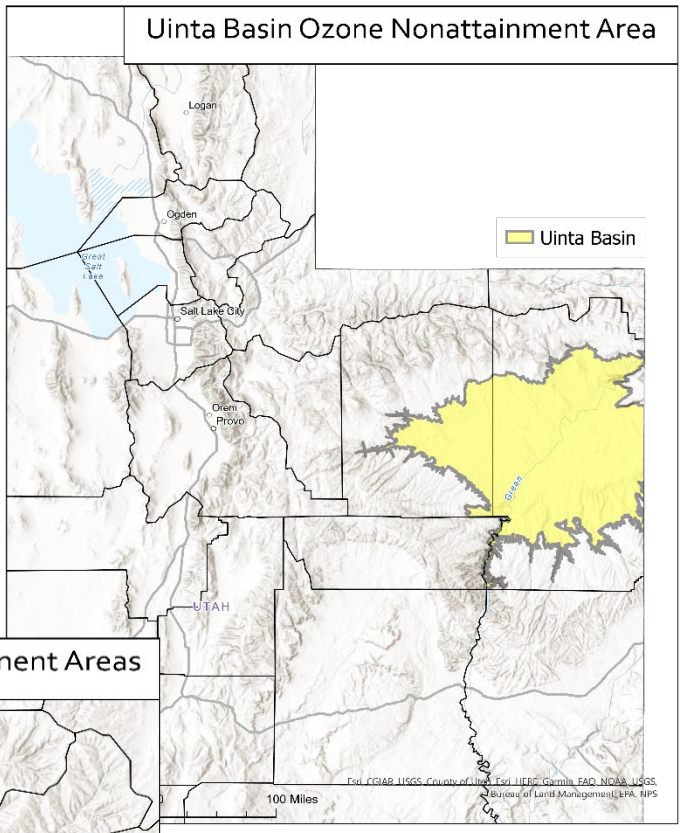


Figure 1: Uinta Basin Ozone Nonattainment Area

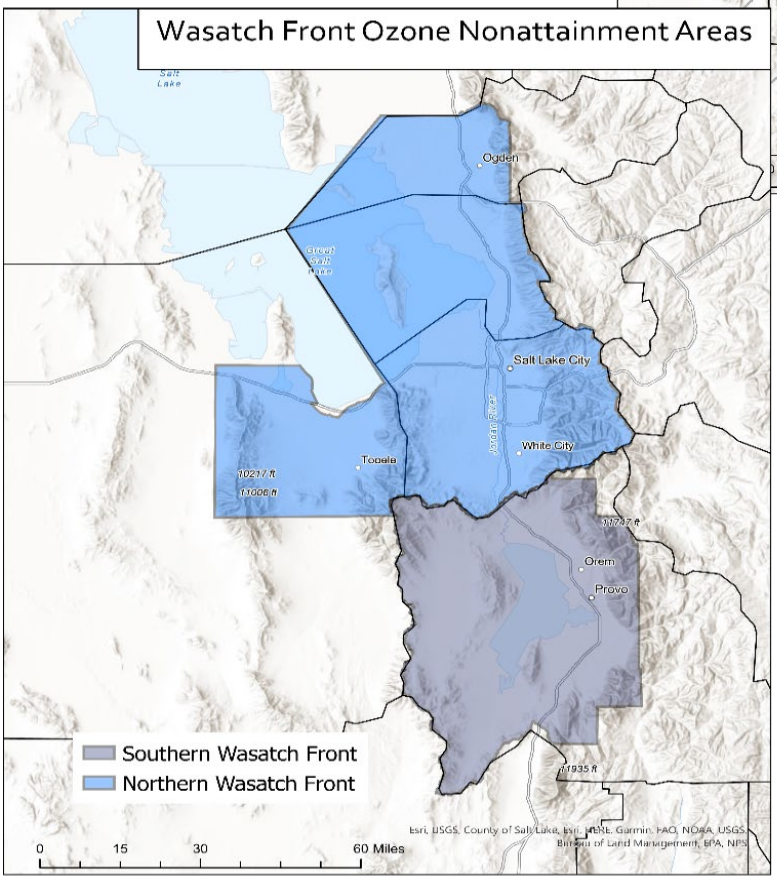


Figure 2: Wasatch Front Ozone Nonattainment Areas

Figure 3 shows current nonattainment area boundaries for $PM_{2.5}$. Figure 4 shows the boundaries for the Wasatch Front SO_2 nonattainment area.

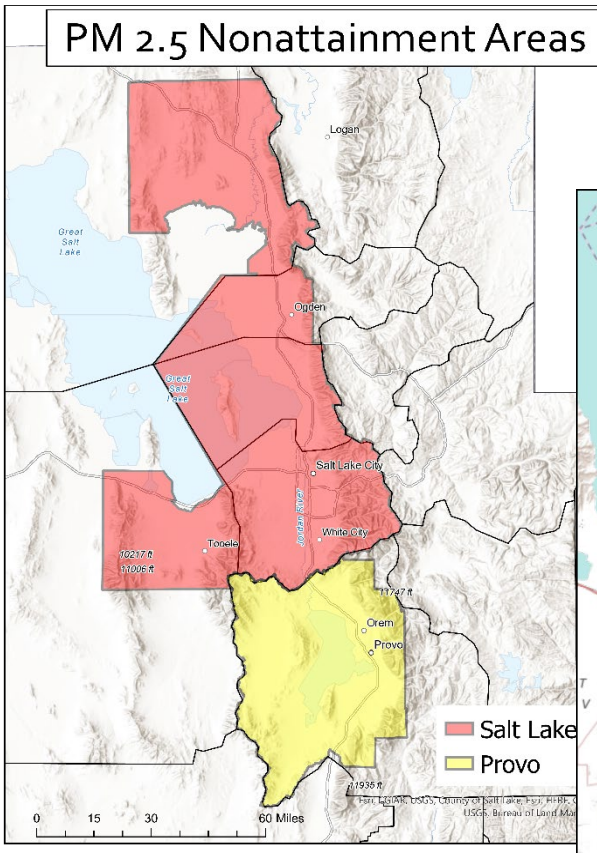


Figure 3: Wasatch Front $PM_{2.5}$ Nonattainment Areas

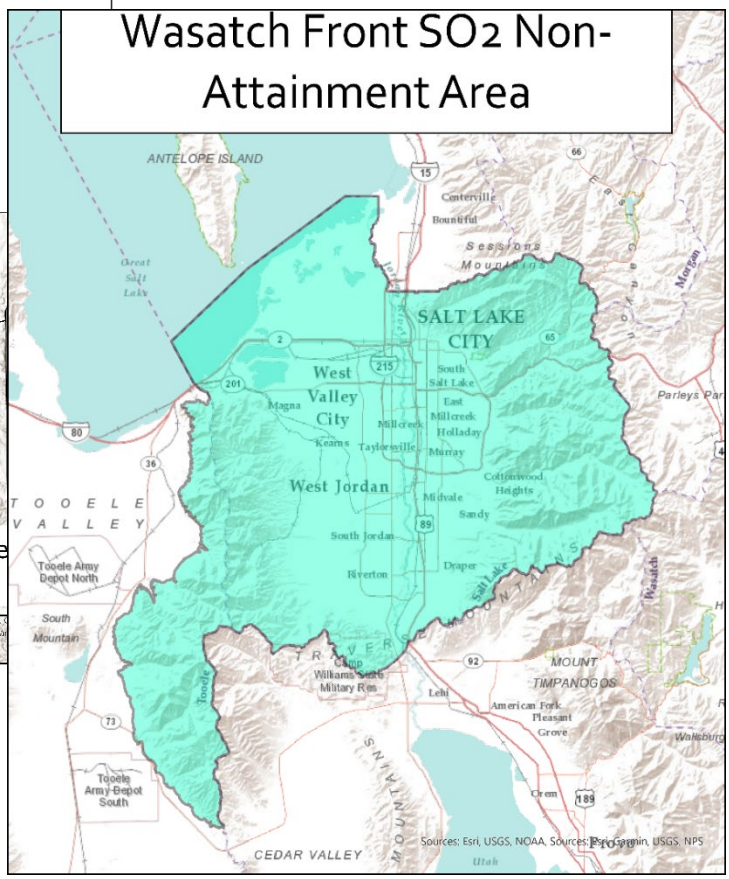


Figure 4: SO_2 Nonattainment Area

Figure 5 highlights maintenance area boundaries for carbon monoxide, PM_{10}, and $PM_{2.5}$.

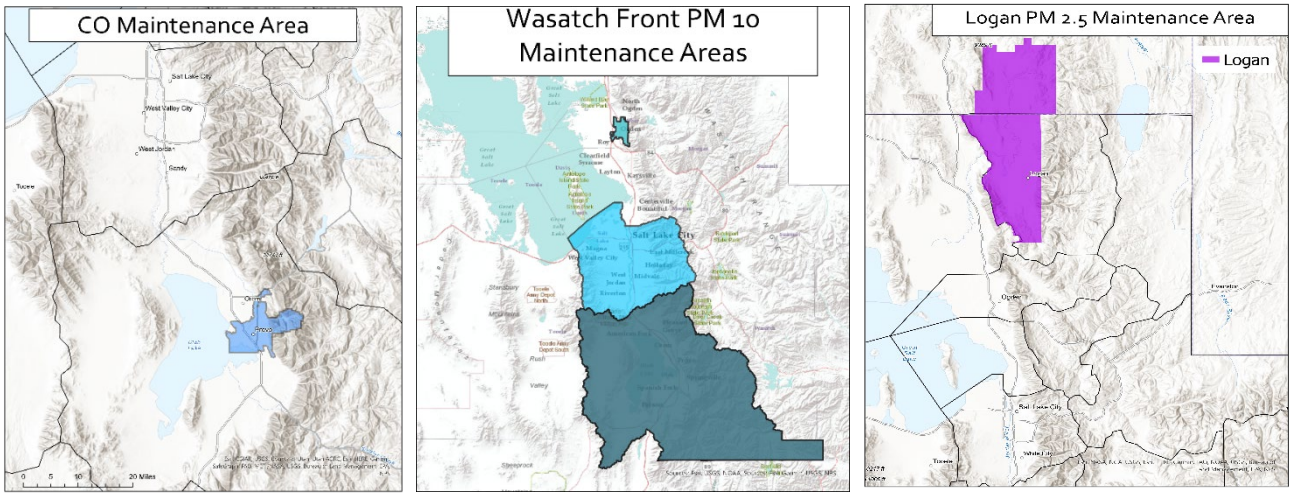


Figure 5: CO and PM Maintenance Areas.

Criteria Air Pollutants

Carbon Monoxide (CO)

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

Because motor vehicle emissions are the primary source of carbon monoxide, 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 the EPA's presumption that all elevated carbon monoxide 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 carbon monoxide concentrations were typically found near roadways. Carbon monoxide values are higher in winter due to several factors, including: cold weather resulting in motor vehicles running less efficiently, wood burning and building heating, and temperature inversions which can trap carbon monoxide and other pollutants.

NAAQS Standards

The EPA has developed two national ambient air quality standards for carbon monoxide. 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 is in violation, it is designated as nonattainment.

Utah Monitoring Data

Three cities in Utah (Salt Lake City, Ogden, and Provo) were at one time designated as nonattainment areas for carbon monoxide. Due primarily to improvements in motor vehicle technology, Utah has been in compliance with carbon monoxide standards since 1994 (Figure 6 and Figure 7). Salt Lake City, Ogden, and Provo were re-designated to attainment status in 1999, 2001, and 2006 respectively. Re-designated areas are required to complete two 10-year maintenance periods to demonstrate the ability to maintain attainment of the standard. The maintenance period for Salt Lake City ended in 2019 and in 2021, Ogden completed its maintenance period, leaving only Provo in maintenance for carbon monoxide.

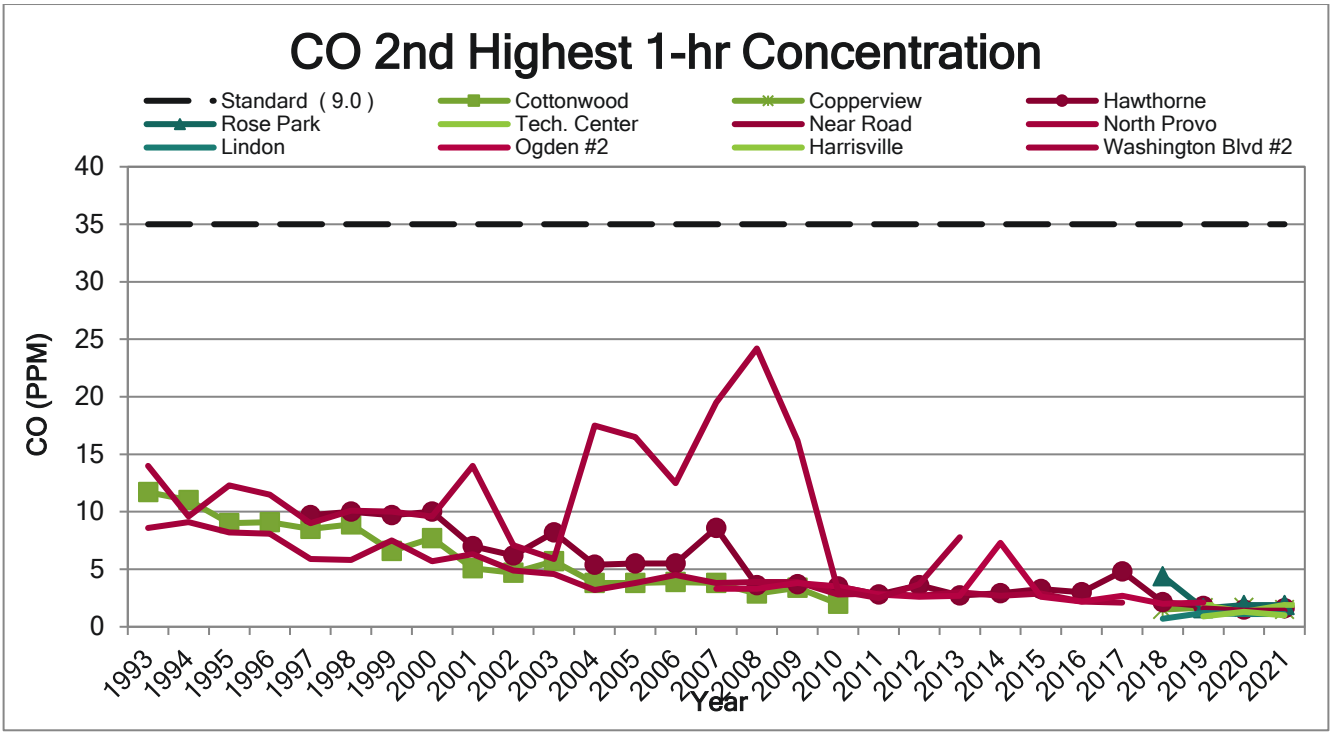


Figure 6: Carbon Monoxide Second Highest 1-Hour Concentration

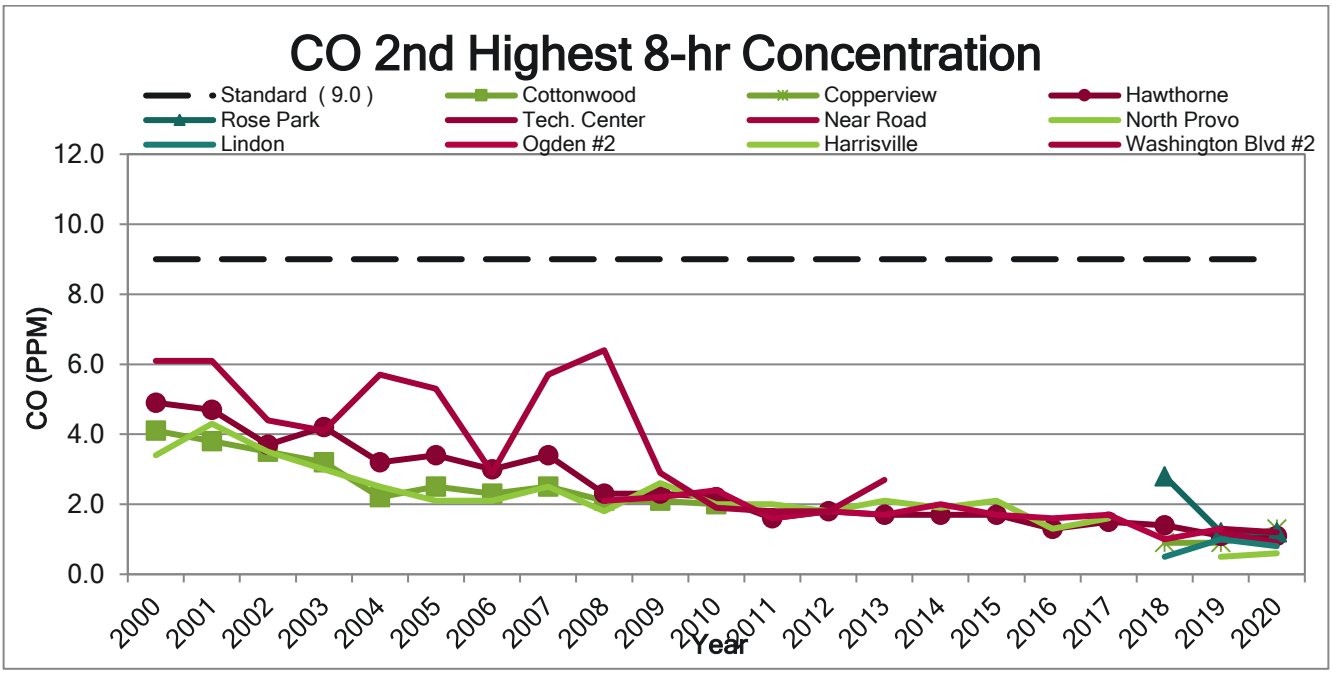


Figure 7: Carbon Monoxide Second Highest 8-Hour Concentration

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 can react with other pollutants through secondary reactions in the atmosphere to form additional pollutants of concern. In the summer along the Wasatch Front, and in the winter in the Uinta Basin, photochemical reactions between NO_2 and volatile organic compounds (VOCs) lead to the formation of ground-level ozone. In the winter, NO_2 can undergo a series or reactions to form nitric acid (HNO_3) which then reacts with ammonia (NH_3) to form fine particulate matter ($PM_{2.5}$). Both of these seasonal scenarios can result in increased pollution and violations of the NAAQS. Utah continues to have difficulty with both the ozone and particulate matter standards; and because of this, the DAQ is mindful of the trend in NO_2 concentrations as illustrated in Figure 9.

NAAQS Standards

The EPA has established 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.

The annual NO_2 standard of 53 ppb is expressed as an annual arithmetic mean (average) as seen in Figure 9. The DAQ monitors the concentrations of NO_2 at various locations throughout the state.

Utah Monitoring Data

As shown in Figure 8 and Figure 9, Utah has never exceeded the standards for NO_2.

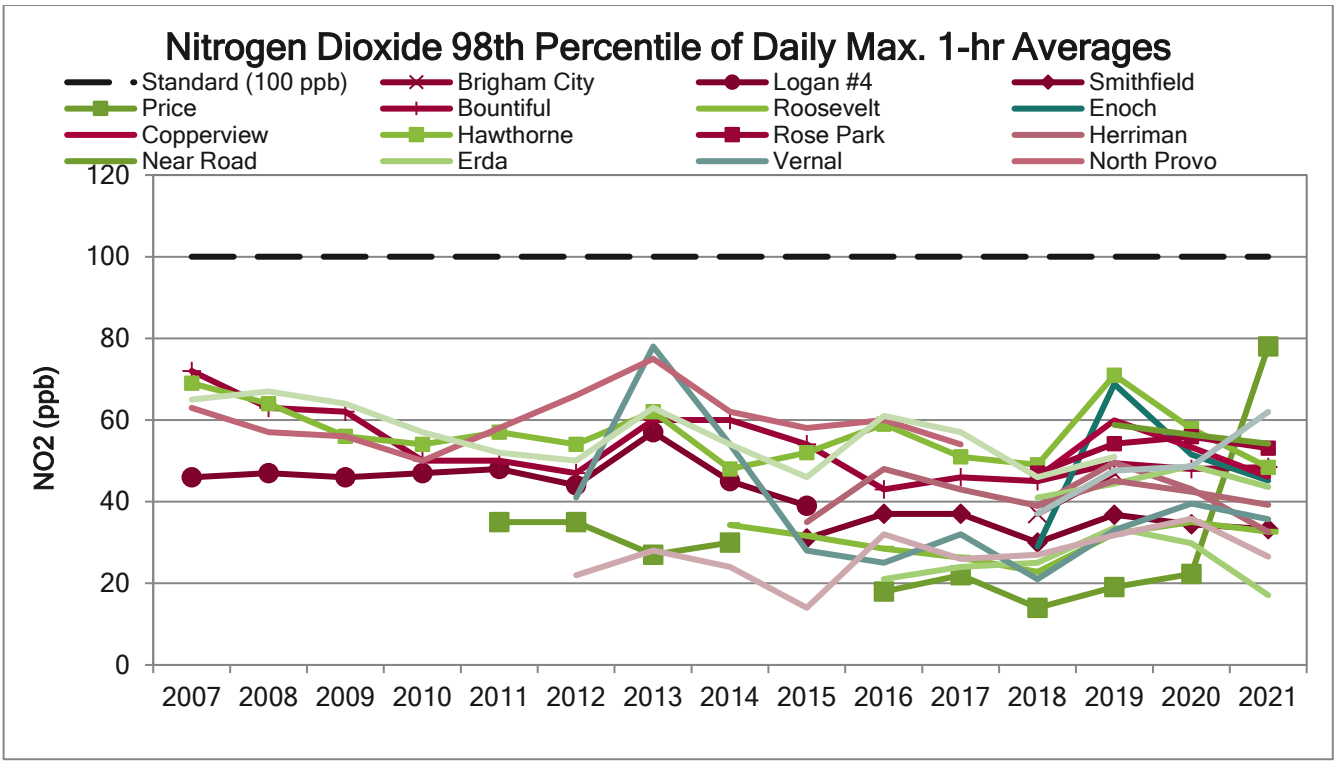


Figure 8: Nitrogen Dioxide 98th Percentile of Daily Max 1-hr Averages

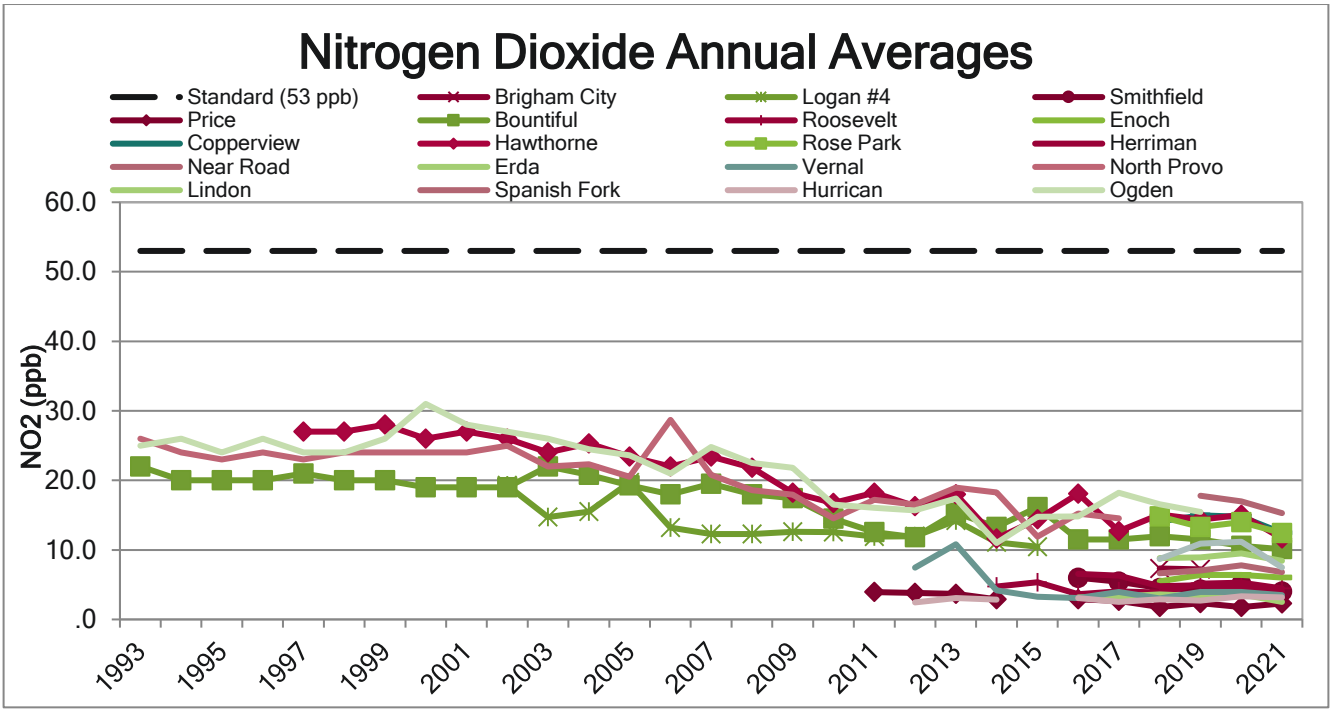
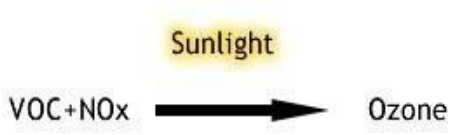


Figure 9: Nitrogen Dioxide Annual Averages

Ozone (O_3)

Ozone is a highly unstable, colorless gas composed of three molecules of oxygen bonded together. Ground-level ozone, which is regulated by EPA, should not be confused with the stratospheric ozone layer located ~15 miles above the earth's surface which shields the earth from cancer-causing ultraviolet radiation. Ground level ozone is not directly emitted, but is rather formed by a complex chemical reaction involving VOCs and oxides of nitrogen NO_x in the presence of sunlight.



Some major sources for both VOCs and NO_x are vehicle exhaust, emissions from industrial facilities, gasoline vapors, chemical solvent use, oil and gas production, wildfires, and biogenic emissions from natural sources such as vegetation.

Ozone production is a year-round phenomenon, with the highest concentrations generally observed during the summer months when strong incoming solar radiation, high temperatures, and stagnant meteorological conditions combine to drive the chemical reactions. However, it has been found that under very unique circumstances, high ozone levels can occur during the wintertime. In the Uinta Basin of Utah, wintertime ozone is associated with the confluence of temperature inversions, snow cover, significant VOC and NOx emissions associated with oil/gas production, and solar radiation (sunlight). Research is on-going to better understand the chemical processes that lead to wintertime ozone production. The maximum daily 8-hour monitored values for the Ouray monitor in the Uinta Basin and the Hawthorne monitor on the Wasatch Front illustrate the timing of high values in each area. Figure 10 shows that higher values in the Uinta Basin are typically seen in the winter months, whereas higher values on the Wasatch Front are typically observed in the summer.

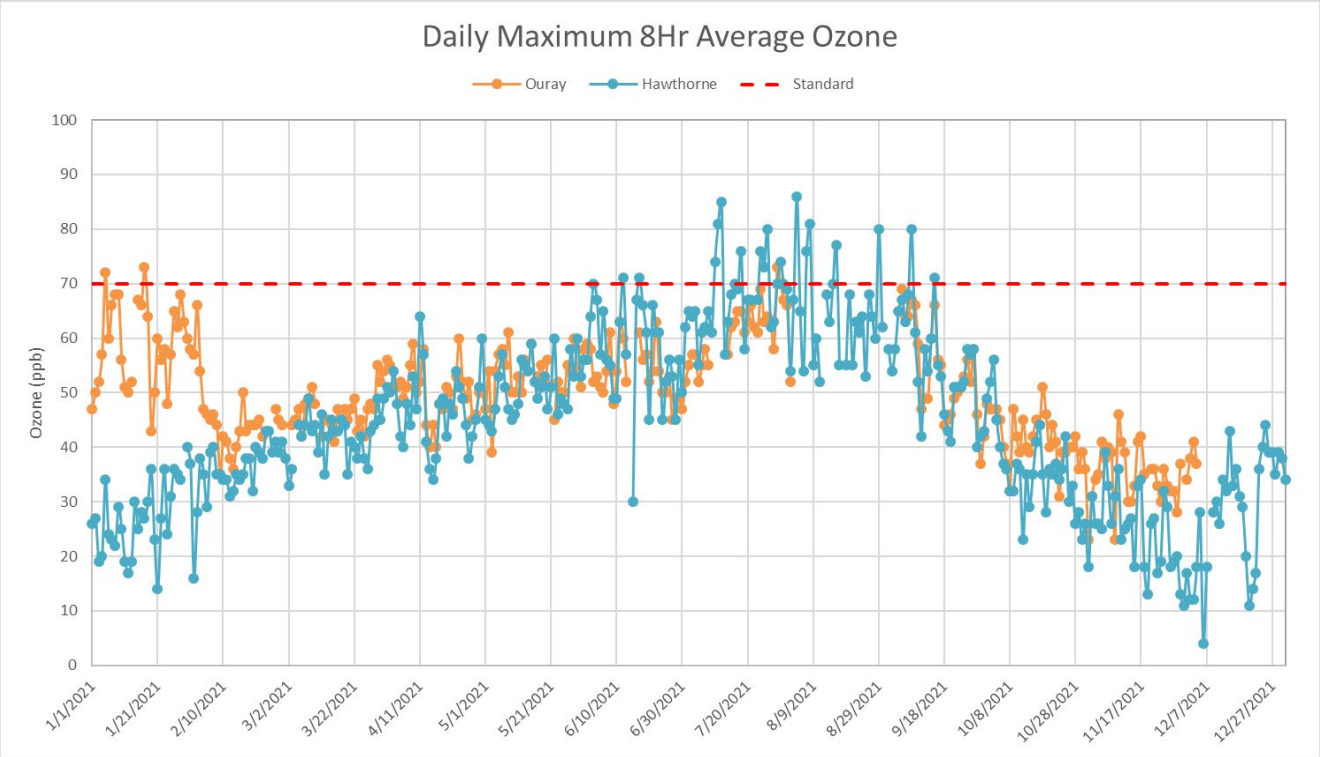


Figure 10: Daily Maximum 8-Hour Ozone Average

NAAQS Ozone Standards

In October of 2015, the EPA strengthened the primary and secondary ozone NAAQS from 0.075 ppm to 0.070 ppm, based on a three-year average of the annual 4th highest daily eight-hour average concentration. The standard was reviewed again in 2020 and the EPA chose to retain the standard at 0.070 ppm. In August 2018, the EPA designated portions of the Wasatch Front and Uinta Basin nonattainment as marginal nonattainment for ozone.

Health Impacts of Ozone

Exposure to ozone has been linked to a variety of respiratory and pulmonary problems, especially among susceptible populations. These health problems can include increased susceptibility to respiratory illness like pneumonia and bronchitis, chest pain, irritation and damage of lung tissue, irritation of the eyes, and aggravation of preexisting respiratory issues like asthma or chronic obstructive pulmonary disease (COPD).

Utah Monitoring Data

-Figure 11 through Figure 13 show the annual 4th highest eight-hour ozone concentrations for monitors on the Wasatch Front, in the Uinta Basin, and other monitors located throughout the state. Figure 14 shows how each area compares to the NAAQS with the three-year average of the 4th highest eight-hour ozone concentration. The heavy black dashed lines indicate the previous standard of 0.075 ppm. The heavy red dashed line indicates the current 0.070 ppm standard.

In 2021, DAQ monitors showed multiple exceedances of the 2015 standard in all monitored counties along the Wasatch Front. In 2021, there was one exceedance of the current standard at the Roosevelt monitor in the Uinta Basin. This occurred during the summer months, which is not the established ozone season for the Uinta Basin, and the exceedance may have been caused or exacerbated by wildfire smoke.

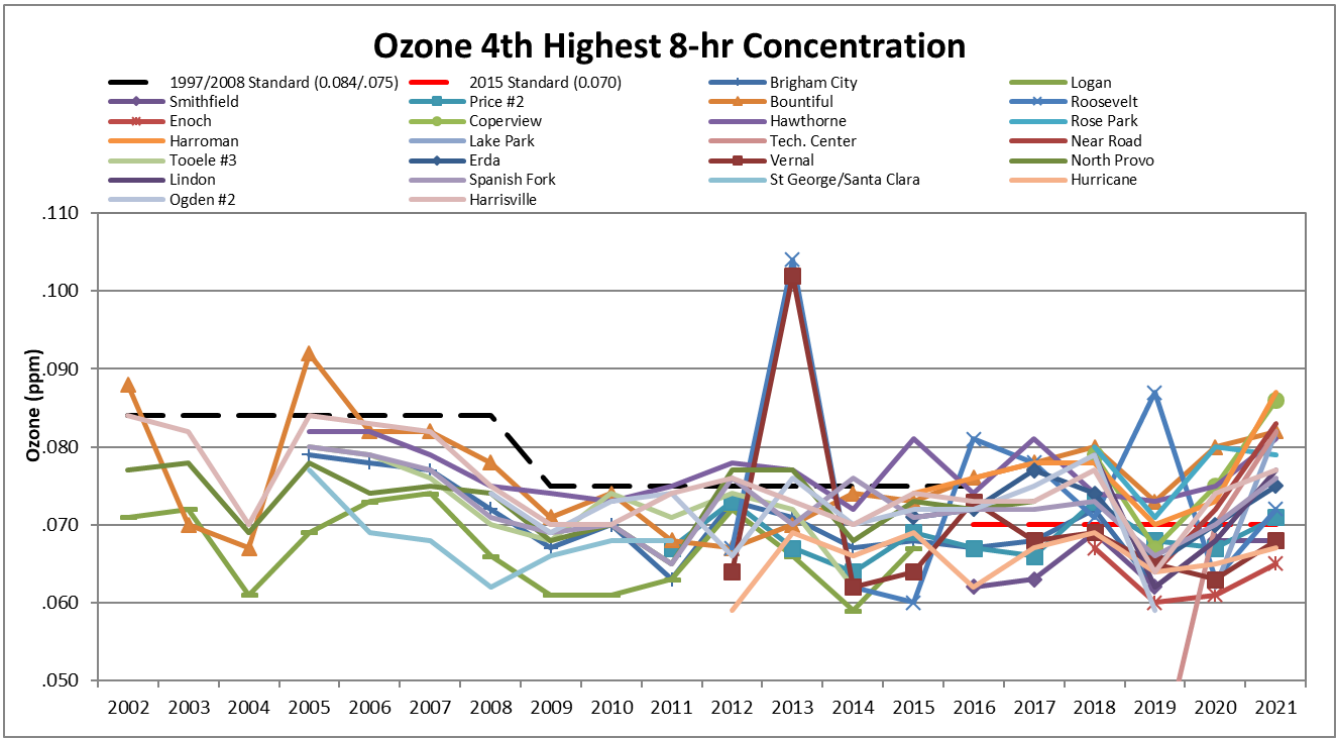


Figure 11: Ozone 4th Highest 8-Hour Concentration

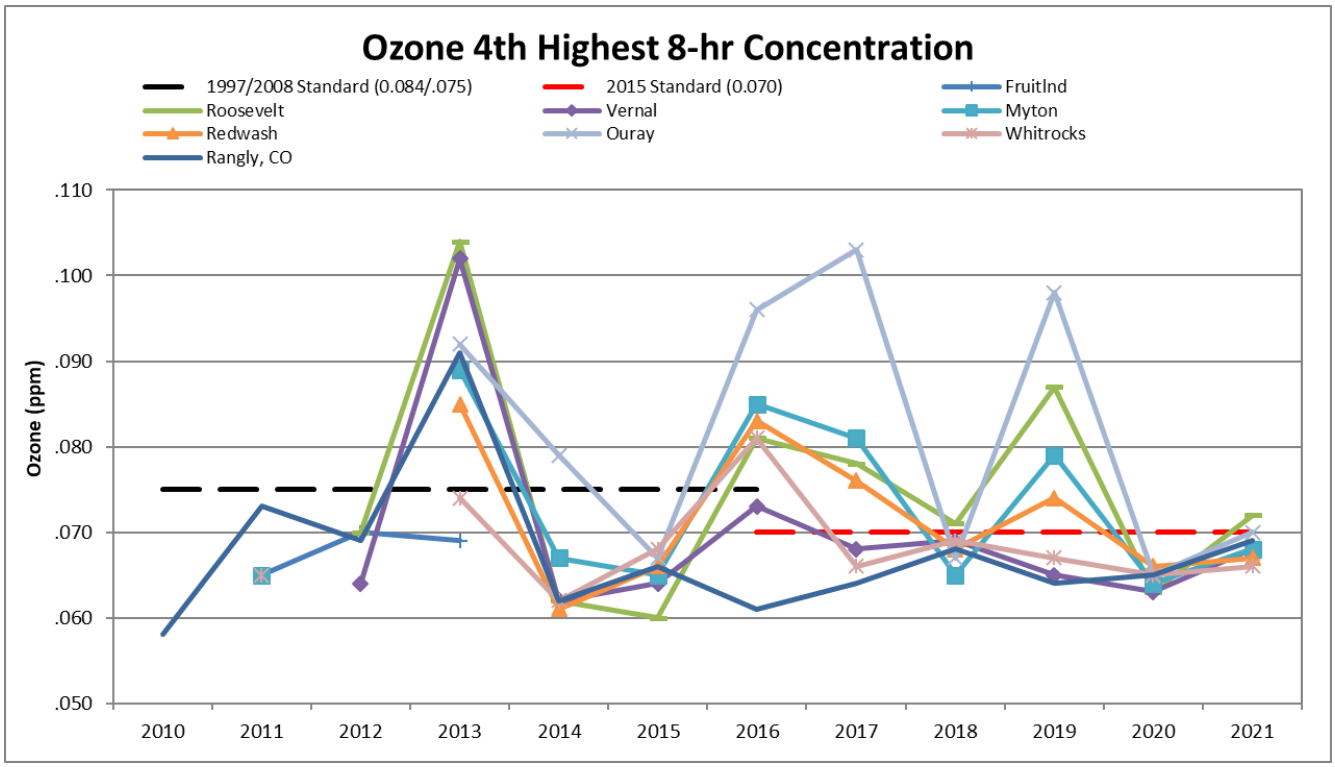


Figure 12: Ozone 4th Highest 8-Hour Concentration in Uinta Basin

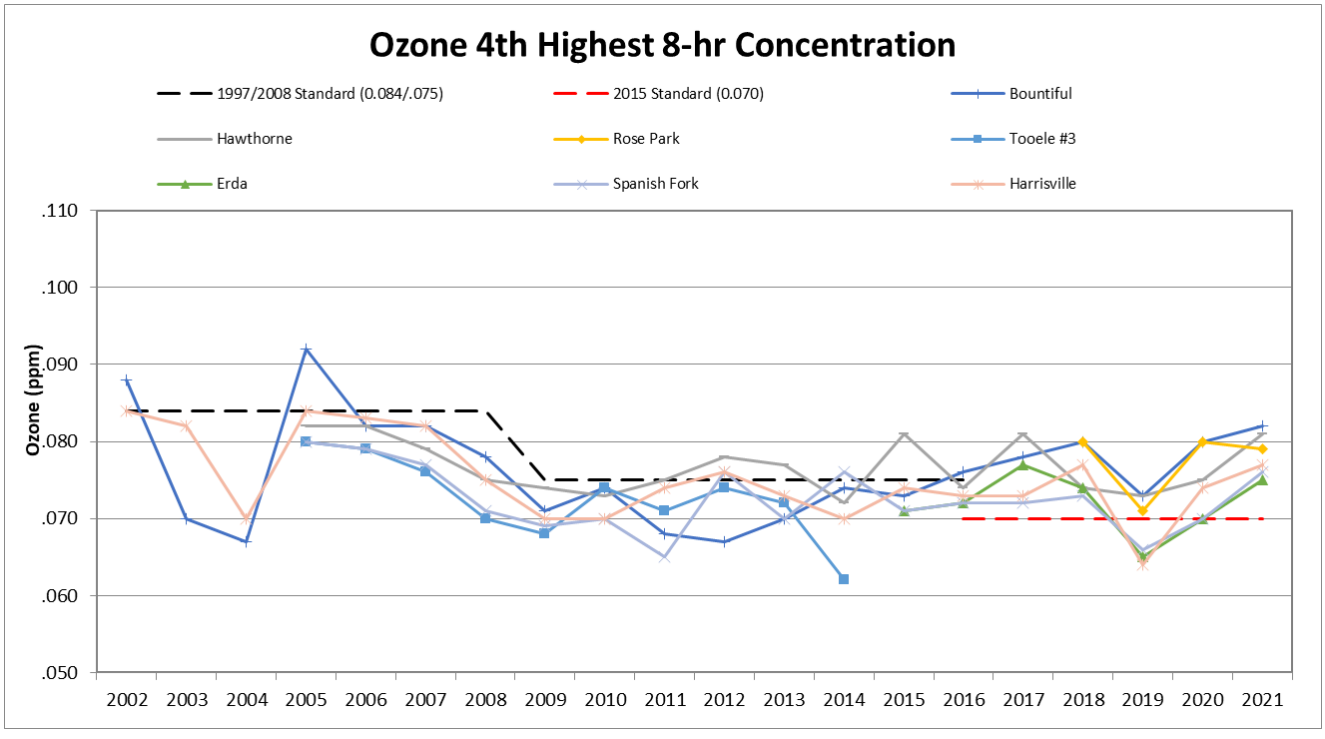


Figure 13: Ozone 4th Highest 8-Hour Concentration in Wasatch Front

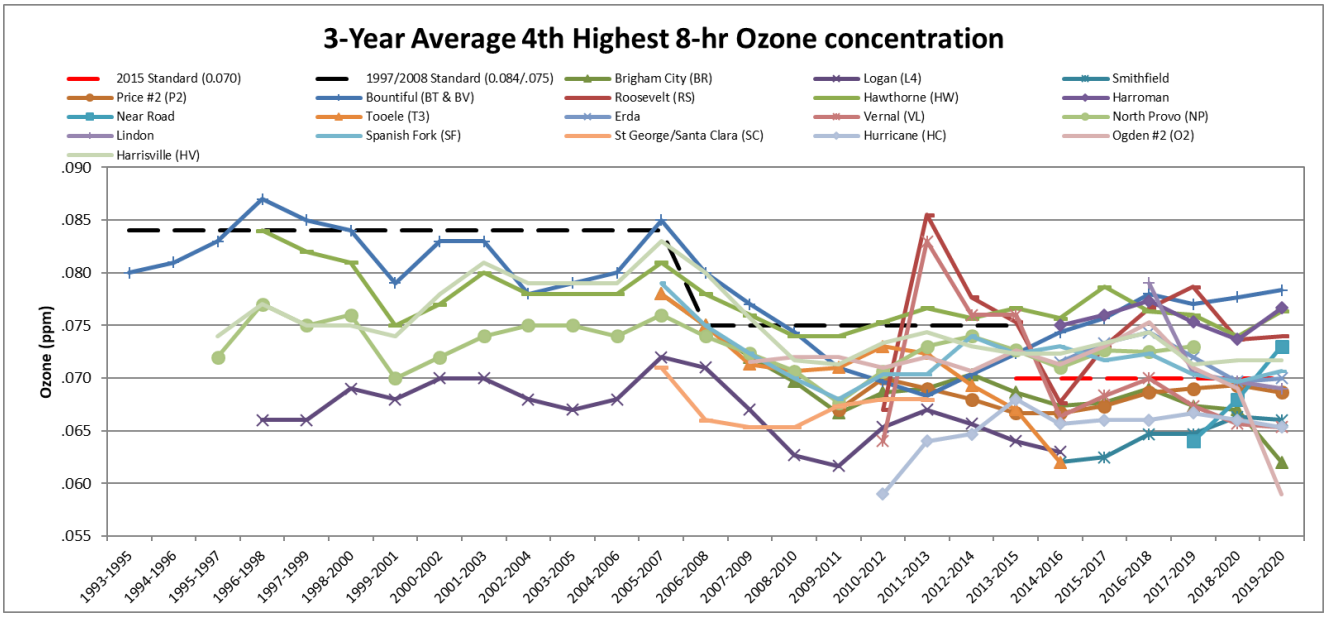


Figure 14: Three-Year Average 4th Highest 8-Hour Ozone Concentration

Photo Credit: Becky Close, 2022.

Particulate Matter (PM)

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 a particulate less than ten 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 microns in diameter or less. The coarse fraction of PM_{10}, which is larger than 2.5 microns, is typically made up of "fugitive dust" (sand and dirt blown by winds from roadways, fields, mining, 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 such as fly ash from power plants, black carbon 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 sulfur dioxide (SO_2), NO_x, and VOCs 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 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 EPA established the 24-hour air quality standard for PM_{10} in July 1987 as 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 estimated exceedances within a three-year period would constitute a violation. Salt Lake County and Utah County had been designated nonattainment for PM_{10} shortly after the standard was promulgated. Ogden City 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.

Utah Monitoring Data

State Implementation Plans (SIP) were written and promulgated in 1991, and included control strategies that were responsible for the marked decrease in PM_{10} concentrations observed in the early 1990s. Ogden City, and Salt Lake and Utah Counties were officially designated as attainment for PM_{10} effective March 27th, 2020. These three former nonattainment areas are now subject to the maintenance plans that were approved by EPA and the areas must continue to attain the standard for the first maintenance period of ten years.

High values of monitored PM_{10} sometimes result from exceptional events, such as dust storms and wildfires. The data from such events can be flagged under the EPA Exceptional Events Rule for exclusion by EPA when they cause a violation. While there have been isolated high values in the past 13 years, none resulted in a violation of the NAAQS. Figure 15 shows the PM_{10} estimated exceedances at monitored sites in Utah since 2000.

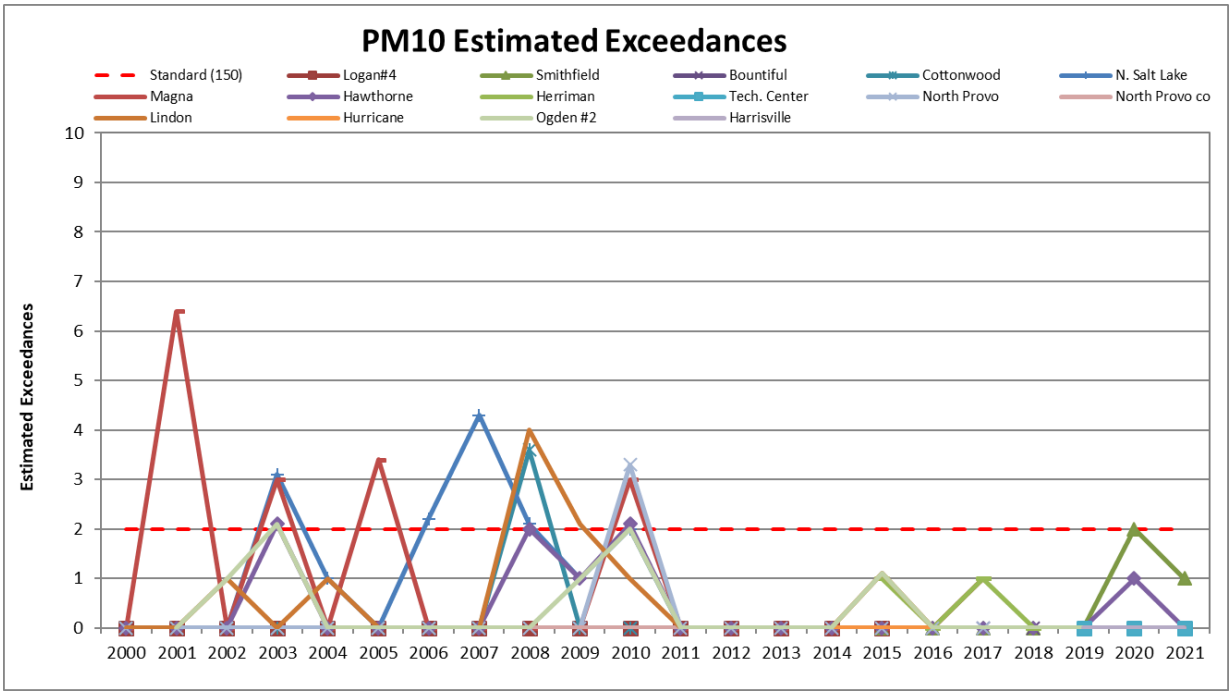


Figure 15: PM_{10} Estimated Exceedances

The statistical form of the standard essentially allows for one exceedance per year, regardless of how high the value may be. For this reason, it is often useful to look at the second highest value collected at a particular location.

Figure 16 shows the second highest 24-hour PM_{10} concentrations recorded at each station since 2000. The heavy dashed line indicates the NAAQS.

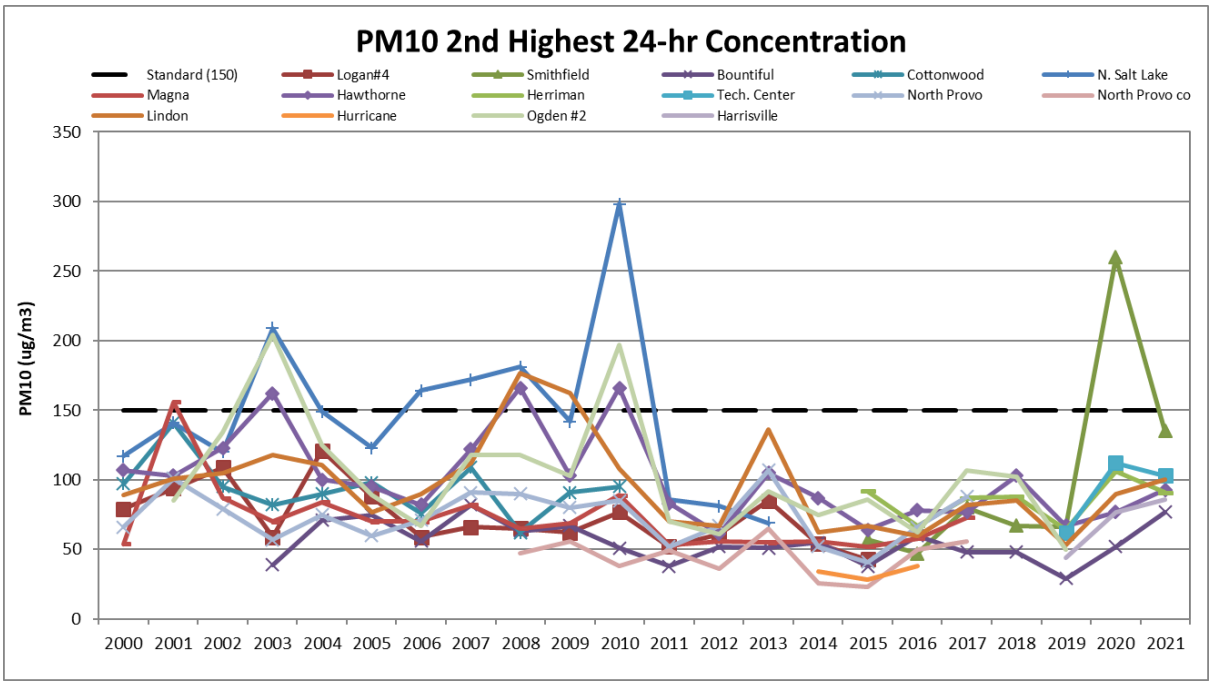


Figure 16: PM_{10} Second Highest 24-Hour Concentration

Standards – $PM_{2.5}$

The EPA first established standards for $PM_{2.5}$ in 1997. In 2006, the EPA lowered the 24-hour $PM_{2.5}$ standard from 65µg/m^3 to 35 µg/m^3. In 2012, the EPA lowered the annual standard from

15µg/m^3 to 12µg/m^3. The $PM_{2.5}$ NAAQS underwent a review in 2020 and the standards were retained. Both standards are evaluated by considering monitored data collected during a three-year period. This minimizes the effects of year-to-year meteorological variability. 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.

Utah Monitoring Data

Figure 17 shows that all monitors in Utah are in compliance with the 1997 standard. The three-year averages from 2018-2020 show that all monitors are in compliance with the 2006 standard.

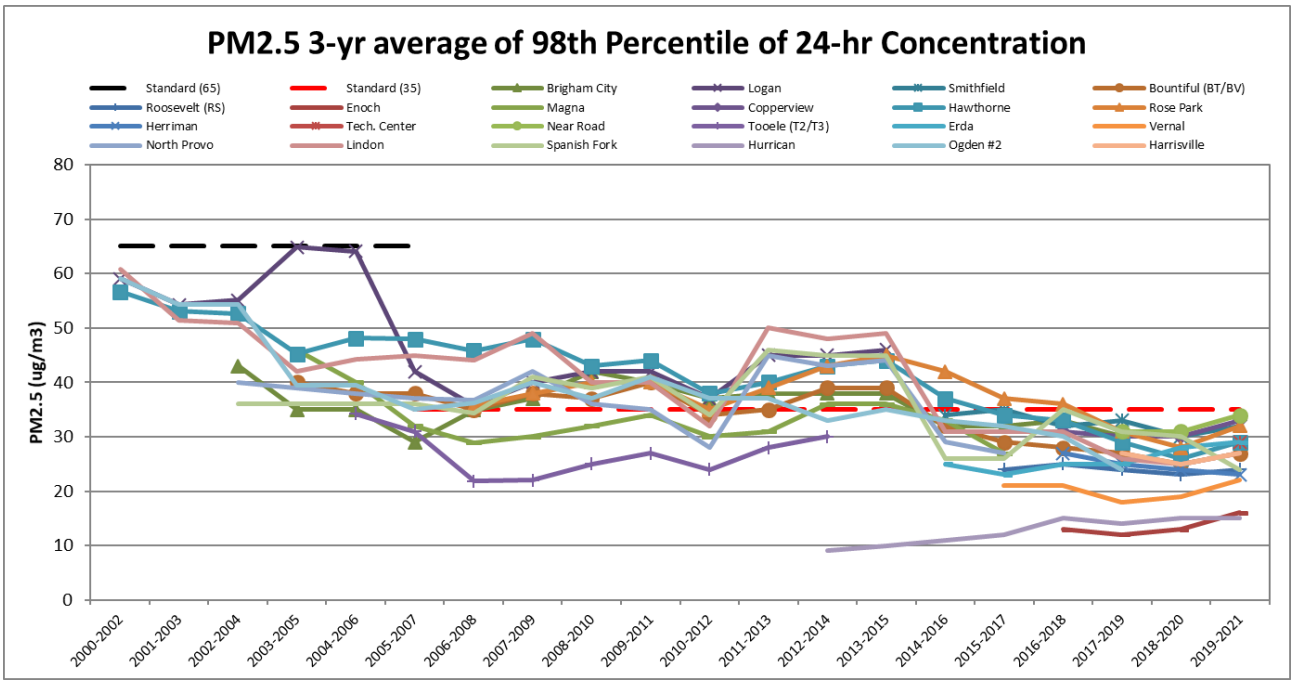


Figure 17: $PM_{2.5}$ Three-Year Average 98th Percentile 24-Hour Concentration

The annual standard is met when the three-year average of annual mean concentrations is no greater than 12µg/m3.

Figures 18 and 19 show that all locations meet the annual standard.

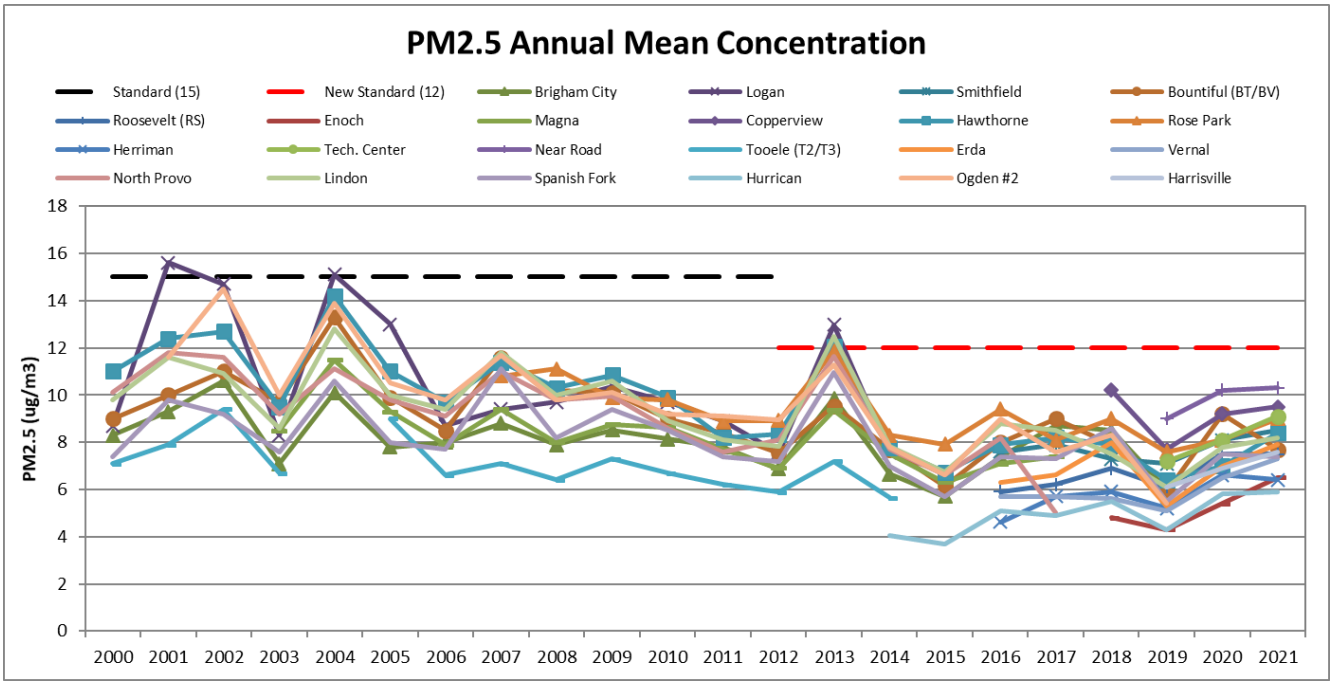


Figure 18: $PM_{2.5}$ Annual Mean Concentration

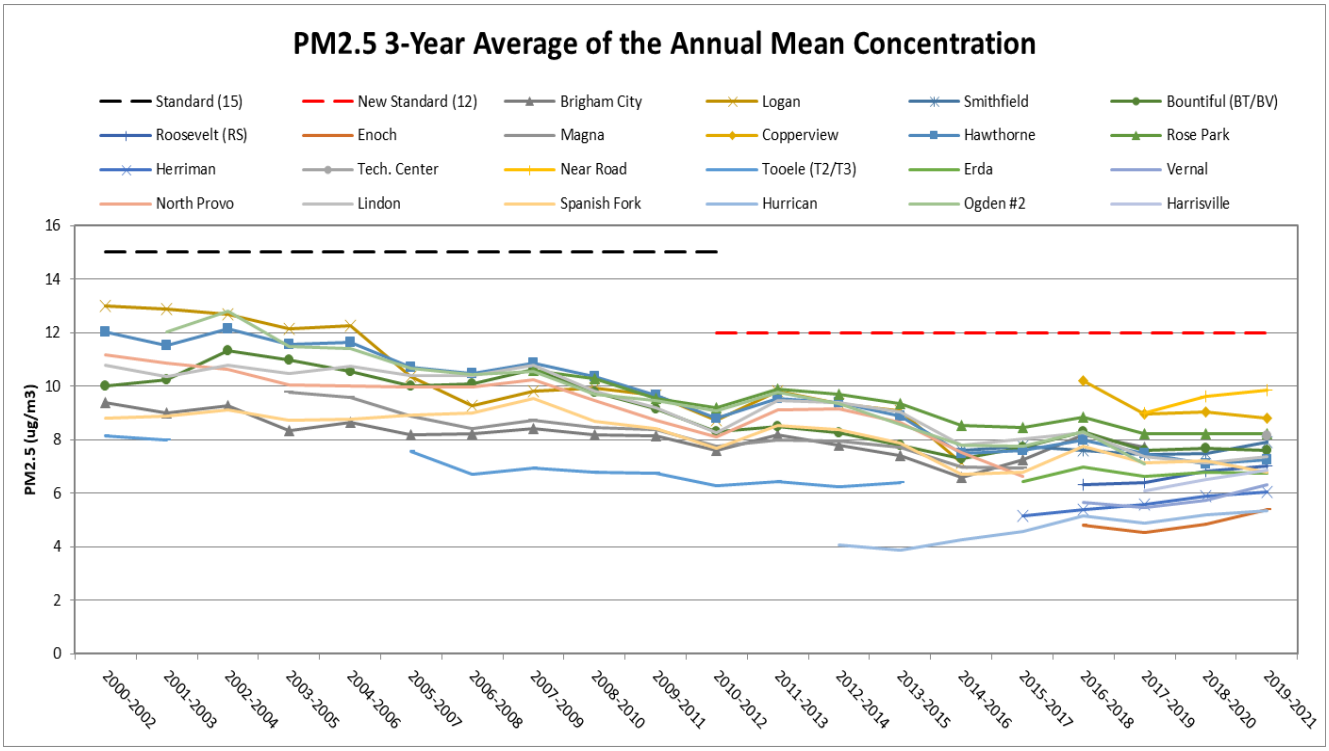


Figure 19: $PM_{2.5}$ Three-Year Average of the Annual Mean Concentration

Also illustrated in Figures 18 and 19 is a downward trend in the annual mean concentrations. This is interesting to note because trends in the annual averages are not as easily obscured by short term meteorology as are trends in the 24-hour values. This downward trend is likely also indicative of trends in 24-hour concentrations, absent the influence of year-to-year variability in the severity of wintertime cold pool (inversion) conditions.

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 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

In 1971, EPA established a 24-hour average SO_2 standard of 0.14 ppm, and an annual arithmetic average standard of 0.030 ppm. In 2010, EPA revised the primary standard for SO_2, setting it at 75 ppb for a three- year average of the 99th percentile of the annual distribution of daily maximum one-hour average concentrations for SO_2. The secondary standard is a three-hour standard of 0.5 ppm and is not to be exceeded more than once per year.

Utah Monitoring Data

Throughout the 1970s, the Magna monitor routinely measured violations of the 1971 24-hour standard. Consequently, all of Salt Lake County and parts of eastern Tooele County above 5,600 feet were designated as nonattainment for that standard. Two significant technological upgrades at the Kennecott smelter costing the company nearly one billion dollars resulted in continued compliance with the SO_2 standard since 1981. In the mid-1990s, Kennecott, Geneva Steel, the five refineries in Salt Lake City, and several other large sources of SO_2 made dramatic reductions in emissions as part of an effort to curb concentrations of secondary particulates (sulfates) that were contributing to PM_{10} violations. More recently, Kennecott closed Units 1, 2, and 3 of its coal-fired power plant in 2016, and it closed Unit 4 in 2019, resulting in further SO_2 emissions reductions.

Utah submitted an SO_2 Maintenance Plan and re-designation request for Salt Lake and Tooele Counties to the EPA in April of 2005, but EPA never took formal action on the request. Because of changes in the emissions in subsequent years, and changes in the modeling used to demonstrate attainment of the standard, in November, 2019, the State of Utah withdrew the 2005 Maintenance Plan and re-designation request. DAQ is currently working very closely with EPA to develop a new maintenance plan and redesignation request to address the 1971 standard. DAQ will conduct modeling and other analyses in 2022 with the goal of submitting an approvable maintenance plan and redesignation request to EPA upon completion.

On November 1, 2016, Governor Herbert submitted a recommendation to EPA that all areas of the state be designated as attainment for the 2010 SO_2 NAAQS based on monitoring and air quality modeling data. On January 9, 2018, EPA formally concurred with this recommendation and designated all areas of the state attainment/unclassifiable. Figure 200 shows the most current measurements to compare against the primary SO_2, NAAQS of 75 ppb.

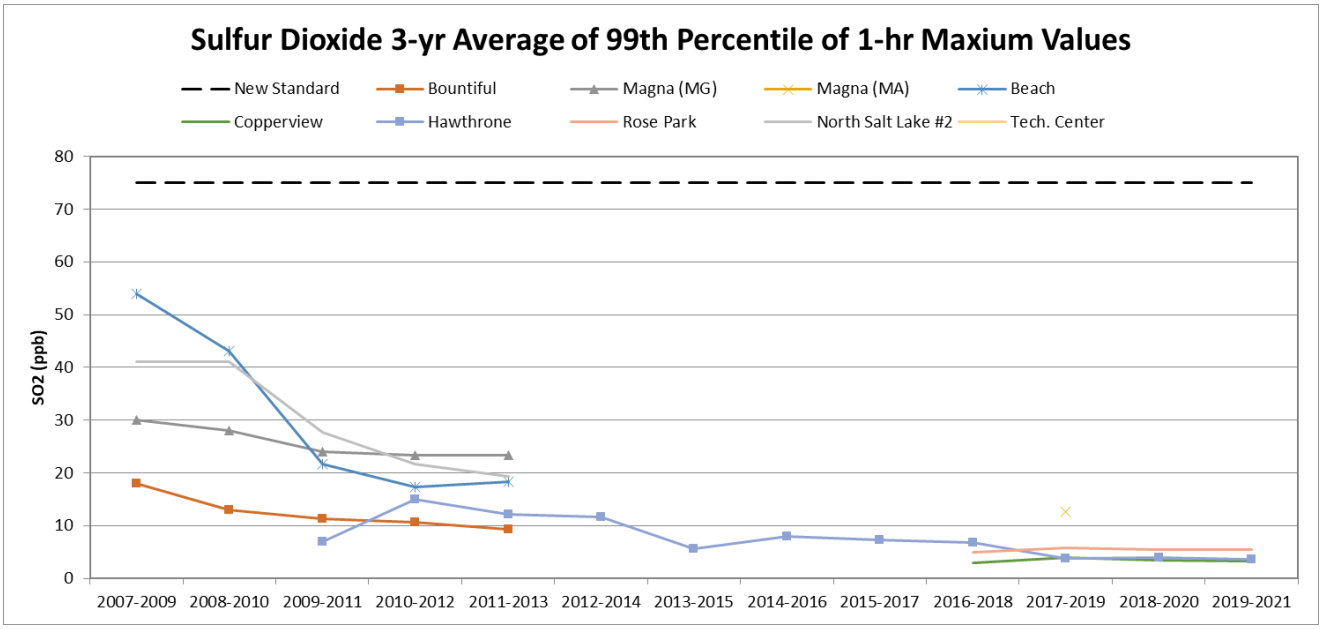


Figure 20: Sulfur Dioxide Three-Year Average of 99th Percentile of Daily Maximum One-Hour Averages

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 leaded gasoline. However, because leaded gasoline for automobiles was completely phased out in the U.S. 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 the EPA authorized the discontinuation of lead monitoring in Utah in 2005; however, in both 2008 and 2010, the EPA set new monitoring requirements for lead, and the DAQ resumed monitoring in 2010.

Standards

On November 12, 2008, the EPA strengthened the NAAQS for lead. The previous standard was a calendar quarter (three-month) average concentration not to exceed 1.5 $\mu g/m^3$. The new standard is 0.15 $\mu g/m^3$ as total suspended particles (TSP), measured as a three-month rolling average.

Utah Monitoring Data

The new standard included a new monitoring requirement, so the DAQ began lead monitoring again at the Magna station near the Kennecott copper smelter (Figure 21). Data was collected from January 2010 through June 2017, at which time DAQ was able to demonstrate the likelihood of violating the standard was so remote, it would no longer be necessary to run the monitor. With EPA's concurrence, the Magna lead monitor was shut down in June 2017. UDAQ and EPA continue to monitor requirements, such as source emission thresholds, population, and NAAQS revisions that may trigger the necessity to resume monitoring lead in Utah.

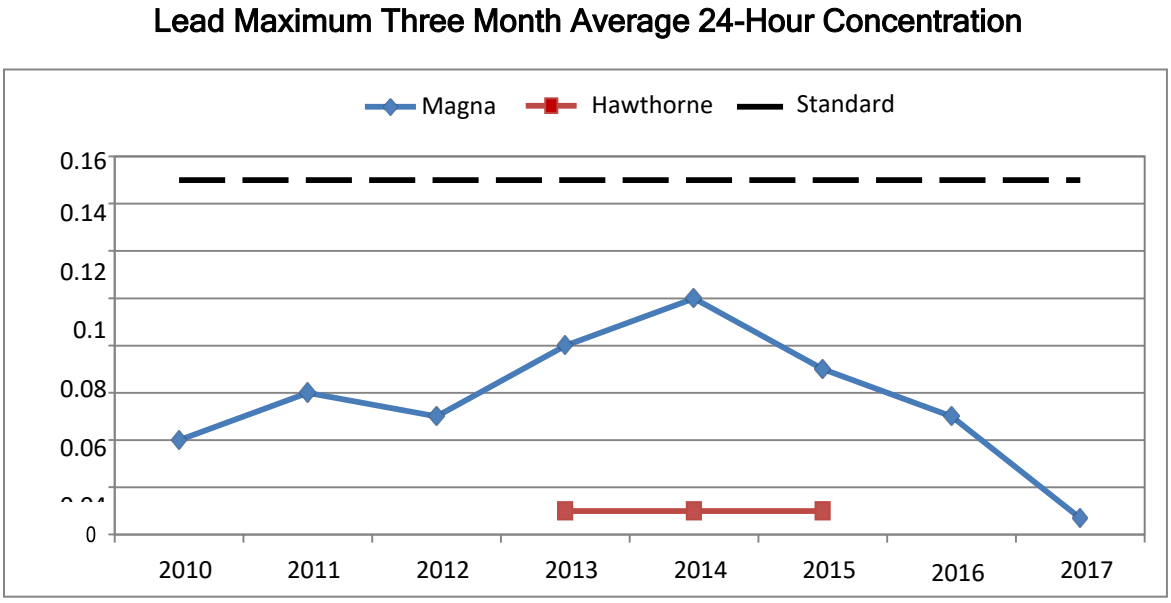


Figure 21: Lead Maximum Three-Month Average 24-Hour Concentration

Photo Credit: Becky Close, 2022.

Emissions Inventories

Every three years, EPA develops the National Emissions Inventory (NEI), and requires each state to submit its inventory data into the NEI directly. To do so, the 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 to meet the fee requirements of Title V Operating Permits of the CAA, or requirements in various sections of the SIP. Finally, additional detailed inventories are prepared, as needed, for special projects such as SIP development, and to quantify emissions during specific seasonal air pollution episodes. Much of this data is uploaded into the NEI annually, as available.

Once collected, the inventory information is reviewed, quality assured, analyzed, stored in the DAQ data system and the NEI, if required, and made available to the public. The inventory is available two years following the year of collection. For example: the 2020 inventory is collected in 2021, and will be available in 2022. The DAQ uses this emissions information to review trends over time, as input data for air quality modeling analysis and as an indicator of the effectiveness of existing and projected control strategies.

Figure 22 shows total statewide emissions (including all anthropogenic sources, biogenics, and wildfires) and per capita emissions from the same sources from 2002 through 2017. The increase in 2017 emissions is attributed to updated calculations for wildfires, locomotives, and airport equipment since this graph was originally created. In addition, it is important to remember inventories experience significant fluctuations due to changing methods, data sources, and new emissions categories. Despite an increase in 2017, per capita emissions have decreased 34% since 2002 while total population has increased 34%.

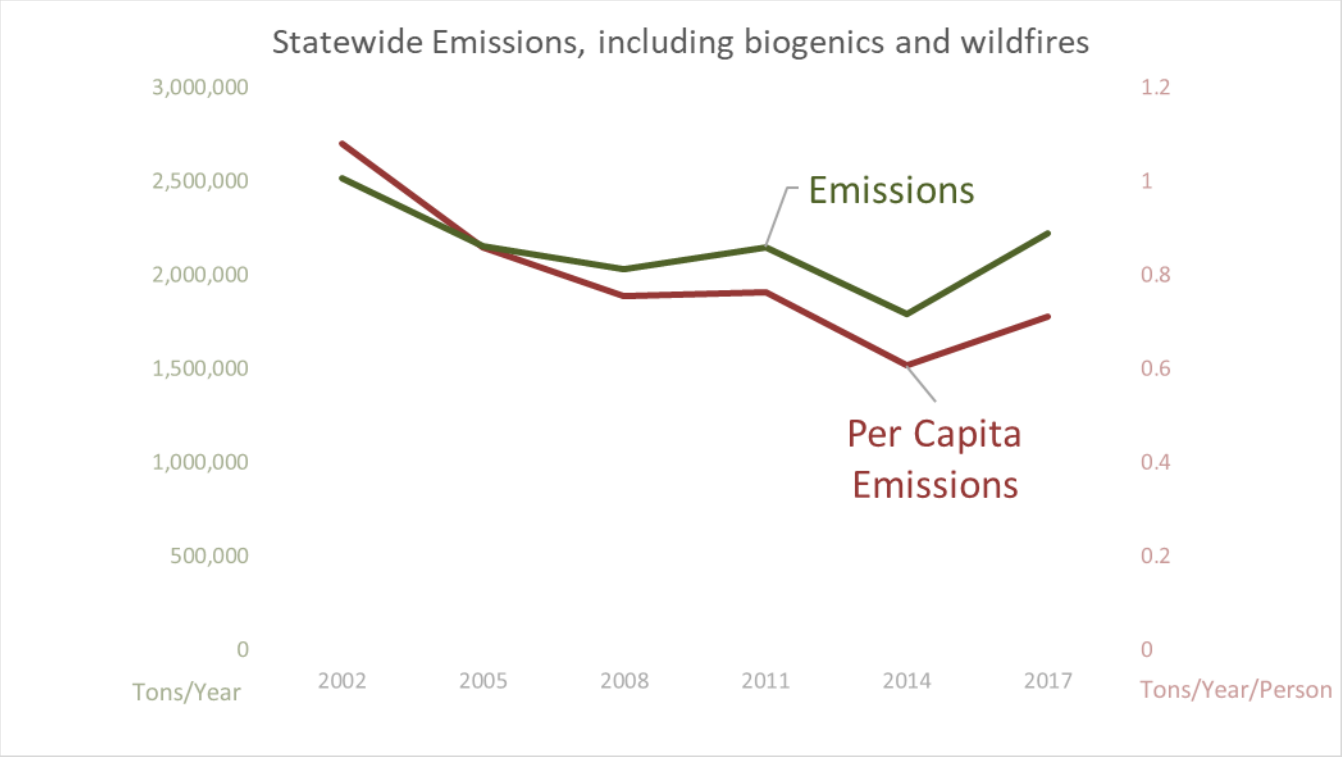


Figure 22: Total Emissions

Sources of Air Contaminants

Emission inventories are typically organized into three types of sources: Point, Area, and Mobile. Point sources are stationary industrial or commercial sites, such as power plants, refineries, and manufacturing facilities. They emit more than 100 tons per year of a regulated pollutant, or are otherwise federally required to submit an inventory. Air pollutants released from these sources are reported directly to DAQ staff through the State and Local Emissions Inventory System (SLEIS). The mobile sector consists of emissions from non-stationary sources such as cars, trains, and aircraft. Mobile emissions are further broken down into on-road, non-road, and VOC refueling categories. On-road mobile sources primarily consist of personal and commercial cars and trucks, and contribute the largest part of the mobile source emissions. Non-road mobile sources consist of a diverse group of heavy construction equipment, small engines (lawnmowers and snow blowers), trains, and aircraft. VOC refueling emissions are vapors released from gasoline tanks of mostly older vehicles without on-board refueling vapor recovery technology.

Estimating emissions from mobile sources requires understanding vehicle emission characteristics and model years. It is also necessary to know how they are driven, where they are driven, and the distances they are driven. On-road mobile sources produce about 39% of the annual man-made pollution (NO_x, $PM_{2.5}$ exhaust, and VOC) along the Wasatch Front. Although heavy-duty diesel vehicles account for only 7.5% of the vehicle miles travelled, they produce over 30% of the pollution. Mobile sources have historically been the largest source of emissions in areas not meeting the NAAQS, but with the implementation of federal emissions standards and the introduction of Tier 3 fuel in Utah, this will change over the next few years.

Area sources are generally much smaller stationary sources, and due to their greater number, are generally accounted for in a group. However, as the NAAQS become more restrictive, it is necessary to start tracking emissions more closely from smaller industrial sources. Additionally, as mobile source emissions drop, area sources are quickly becoming the largest source of emissions. Home heating, agricultural burning and harvesting, construction, residential and commercial energy generation, wildfires, and biogenics (emissions from vegetation) are examples of area source categories. The upstream oil and gas inventory is unique in the area source inventory because rather than using surrogate activity data and generic emission factors, oil and gas companies submit an inventory for their facilities.

Triennial Emissions Inventory

Under current federal law, Utah is required to collect a statewide emission inventory every three years. The 2017 triennial inventory is the most recent statewide inventory available. The 2017 triennial inventory covers 486 individual point sources, 128 area categories, 65 oil and gas categories, 32 on-road categories, and 215 non-road categories. Table 4 shows total emissions, by county, of the criteria pollutants, CO, NO_x, PM_{10}, $PM_{2.5}$, SO_2, and VOCs. Figures 23 through 28 show the 2017 triennial emissions inventory in six pie charts, displaying the relative proportion of emissions generated within source categories.

The figures in the charts represent statewide annual emissions 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 are usually estimated as segments within the area source category, but have been listed separately due to their unique nature and impact.

Table 4: 2017 Triennial Inventory (tons/year)

Table 4: 2017 Triennial Inventory (tons/year)						
County Name	**CO**	**NOx**	**PM_{10}**	**$PM_{2.5}$**	**SO2**	**VOC**
Beaver	9,360.74	2,009.93	3,211.75	553.44	9.49	27,597.62
Box Elder	29,756.51	4,893.39	9,151.64	2,202.54	181.12	40,317.99
Cache	14,704.70	2,188.78	8,843.71	1,337.11	41.86	11,782.56
Carbon	7,606.01	2,620.92	4,464.61	645.22	488.50	17,147.58
Daggett	2,441.85	820.89	545.94	88.77	2.79	9,520.50
Davis	29,981.77	6,564.15	3,399.96	927.99	165.36	11,780.94
Duchesne	13,842.39	7,936.32	6,944.39	1,139.99	39.43	37,532.62
Emery	20,083.59	17,983.29	7,244.46	1,447.11	5,802.28	36,752.05
Garfield	53,913.49	1,289.40	6,983.94	4,006.81	321.32	55,625.73
Grand	13,709.56	2,736.21	3,801.89	518.30	7.59	40,977.97
Iron	252,692.12	6,362.13	27,887.93	20,471.68	1,560.09	90,072.73
Juab	12,444.25	2,495.00	2,531.27	472.68	18.52	33,614.21
Kane	11,520.10	884.30	3,695.19	452.89	8.09	42,417.16
Millard	28,407.38	15,312.98	6,705.59	2,018.81	2,536.65	64,439.92
Morgan	3,970.71	2,223.11	1,117.82	173.63	199.60	7,326.22
Piute	3,930.51	194.87	1,072.74	288.47	14.66	8,719.54
Rich	3,125.76	251.00	1,746.98	291.66	0.80	7,646.69
Salt Lake	109,545.17	23,468.37	17,049.22	4,334.65	2,486.43	29,512.95
San Juan	21,136.43	1,945.59	7,122.89	936.52	19.40	77,783.03
Sanpete	7,000.29	1,017.08	4,913.45	660.74	15.72	17,057.26
Sevier	10,203.59	1,805.23	5,185.07	926.44	41.59	18,504.12
Summit	13,290.35	3,708.91	3,714.32	814.08	168.80	17,241.56
Tooele	33,952.33	5,774.69	7,645.79	2,681.10	202.63	48,353.36
Uinta	19,666.77	7,907.88	6,882.60	1,243.95	39.48	93,036.36
Utah	76,136.58	11,431.48	17,361.36	4,890.11	311.95	36,528.75
Wasatch	7,122.20	1,090.87	4,029.14	571.15	11.94	13,626.37
Washington	28,966.24	4,944.07	7,440.27	1,201.15	36.47	39,292.90
Wayne	5,507.90	492.76	1,265.28	184.96	2.98	20,018.24
Weber	25,336.12	4,378.80	4,393.97	991.56	34.79	10,764.64
Total	**869,355.41**	**144,732.39**	**186,353.19**	**56,473.51**	**14,770.32**	**964,991.60**
Multiple (portable facilities)	147.32	438.10	154.66	61.89	76.53	30.72
Grand Total	**869,502.73**	**145,170.49**	**186,507.85**	**56,535.40**	**14,846.85**	**965,022.32**

The triennial inventory for 2017 changed this year because of updated EPA SCC codes in the rail inventory, where three counties, Salt Lake, Utah, and Weber, were double counted under two SCC codes previously.

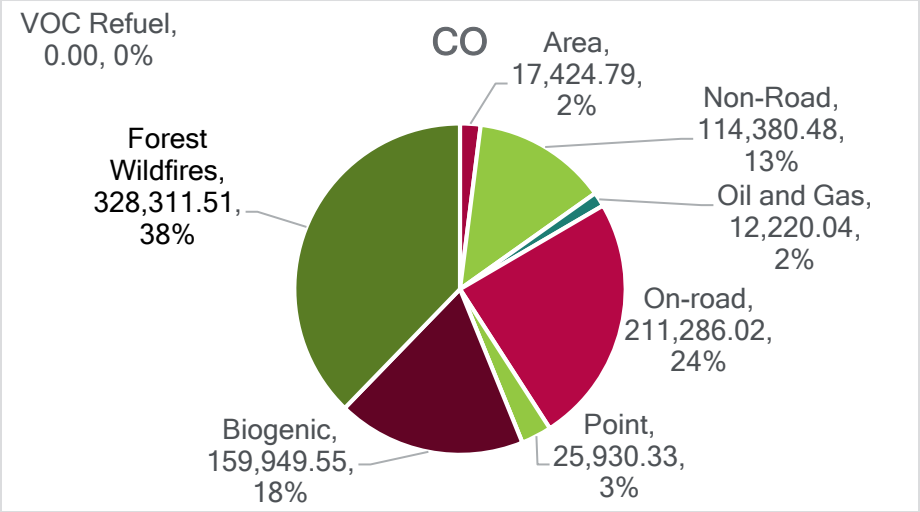


Figure 23: Statewide Annual Emissions Inventory: CO

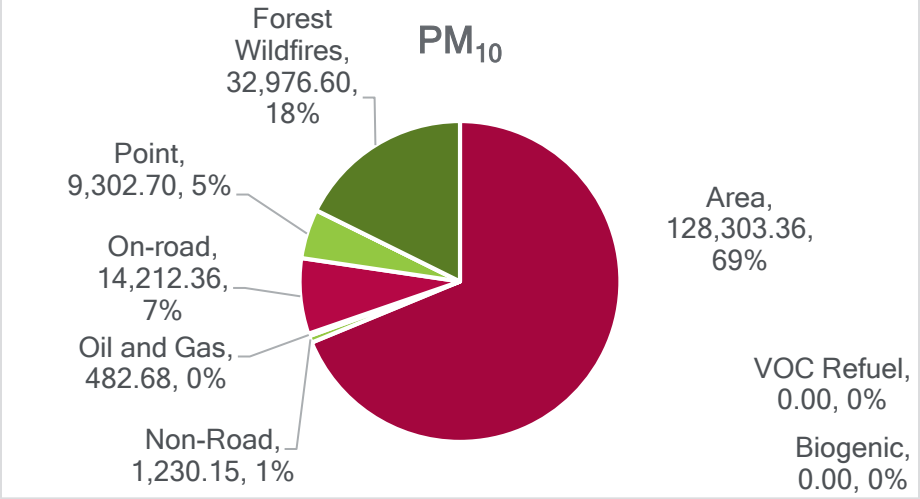


Figure 24: Statewide Annual Emissions Inventory: PM_{10}

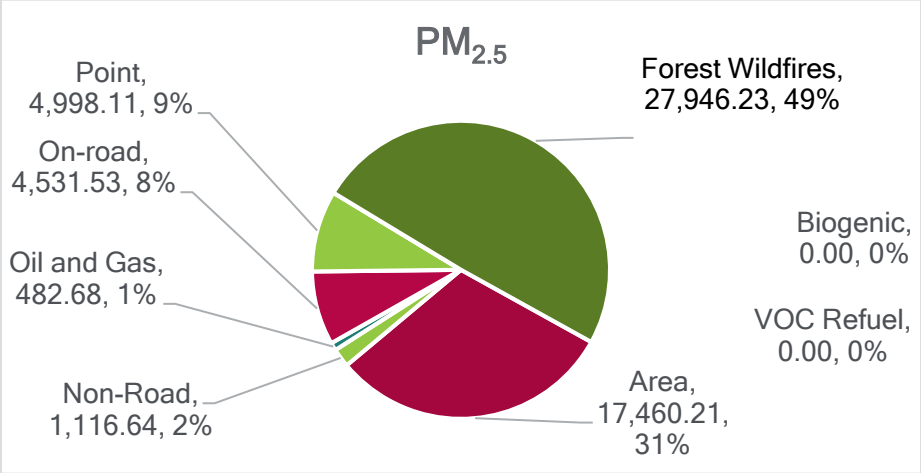


Figure 25: Statewide Annual Emissions Inventory: $PM_{2.5}$

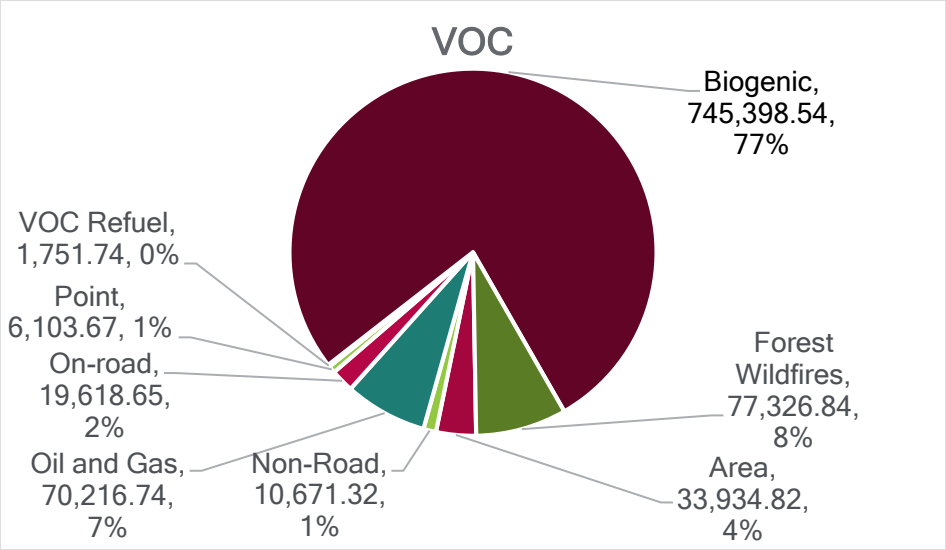


Figure 26: Statewide Annual Emissions Inventory: VOC

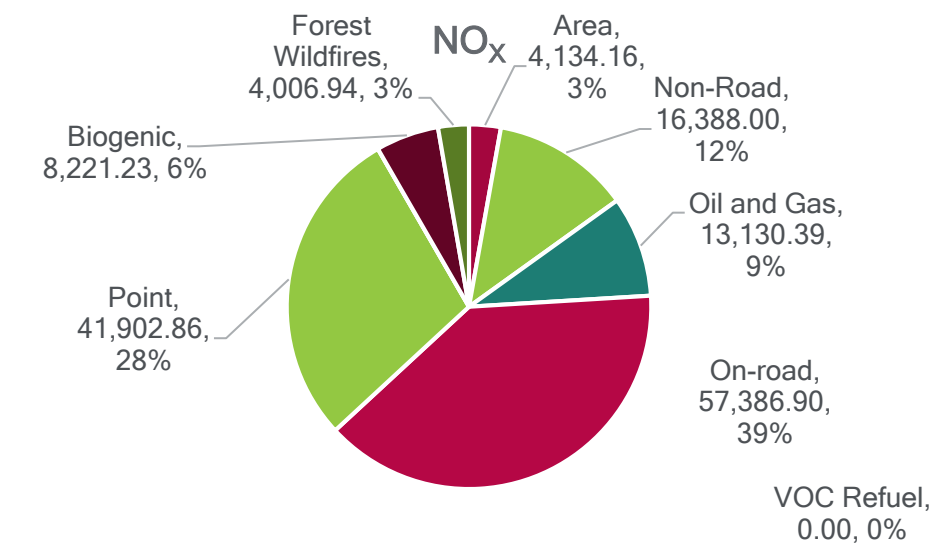


Figure 27: Statewide Annual Emissions Inventory: NO_x

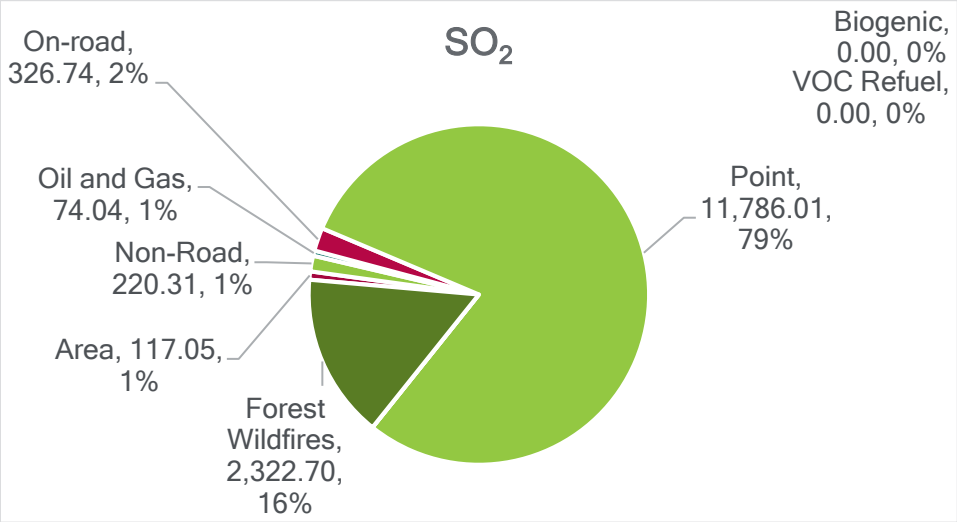


Figure 28: Statewide Annual Emissions Inventory:SO_2

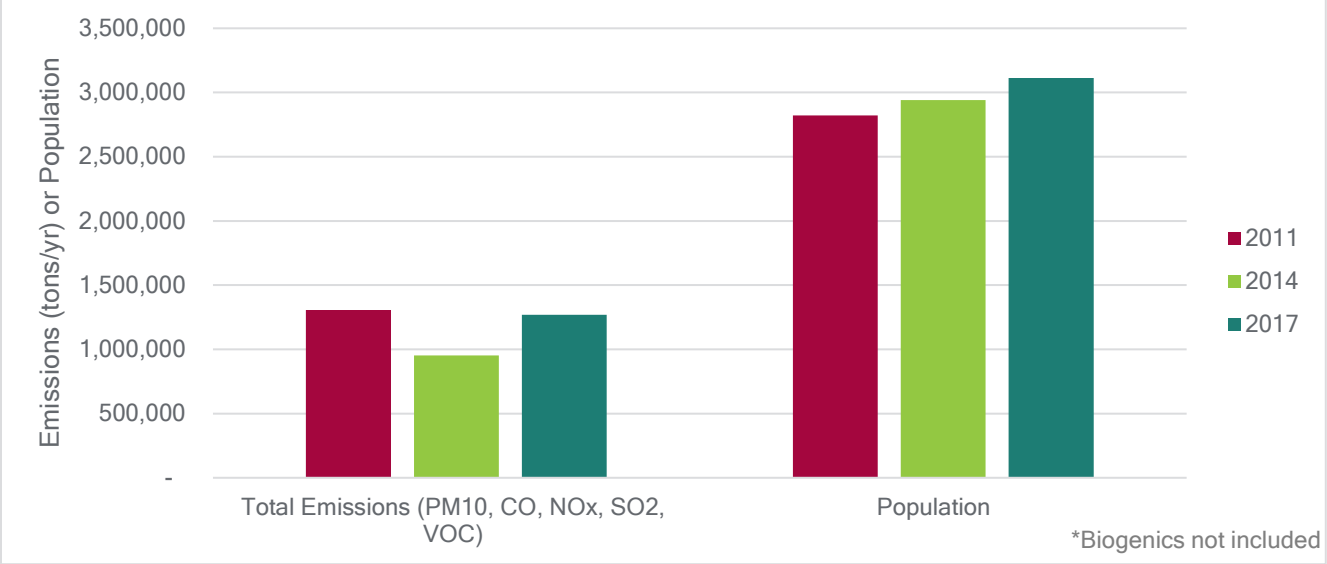


Figure 29: Statewide Population Growth vs. Emissions Reductions

Photo Credit: Courtney Ehrlich, 2022.

Division Organization

The DAQ is divided into three branches: Planning, Compliance, and Permitting.

The Planning Branch is responsible for developing and coordinating the implementation of comprehensive plans to reduce air pollution and collecting and analyzing the data necessary to show the effectiveness of those plans. The Planning Branch is organized into four sections.

- The *Air Monitoring Section* is responsible for establishing and operating the monitoring network to gather and analyze data used to determine ambient concentrations of air pollutants, as well as meteorological conditions when those pollution concentrations occurred.
- The *Inventory Section* has the primary responsibility to collect and collate emissions inventories in order to understand the origins of the various contaminants detected in the air. This includes both historic inventories and projection inventories, reflecting current and proposed control strategies.
- The *Technical Analysis Section* refines and analyzes available emissions inventories and monitoring data, using 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 for past, current and future pollution episodes.
- The *Air Quality Policy Section* uses this information to develop SIPs and coordinate the rule-making activities of the Division. Air pollution reduction grants and incentive programs are administered by the Policy Section.

The Compliance Branch is responsible for ensuring that industries and residents comply with Utah's air quality rules and is comprised of three sections*: Major Source Compliance Section, Minor Source Compliance Section, and Air Toxics, Lead-Based Paint, and Asbestos Section (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. ATLAS is 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 (SBEAP)*, 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 SBEAP 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 Source NSR, Major Source 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 principally responsible for developing 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 to developing plans and rules, the Planning Branch is actively engaged in acquiring the funding for and administering and managing many projects and initiatives that are aimed at improving air quality throughout the State.

Photo Credit: Courtney Ehrlich, 2022.

Status of Projects and Initiatives

Air Quality Research Projects

Legislative funding for air quality research has provided DAQ with the resources to investigate the complex conditions that lead to high pollution levels during winter inversions and summer ozone episodes. Better understanding of the unique conditions that lead to poor air quality helps DAQ craft effective regulations, target emission sources, and apply appropriate emission-control technologies. In addition, this state funding is critically important for leveraging federal, state, private-sector sponsorships, and in-kind support for research initiatives.

In 2018, the Utah Legislature approved $500,000 in ongoing funding for air-quality research through the Science for Solutions Research Grant. This annual research funding will help DAQ improve its knowledge of the unique atmospheric and chemical conditions that contribute to air pollution in Utah.

For detailed information about DAQ's applied air quality research projects, please visit our website at: aqresearch.utah.gov

Current Research Projects (FY 2022)

Five air-quality research projects were funded for fiscal year (FY) 2022 by the state legislature through the Science for Solutions Research Grant:

Development of a WRF-based Urban Canopy Model for the Greater Salt Lake City Area

Continued urban growth in the greater Salt Lake City metropolitan area has changed land surface properties and resulted in continued development of an urban canopy over the greater Salt Lake area (GSLA). This canopy refers to impacts on local meteorological conditions due to increased profiles of building structures and anthropogenic heating. These changes in turn impact local pollutant reactions and transport. This is particularly relevant in the GSLA due to the high levels of summertime ozone and wintertime $PM_{2.5}$ along the Wasatch Front. The influence of existing urban canopies can be observed, but accurate forecasting of weather interactions with urban areas and impacts of future urban growth require predictive modeling. Modeling can be used to fill in measurement gaps and to better understand the correlation between urban growth characteristics, meteorological properties, and ozone and $PM_{2.5}$ concentrations. Improved understanding of urban growth impacts can inform future growth planning and resulting health impacts.

This two-year project will utilize state-of-the-science meteorological modeling with land use descriptions of the GSLA to characterize impacts of urban growth on local meteorological conditions. These modified ground to atmospheric properties can then be used with state-of-the-science air quality models such as EPA's Community Multi-scale Air Quality (CMAQ) model to predict ozone and $PM_{2.5}$ behavior. This project will: 1) develop a current meteorological model of the GSLA which accounts for urban canopy impacts based on publicly available software; 2) use this model to predict impacts on local air temperature, humidity, and wind velocities for changing land use conditions (i.e., urban growth), and 3) document model methodology and usage so air quality modelers can use existing or self-developed future results for additional urban growth and air pollutant assessments.

Impacts of the Great Salt Lake on Summer Ozone Concentrations Along the Wasatch Front

The University of Utah will determine the meteorological factors contributing to elevated ozone concentrations along the southern and eastern margins of the Great Salt Lake that serve as a source region for high ozone concentrations along the Wasatch Front. We hypothesize that multiple factors contribute to elevated ozone in the Farmington Bay region: 1) ozone precursors from the urban corridor (NO_x and VOCs) and local biogenic precursors near freshwater ponds are transported by the nocturnal land breeze over the playa surfaces, 2) actinic fluxes are elevated due to the high albedo over exposed playa surfaces, 3) initial development of the lake breeze concentrates precursors and ozone within the relatively shallow stable lake boundary layer, and 4) the lake breeze then transports ozone into the nearby urban regions later in the afternoon. Completion of these tasks will provide resources that are likely to enhance operational air quality forecasting and provide critical information to initialize and verify the air chemistry models used to identify approaches to meet federal air quality standards.

Particulate Chloride in the Urban Environment

A growing body of observations and modeling studies indicate that halogen radicals, particularly chlorine radical and related species, can play a significant role in urban atmospheric chemistry. Chlorine radicals can be produced by the photodissociation of chlorinated species, gas-phase chemical reactions involving HCl or chlorocarbons, or heterogeneous reactions of particulate chloride. Although chlorine in particulate matter is generally in the form of unreactive chloride, a variety of heterogeneous and multi-phase reaction processes can lead to the conversion of particulate chloride into gas-phase, reactive chlorine species. The two dominant processes for this conversion include aqueous-phase chemical reactions of dissolved gases and acid displacement. Short-duration measurements made during the National Ocean and Atmospheric Association (NOAA) Utah Winter Fine Particulate Study (UWFPS) in 2017 discovered that up to 15% of the $PM_{2.5}$ mass was composed of ammonium chloride during winter air pollution events. The UWFPS field experiment also indicated that significant coarse-mode particulate chloride might be present as well. The source of the fine-mode and course-mode particulate chloride is currently unknown.

The proposed study is intended to significantly reduce uncertainties regarding the temporal, spatial, and particle size distributions of particulate chloride. It will also identify the dominant sources of this important halogen. These results will provide important emission inventory constraints for future air quality modeling efforts performed by UDAQ and others.

Assessing Wintertime Ozone Prediction Sensitivity to Photochemical Mechanism

This project will be conducted as a collaboration among Ramboll, the Utah State University - Bingham Research Center (BRC), and Dr. William Stockwell of the University of Texas at El Paso as an independent sub-contractor. The objective of the study is to thoroughly

investigate wintertime ozone prediction sensitivity in the Uinta Basin among two current photochemical mechanisms using a consistent modeling platform. Recent modeling conducted by BRC using different modeling systems indicates that the Regional Atmospheric Chemistry Mechanism (RACM) produces much higher ozone concentrations than the Carbon Bond (CB) mechanisms currently used by UDAQ. Our proposed scope of work will: 1) implement RACM version 2 (RACM2) into the Comprehensive Air quality Model with Extensions (CAMx); 2) develop RACM2 photolysis rates for CAMx and emission speciation profiles for the Sparse Matrix Operator Kernel Emissions (SMOKE) processing system; and 3) comprehensively test and understand RACM2 performance in simulating wintertime ozone in the Uinta Basin relative to the CB version 6 (CB6) mechanism currently implemented in CAMx.

Development of Top-down Hydrocarbon Emission from Oil and Gas Production in the Uintah Basin

In this project, Utah State University (USU) and the University of Utah (UU) are proposing to use a method known as top-down emission estimation to refine volatile organic compounds (VOCs) emissions from oil and gas production based on long-term surface level measurements of methane (CH_4) and hydrocarbons in the Uintah Basin. The objective of this project is to improve the Utah Division of Air Quality (UDAQ) bottom-up Uintah Basin Emission Inventory (UBEI), which is critical for developing a regulatory model for the State Implementation Plan (SIP) to attain the 8-hour ozone (O_3) standard in the Uinta Basin. This project will be conducted as a collaboration between USU and UU.

Emissions of CH_4 in the Uinta Basin will be estimated using the Stochastic Time-Inverted Lagrangian Transport (STILT) model, then VOC emissions will be estimated based on CH_4/VOC-species ratios. Here we make use of the near surface long-term observations of CH_4 in the Uinta Basin, coupled with VOC observations, to scale up the VOC emissions and probe multi-year shifts in VOC emissions. Finally, top-down emissions derived with this method will be utilized in a photochemical model and evaluated for ozone performance. This project leverages long-term measurements of CH_4 by the UU and VOC by USU from stationary stations and from recent USU mobile canister sampling in the Uinta Basin.

Goals and Priorities (FY 2023)

DAQ has recently sent out a Request for Proposals (RFP) for soliciting new applied air quality research projects. In anticipation of supporting a collaborative field campaign for the summer of 2023 that focuses on summertime ozone in the Northern Wasatch Front, UDAQ will fund research projects this year whose results or investments will directly benefit that collaborative effort. Studies that use instruments that can be applied to the future large collaborative study focusing on summertime ozone are encouraged. To be considered for funding under this RFP, each project proposal must address at least one of the following two topics below.

Summertime Ozone Formation along the Wasatch Front

The Wasatch Front often experiences exceedances of the national ambient air quality standard for ozone during the summer. Regulating locally-formed ozone to reach attainment is complicated by the fact that ozone has a mix of different sources (local and non-local) and its formation can be limited by oxides of nitrogen (NO_X), volatile organic compounds (VOCs) or both. To help establish control regulations, determining the sensitivity of ozone to NO_X or VOCs is needed. Identifying the VOCs that are most important to ozone formation and their sources, including volatile chemical products (VCPs), is also of interest. Determining the impact of halogen emissions on ozone formation is also needed. To inform and validate air quality models, ambient measurements of speciated VOCs, including biogenic and oxygenated VOCs, at high temporal frequency and spatial resolution are of particular importance. Measurements that can help constrain emissions inventory estimates and

understand the coupling of meteorology and chemistry are needed. Better representation of complex meteorological features and chemical mechanisms in meteorological and air quality models, including the Comprehensive Air Quality Model with Extensions (CAMx) photochemical model which UDAQ uses for regulatory demonstrations, are also required.

Wildfire Emissions and Air Quality

Wildfires emit large amounts of $PM_{2.5}$, ozone and their precursors, leading to exceedances of the national ambient air quality standard for ozone and enhancements of $PM_{2.5}$ concentrations during summertime. With wildfires becoming increasingly common, measurements that can be used to identify wildfire events and accurately quantify their impact on local air quality are needed to support exceptional events demonstrations. Methods and measurements that help improve model representation of fire emissions, plume rise, chemistry and transport are also of interest.

NAAQS Updates

Particulate Matter

A number of health studies have been published since 2000, and EPA has shifted focus from PM_{10} to $PM_{2.5}$, as smaller particles cause more severe health impacts. On March 27, 2020, EPA redesignated the three former PM_{10} nonattainment areas to attainment status. Salt Lake County, Utah County, and Ogden City are now in the first of two 10-year maintenance periods for PM_{10}.

With the $PM_{2.5}$ NAAQS lowered in 2006, Salt Lake City, Provo, and Logan areas were classified as moderate nonattainment. Moderate SIPs were submitted to EPA; however, Salt Lake City and Provo failed to attain the 24-hour standard (35 $\mu g/m^3$) as of the statutory attainment date of December 31, 2015. As a result, EPA reclassified these areas from moderate nonattainment areas to serious nonattainment areas.

Reclassification to serious nonattainment required UDAQ to revise the implementation plans. The serious area SIP amendments reach beyond the level of emission controls determined to be “reasonably available” which were included in Utah’s moderate area SIPs, and achieve a level defined as the “best available.” The additional controls implemented through the serious SIP, coupled with favorable meteorology brought the areas into attainment of the standard by the attainment date of December 31, 2019.

Attainment of the standard does not mean the area is reclassified to attainment status. The EPA must act to redesignate an area from nonattainment to attainment status. The CAA outlines five requirements that a nonattainment area must satisfy for redesignation to occur.

1. Attainment of the Standard
2. Fully Approved Attainment SIP
3. Improvement in Air Quality is due to Permanent and Enforceable Emissions Reductions
4. The State has met requirements applicable to the area under CAA Section 110 and part D
5. Fully Approved Maintenance Plan

All regulatory requirements for redesignation have been met for all three areas, with the maintenance plan being the core requirement for redesignating areas to attainment. The plans demonstrate continued attainment of the standard through 2035 with an intermediate year check in 2026. Eight years after redesignation, UDAQ is required to submit a maintenance plan revision demonstrating attainment for the second 10-year maintenance

period.

EPA finalized redesignation of the Logan, UT-ID nonattainment area to attainment on June 18, 2021. The Logan area is now in the first 10-year maintenance period. EPA has proposed that the Salt Lake and Provo nonattainment areas be redesignated to attainment status. The final rule is expected to be published in the Federal Register in 2022

Wasatch Front Ozone

When EPA developed the first NAAQS for ozone in 1979, Salt Lake and Davis counties designated as nonattainment areas for that 1-hour standard. Following that first designation, both Salt Lake and Davis counties met the standard and were redesignated to attainment. Since 1979, the EPA changed the ozone NAAQS in 1997, 2008, and 2015. All areas of Utah met the 1997 and 2008 standards.

With a more stringent ozone NAAQS promulgated in 2015, the EPA designated three nonattainment areas in Utah in August of 2018. Two of the nonattainment areas are on the Wasatch Front. The Southern Wasatch Front nonattainment area (SWF NAA) includes Utah County. The Northern Wasatch Front nonattainment area (NWF NAA) includes Salt Lake, Davis, and parts of Weber and Tooele counties.

In partnership with local universities and the EPA, several studies have helped develop a better understand ozone formation and transport along the Wasatch Front. Some of the studies' conclusions are:

- Ozone formation along the Wasatch Front is associated with clear, sunny summer days with little wind.
- The Wasatch Front experiences some transport of ozone and its precursors from upwind states and international sources, although the impact of transported ozone is relatively small on high ozone days.
- The Great Salt Lake's diurnal wind patterns contribute to the transportation and formation of ozone.
- Motor vehicles are the largest source of NOx within the nonattainment area.
- Sources of halogens and brominated compounds may be playing an important role in ozone formation.
- A large portion of VOCs come from biogenics (natural sources such as plants).
- Elevated ozone coincided with elevated levels of VOCs and NOx, which are the primary chemical precursors of ozone formation.

Based on monitoring data from 2018, 2019, and 2020, the SWF NAA is currently attaining the standard. Ozone monitors along the Wasatch Front continue to show exceedances of the ozone NAAQS in Weber, Davis, Tooele, and Salt Lake counties. The NWF NAA is likely to be reclassified from marginal to moderate nonattainment in the upcoming DAAD which is expected to be published early in 2022. Moderate SIP planning efforts are well underway, including creating a detailed inventory of emissions from the NAAs and developing photochemical modeling. The DAQ is also expecting to focus much of its research efforts in the next year to better understanding the complex chemistry and transport of ozone and its precursors.

Uinta Basin Ozone

On August 3, 2018, the EPA designated the Uinta Basin as an ozone nonattainment area with a marginal classification. This designation required attainment of the 2015 ozone standard by August 3, 2021. Several monitors in the Uinta Basin measured high levels of ozone during a strong inversion in February 2019. These monitored levels show that the Uinta Basin did not attain the ozone standard by that date. However, there were no exceedances of the standard in 2020 and the DAQ submitted to EPA a one-year extension to the attainment date. This request is anticipated to be approved by EPA in early 2022. Additionally, 2021 monitoring data currently supports the requirements for requesting a second one-year extension as the average 4th high ozone values averaged over 2020 and 2021 do not exceed the standard. Therefore, 2022 becomes a pivotal year to determine attainment of the ozone standard and reclassification status.

If the Uinta Basin experiences exceedances in January or February of 2022, the second 1-year extension will likely not be approved and a moderate SIP will be due in February of 2023. Therefore, UDAQ, EPA, and the Ute Tribe continue to plan for a possible bump up from marginal to moderate. The moderate SIP will require additional controls and a modeled demonstration of attainment by August of 2024. An understanding of the emissions and sources of the ozone precursors VOCs and NO_x will be the stepping stones to control strategies and future regulations included in the SIP. Information gathered from the 2017 oil and gas emission inventory will be vital to understanding emissions that contribute to ozone formation in the Basin. Additionally, in 2021 UDAQ worked with sources that will need to implement Reasonably Available Control Technology (RACT) requirements, and preparing projected and episodic inventories to support the development of a working photochemical model for the Basin.

The EPA and DAQ have been monitoring ozone levels in the Uinta Basin since about 2009 and have been working towards greater understanding of the wintertime ozone phenomenon since first observing the elevated levels. Several years of study have established the following thoughts on ozone formation in the Basin:

- Ozone formation is associated with stable meteorological conditions, snow cover, and sunshine.
- Elevated ozone coincides with elevated levels of VOCs and NO_x, which are the primary chemical precursors of ozone formation.
- NO_x comes from hot combustion sources, and the highest levels are in the oil production areas and population centers.
- VOCs come from oil and gas production with the highest levels in the gas production areas. There is high year-to-year variation in ozone levels due to variation in meteorological conditions, principally snow cover.
- 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 secondary formation of wintertime ozone pollution in the Basin; therefore, VOC control measures focused on these types of VOCs will be particularly effective.

- Formaldehyde (HCHO) and other aldehydes are the dominant radical sources needed for ozone formation and are important chemical species to control.

Research funding was used for an aerial helicopter study of oil and gas sources on both Indian and state lands combined with ground observations in the winter/spring of 2018. This was a cooperative study between the Ute Tribe, BLM, UDAQ, and EPA and provided further understanding of where potential emissions from oil and gas production equipment can originate. Unfortunately, the cold winter and snow resulted in less than optimal results. A study into the composition of VOC emissions from oil and gas wells in the Basin began in the fall of 2018 and sampling went into 2019. Additionally, through permitting requirements and sampling requests by EPA, a large number of samples from produced water disposal ponds have been collected and provided a larger, technically valid data set to also update the value estimated in the 2017 UBOGEI.

A thorough evaluation of the results of the above study by a technical team of EPA and UDAQ staff, with coordination with the Ute Tribe, led to revised emissions factors for oil and gas sources and an update to the 2017 Uinta Basin Oil and Gas Emission Inventory (UBOGEI). This provides a more accurate data set for use in upcoming photochemical modeling and development of control strategies to help bring the Basin into attainment with the 2015 ozone standard. The updated 2017 UBOGEI was presented to stakeholders in December of 2020. This update added a significant increase in total annual VOC's for the Basin. In 2021 UDAQ, EPA and the Tribe have worked with industry, academia and laboratory experts to draft sampling and modeling protocols to attempt to establish a common understanding and consistency in estimating emissions and ultimately control strategies.

In 2021, there were two studies performed to collect emissions data from the smaller horsepower engines that provide power to pumpjacks to pump oil in areas of the Basin that do not have electricity. A study was performed by the USU Bingham Research Center with funds from the Utah State legislature to collect emissions data from these engines with preliminary data indicating that VOC emissions have been underestimated and also contain more reactive VOCs, and interestingly also indicate lower NO_x emissions than reported. The EPA Region 8 also collected data in late 2021 with similar preliminary results. This data is currently being evaluated and again the 2017 UBOGEI will be revised to reflect this new data. This will be vital for enhancing the performance of photochemical modeling and ultimately identify emissions reductions to achieve attainment.

With the revised 2017 UBOGEI the current oil and gas rules were evaluated and it was determined that some changes were required to reflect the revised emission factor as well as preparing for the need to reduce VOCs as part of a potential moderate SIP. An advance notice and draft of proposed rule changes were provided to stakeholders in December 2021 and are planned to be presented to the Air Quality Board in March of 2022.

An EPA-funded competitive targeted airshed grant was awarded to DAQ in 2019 that would help fund the replacement of older natural gas engines that support oil and gas operations in the Basin with newer, cleaner natural gas engines. There are approximately 3300 older 25-100 horsepower pumpjack engines in the Uinta Basin that emit significant emissions of VOCs into the airshed. This engine replacement grant was funded at $5 million. Unfortunately, there have not been any grant applicants, potentially due to the decrease in production and economic impact of the COVID-19 pandemic. However, the feedback from operators also indicates that to replace these engines with newer, larger engines is not practical as the power needed is so small that those engines would be too much for the facility. DAQ is working with EPA and operators on other options that would work within the requirements of the grant.

Regional Haze SIP

The Regional Haze Rule (RHR) requires Utah to address regional haze in each mandatory Class I Area (CIA) located within Utah and in each mandatory CIA located outside Utah, which may be affected by emissions from within Utah. Utah is required to submit a SIP addressing the specific elements required by the rule.

The objectives of the RHR are to improve existing visibility in 156 national parks, wilderness areas, and monuments (termed Mandatory Class I Areas or CIAs), prevent future impairment of visibility by manmade sources, and meet the national goal of natural visibility conditions in all mandatory CIAs by 2064. Utah's CIAs consist of: *Arches National Park, Bryce Canyon National Park, Canyonlands National Park, Capitol Reef National Park, and Zion National Park.*

The RHR establishes several planning periods extending from 2005 to 2064. The State of Utah is required to develop a Regional Haze (RH) SIP for each period. The first implementation period spanned from 2008 to 2018. The second implementation period spans from 2018 to 2028, with a SIP requirement that was originally due for submission to the EPA on July 31st, 2018, but was extended to July 31st, 2021. There have been a number of obstacles to a timely submission, but DAQ submitted Utah's regional haze SIP to Federal Land Managers (FLMs) on December 9, 2021 for a mandatory 60-day review. Utah also shared this draft with EPA Region 8 and tribes of Utah at this time. Once the FLMs have completed their review, DAQ will present the SIP to the Air Quality Board for the public comment process, with a final submittal to EPA expected around July 2022.

In this SIP revision, UDAQ demonstrates the visibility progress to date in each of Utah's CIAs and analyzes Utah's emissions trends and sources of visibility impairment. Utah is required to set reasonable progress goals which must:

1. provide for an improvement in visibility for the most impaired days over the period of the implementation plan, and
2. ensure no degradation in visibility for the least impaired days over the same period.

For this purpose, Utah has outlined its Long-Term Strategy (LTS) in this document as well as determination of reasonable progress goals (RPGs) for CIAs in Utah.

The RH SIP must also address mandatory CIAs outside of the state that are reasonably anticipated to be affected by emissions from Utah as well as out-of-state sources impacting Utah CIAs. For this requirement, UDAQ analyzed Western Regional Air Partnership (WRAP) photochemical modeling and found that Utah does not significantly impact visibility in CIAs outside the state. Utah has also determined that Utah's CIAs are not significantly impacted by out-of-state sources. Upon consultation with Utah's surrounding states, Utah will not require any actions from other states for impacts on Utah's CIAs and Utah has received no requests for actions regarding Utah sources' impacts on out-of-state CIAs.

Throughout the second implementation period, UDAQ has participated in the WRAP, which has conducted modeling and technical analysis for the purposes of supporting state RH planning. UDAQ has also consulted with Federal Land Managers (FLMs), Tribes, Utah's surrounding states, as well as environmental advocates, industry stakeholders, and the public.

The SIP revision also examines the need to implement additional emission reduction measures on sources which are reasonably anticipated to contribute to visibility impairment. The examination required to determine actions for this period is known as a four-factor

analysis and consists of four criteria:

1. cost of compliance,
2. time necessary for compliance,
3. energy and non-air quality environmental impacts, and
4. remaining useful life.

In order to determine which sources must submit a four-factor analysis to the State, UDAQ performed a Q/d (emissions/distance) analysis to determine which of Utah's sources have the highest potential visibility impact on Utah's CIAs. These facilities include the Ash Grove Cement Company Leamington Cement Plant, the Graymont Western US Inc. Cricket Mountain Plant, PacifiCorp, the Sunnyside Cogeneration Associated Sunnyside Cogeneration Facility, and the US Magnesium LLC Rowley Plant.

UDAQ requested that each facility submit a four-factor analysis for the purpose of this second implementation period. UDAQ has received each facility's four-factor analysis, provided each with an evaluation of their analysis, and received evaluation responses from each. After consideration of the information provided, as well as the modeling results provided by the WRAP, UDAQ made reasonable progress determinations for each facility. The actions deemed necessary for reasonable progress to be made in Utah's CIAs for the purposes of this implementation period consist of establishing a firm closure date for units 1 and 2 of the Intermountain Generation Station, setting emissions limits for PacifiCorp's Hunter and Huntington Power Plants, and requiring the installation of a Flue Gas Recirculation (FGR) unit on the Riley Boiler at US Magnesium's Rowley Plant. The emissions limits proposed for PacifiCorp ensure their emissions do not exceed their modeled or recent actual emissions levels for the purposes of keeping the Hunter and Huntington Power Plant's utilization levels below that at which controls would be cost effective and maintaining Utah's 2028 "on-the-books" projections as modeled by WRAP in order to ensure reasonable visibility progress at Utah's CIAs by the end of this implementation period.

Air Quality Incentive Programs

The DAQ administers several incentive programs created to encourage individuals and businesses to voluntarily reduce emissions. Funding for these programs comes from various sources, including settlement agreements, legislative appropriations, and federal grant programs. The following sections provide a summary of each program. More information on these programs is available online at airincentives.utah.gov.

Targeted Air Shed Grants

Through congressional appropriations, EPA provides funding opportunities to the top five most polluted nonattainment areas for ozone, annual $PM_{2.5}$, or 24-hour $PM_{2.5}$ standards through competitive grants, also known as Targeted Air Shed grants. Successful recipients use the funding to reduce air pollution in the nonattainment areas. UDEQ was a recipient of these funds in 2016, 2017, and 2018 for targeting emissions in the state's three nonattainment areas for the 24-hour $PM_{2.5}$ standards: Logan, Salt Lake, and Provo and the Uinta Basin nonattainment area for wintertime ozone.

School Bus and Heavy-Duty Truck Replacement Programs

School buses were part of the focus for the 2016 funding in the Logan and Provo nonattainment areas. UDEQ received $2,477,250 for 29 diesel school bus replacements in the Cache County/Logan City School District and 10 diesel school bus replacements in the

Provo School District. These projects were successfully completed in 2021 and resulted in emissions reductions of over 273 tons per year and approximately 1,184 over the lifetime of the projects, while reducing diesel fuel use by 107,737 gallons.

In 2017, $3,184,875 was awarded to UDEQ for heavy-duty diesel truck replacements in the Logan, UT, nonattainment area. Cache County and Hyrum, Logan, Nibley, and North Logan cities will replace 15 heavy-duty diesel trucks with this funding, while over $1,090,000 is still available for new projects. The heavy-duty diesel truck replacement projects are estimated to reduce emissions over 94 tons per year and over 1,790 tons over the lifetime of the projects.

Vehicle Repair and Replacement Assistance Program

In March of 2017, EPA awarded $2,477,250 to DEQ for the Logan, Utah-Idaho Nonattainment Area and in September of 2019, EPA awarded $4,698,489 to DEQ for the Salt Lake City, Utah Nonattainment Area. Money from these grants fund a vehicle repair and replacement assistance program (VRRAP). An individual whose vehicle does not pass an emissions test may receive financial assistance from the VRAAP to replace the failed vehicle with a newer, cleaner one or to repair it so that it passes a subsequent emissions test. The amount of financial assistance depends on household income, household size, and whether the applicant chooses to replace or repair the failed vehicle. Financial assistance can be as high as $5,500 for a vehicle replacement or $1,000 for a repair. The program is administered by the Bear River Health Department in the Logan, UT-ID Nonattainment Area, with the Davis, Salt Lake, and Weber- Morgan Health Departments administering the program in the Salt Lake City, UT Nonattainment Area.

The Logan VRRAP officially opened for the public on April 20, 2017. As of September 30, 2021, the VRRAP has repaired 992 and replaced 236 vehicles. These activities are anticipated to reduce emissions annually by 8.12 tons of NMOG, NO_x, and PM and reduce lifetime emissions of NMOG, NO_x, and PM by 114.93 tons. Weber-Morgan Health Department officially started accepting applications for their VRRAP on March 2, 2020 followed by the Davis County Health Department on March 16, 2022. The Salt Lake County Health Department had planned to start its program in the Spring/Summer of 2020; however, COVID delayed the start of their program until September 2021. As of September 30, 2021, the Salt Lake City VRRAP has repaired 48 and 22 replaced vehicles. These actives are anticipated to reduce lifetime emissions of NMOG, No_x, and PM by 5.61 tons.

Uinta Basin Non-Road Engine Replacement Assistance Program

In October 2019, EPA awarded DEQ a Targeted Airshed Grant of $5 million to administer an incentive program called the *Uinta Basin Non-road Engine Replacement Assistance Program*. The Program aimed to provide financial assistance of up to 40% of the cost to replace pre-2008, non-road, natural gas engines supporting oil and gas production with newer, cleaner engines. DEQ intended to work and partner with the Ute Tribe and oil and gas producers to reach out to all potential applicants and eligible energy production equipment. However, the future of the $5 million Uinta Basin TAG is uncertain. Unfortunately, DEQ has not been able to garner interest from oil and gas producers investing in natural gas engine upgrades. We believe this is mainly because many producers would have to purchase larger-powered engines in order to comply with our current rules. Doing so would significantly over-power their sites which is understandably unappealing to them. An amendment to this grant is likely. Alternative projects are being explored and their viability evaluated. DEQ remains in communication with EPA to discuss the amendment process and project suitability.

Wood Stove Conversion Program

The DAQ's wood stove and fireplace conversion program helps residents, particularly low-

income households, reduce their emissions from burning wood by providing financial assistance to convert their wood burning devices to cleaner-burning devices. Residents in Utah's $PM_{2.5}$ nonattainment areas are eligible to participate. The conversion program plays an important role in reducing emissions as one wood stove is shown to emit as much as 100% more than its gas-powered counterpart. Although monitoring data shows that all three nonattainment areas have attained the 24-hour $PM_{2.5}$ NAAQS, wood-burning remains a major contributor to particulate pollution. Woodstove and fireplace conversions will help ensure the areas continue to attain the standard in the future.

The wood stove and fireplace conversion program started in December 2017 after the EPA awarded Utah just over $9.5 million through a competitive Targeted Airshed Grant. The Salt Lake, Provo, and Logan nonattainment areas all received approximately $3.2 million for conversions. 2,484 conversions have been completed in the 3 project areas. The emission reduction estimates will be calculated upon grant completion.

During the 2019 legislative session, the State Legislature identified the continued replacement of wood burning devices with cleaner-burning devices as a key strategy to continued improvement in air quality throughout the state. As a result, they allocated an additional $9 million to augment the wood stove and fireplace conversion program.

The program has become very popular with the public and participation response to the programs have exceeded all expectations. As of the end of 2021, the DAQ has completed 3,332 projects with the combined funding. More information on the program, including eligibility requirements and registration dates, is available at stoves.utah.gov.

Electric Vehicle Supply Equipment (EVSE) Projects

Workplace Electric Vehicle Charging Funding Assistance Program

During the 2019 General Legislative Session, the State Legislature appropriated $4.9 million to incentivize the installation of electric vehicle supply equipment (EVSE) throughout the State. The EVSE incentive program allows businesses, non-profit organizations, and other governmental entities (excluding State Executive Branch agencies) to apply for a grant for reimbursement of up to 50% of the purchase and installation costs for a pre-approved EVSE project. Funds can be used for the purchase and installation of both Level 2 or DC fast charging EVSE.

The program began to accept applications on September 16, 2019. As of December 9, 2021, 44 projects totaling just over $1,400,000 have been completed, with 230 Level 2 and 19 DC fast EVSE installed throughout the State. DAQ has pre-approved an additional 18 projects encumbering approximately $900,000 of the available funds.

Volkswagen (VW) EVSE

As a result of the VW settlement described in the section below, the DAQ has awarded over $3.8 million to 18 government entities to install One single-port and 97 Dual-port level 2 and 27 DC fast chargers throughout Utah. As of December, 9, 2021, 61 Level 2 and 14 DC fast chargers have been installed. See Table 5, below for specific awards and progress. More details on the VW Settlement and the VW EVSE program are provided in the section below.

Table 5: State of Utah VW EVSE Awards

Table 5: State of Utah VW Settlement Awards Light-Duty Zero Emission Vehicle Supply Equipment Category					
Awardee/Locations	Award Amount[1]	EVSE Type[2]	Number of EVSEs[3]	Number EVSE Installed[4]	Dollars Paid for Projects Completed
Clinton City Loc. 1: Civic Center Park Loc. 2: Center Park Loc. 3: Powerline Park	$60,129.00	Level 2	3 Dual-port	3 Dual-port	$46,808.38
Davis Technical College Loc.: DATC Campus	$49,000.00	Level 2	3 Dual-port 1 Single-port	3 Dual-port 1 Single-port	$46,037.00
Utah DFCM[5] Loc. 1: MASOB[6] Loc. 2: Regional Building 2	$49,401.00	Level 2	11 Dual-port	12 Dual-port	$49,401.00
Kamas City Loc.: City Office	$41,227.00	Level 2	1 Dual-port	In Process	In Process
Kaysville City Loc. 1: City Hall Loc. 2: 100 E. 200 N. Loc. 3: 300 N. Flint St. Loc. 4: Kaysville Operations Center	$69,988.00	Level 2	9 Dual-port	9 Dual-port	$69,572.00
Lehi City Loc.: City Hall	$16,755.00	Level 2	1 Dual-port	1 Dual-port	$16,775.00
Murray City Power Loc.: Murray Park Rec. Center	$157,608.00	Level 2	2 Dual-port	2 Dual-port	$141,992.86
		DC Fast Chargers	1	1	
Orem City Loc.: City Hall	$308,269.00	DC Fast Chargers	4	4	$270,675.00
Provo City Loc. 1: Provo City Center Loc. 2: Recreation Center Loc. 3: Academy Library Loc. 4: Public Works Complex Loc. 5: Provo Power Complex Loc. 6: Rock Canyon Loc 7: North Park	$752,500.00	Level 2	20 Dual-port	In process	In progress
S.L. Co. Health Dept. Loc.: S.L. County Environmental Health Department	$603,095.00	Level 2	8 Dual-port	8 Dual-port	$577,771.88
		DC Fast Chargers	2	2	
Sandy City Loc.: City Hall	$118,982.00	DC Fast Chargers	3	3	$118,982.00
Saratoga Springs Loc.: Municipal Campus	$26,788.00	Level 2	3 Dual-port	3 Dual-port	$26,788.00
South Salt Lake City Loc.: City Hall	$136,517.00	Level 2	4 Dual-port	In Process	In Process
Timpanogos Cave National Monument Loc.: Visitor Center	$10,966.00	Level 2	1 Dual-port	In Process	In Process

UDOT[7] Loc 1: Calvin Rampton Loc 2: Garden City Loc 3: Castle Dale City Museum Loc 4: Monticello Visitor Center Loc 5: Bluff Maintenance Station Loc 6: Richfield Admin. Office Loc 7: Kanab Loc 8: The Fork Rest Area Loc 9: Grassy Mtn Rest Area[8] Loc 10: UDOT Price District Office	$1,047,623.00	Level 2	11 Dual-port	10 Dual-port (still in process)	$204,401.00 (still in process)
		DC Fast Chargers	16	4 (Still in process)	
Utah Valley University Loc 1: Orem Main Campus Loc 2: Lehi Campus Loc 3: Aux. Services Building	$99,000.00	Level 2	6 Dual-port	4 Dual-port (still in process)	$72,790.00 (still in process)
Weber State University Loc 1: Campus Services Bldg. Loc 2: Hurst Center Loc 3: Reed K. Swenson Bldg. Loc 4: Dee Event Center	$143,694.00	Level 2	4 Dual-port	4 Dual-port	$76,912.00
West Valley City Loc 1: City Hall Loc 2: West Valley City Fitness Center	$140,564.00	Level 2	4 Dual-port	In Process	In Process
Total	**$3,832,106.00**	**Level 2**	**91 Dual-port 1 Single-port**	**63 Dual-port 1 Single-port**	**$1,071,542**
		DC Fast Chargers	**26**	**12**	

Notes:
1. (based on vendor bids at time of application submittal - November, 2018)
2. Included in Project Proposal
3. As Proposed in Project Proposal
4. by Project Completion Date
5. Division of Facilities and Construction Management
6. Multi-Agency State Office Building
7. Utah Department of Transportation
8. West Bound and East Bound

Volkswagen (VW) Settlement

In 2015, the United States (U.S.) Environmental Protection Agency (EPA) issued two notices of violation of the CAA to Volkswagen Group[1] (Volkswagen or VW), the German automotive manufacturer. The EPA asserted that VW installed software that activated emissions controls only while undergoing emissions testing, but rendered certain emissions controls inoperative during normal driving conditions. Consequently, approximately 500,000 2.0-liter diesel vehicles (models 2009 to 2015) and 90,000 3.0-liter diesel vehicles (models 2009-2016) sold across the U.S. emitted between 9 and 40 times the nitrogen oxides (NO_x) emissions allowed by federal law[4].

Utah received approximately $35 million from a nationwide settlement with VW for violations of the CAA. Utah's portion will help offset excess nitrogen oxides (NO_x) emissions from the approximately 7,000 VW, Audi, and Porsche vehicles in the state affected by the automaker's

[1] The Volkswagen Group collectively includes Volkswagen AG, Audi AG, Volkswagen Group of America, Inc., Porsche AG, and Porsche Cars North America, Inc. Notice of Violation from Phillip A. Brooks, EPA Air Enforcement Division to David Geanacopoulos and Stuart Johnson, Volkswagen Group of America, Inc. (September 18, 2015); Notice of Violation from Susan Shinkman, EPA Office of Civil Enforcement to David Geanacopoulos and Stuart Johnson, Volkswagen Group of America, Inc. and Joseph Folz and Walter J. Lewis, Porsche Cars North America, Inc. (November 2, 2015).

violations.

The DAQ estimates that these excess NO_x emissions contributed between 351 to 1,556 tons of NO_x over the span of time they were operating in Utah. Approximately 70 percent of the affected vehicles were registered in the seven counties designated as nonattainment for particulate matter ($PM_{2.5}$) under the National Ambient Air Quality Standards.

Governor Herbert designated the DEQ as the lead agency to administer these monies. DEQ's responsibilities as lead agency include the development of an Environmental Mitigation Plan (EMP). On behalf of the DEQ, the DAQ oversaw this process and invited the public to provide input on the EMP and worked with an advisory committee on recommendations.

The VW settlement included a prescribed list of categories for NO_x mitigation projects. DAQ crafted an EMP using these guidelines, input from the public, and recommendations from an advisory committee. Final selection of Eligible Mitigation Action (EMA) categories was based on the advisory committee's recommendations, public input, and DAQ goals:

- To achieve significant NO_x reductions that work toward fully mitigating the excess lifetime NO_x emissions from the non-compliant VW vehicles and contribute to the State's ongoing goal of reaching attainment of the NAAQS.
- To maximize the amount of emissions reductions for each dollar spent.
- To benefit areas in Utah that bear a disproportionate amount of the air pollution burden.
- To stimulate emerging vehicle technologies that result in long-term emissions benefits.
- To provide economic and health benefits to the citizens of Utah.

The plan focuses the $35 million settlement funds on upgrades to government-owned diesel truck and bus fleets as well as the expansion of electric-vehicle (EV) charging equipment. Funding allocations are as follows:

- Class 4-8 Local Freight Trucks and School Bus, Shuttle Bus, and Transit Bus: 73.5%
- Light-Duty, Zero Emissions Vehicle Supply Equipment: 11%
- Administrative Costs: 8.5%
- Diesel Emission Reduction Act (DERA) options: 7%

Applications for funding were available from October 1, 2018, to November 30, 2018. Government entities as defined in Utah Code § 63G-7-102(4) and federal government agencies were eligible to apply.

DAQ received 50 applications for the Class 4-8 Local Freight Trucks, School Bus, Shuttle Bus, and Transit Bus categories and 25 applications for the Light-Duty, Zero Emissions Vehicle Supply Equipment category with combined projects totaling over $71 million. Projects were prioritized and selected based on their reduction of nitrogen oxides (NO_x), cost-per-ton of NO_x reduced, value to the nonattainment areas and community benefits. Successful projects are shown in Table 6, below. Awardees have three years to complete their projects. More information on the VW Settlement is available at vw.utah.gov.

Table 6: State of Utah VW Settlement Awards

State of Utah VW Settlement Awards Class 4-8 Local Freight Truck, School Bus, Shuttle Bus and Transit Bus Categories				
Awardee	**Replacement Type**	**Award Amount**	**# of Vehicles Awarded**	**Eligible Mitigation Action Category**
Bountiful City	Diesel to Diesel	$145,000.00	2	Class 8 Local Freight Truck
Canyons School District	Diesel to Diesel	$826,000.00	14	School Buses
Davis School District	Diesel to Diesel	$136,260.00	2	School Buses
Jordan School District	Diesel to Diesel	$138,992.00	2	School Buses
North Salt Lake City	Diesel to Diesel	$108,741.00	1	Class 8 Local Freight Truck
Orem City	Diesel to Diesel	$1,051,000.00	5	Class 8 Local Freight Trucks Shuttle Bus
Park City Municipal Corp	Diesel to Electric	$3,129,449.00	5	Transit Buses
Pleasant Grove City	Diesel to Diesel	$410,112.00	5	Class 8 Local Freight Trucks Class 4-7 Local Freight Trucks
Salt Lake City Corporation	Diesel to Diesel	$1,281,503.00	9	Class 8 Local Freight Trucks
Salt Lake City School District	Diesel to Electric	$699,660.00	4	School Buses
Salt Lake Urban Search & Rescue	Diesel to Diesel	$86,740.00	1	Class 8 Local Freight Truck
Tooele County School District	Diesel to Diesel	$132,000.00	2	School Buses
UDOT	Diesel to Diesel	$2,604,948.00	22	Class 8 Local Freight Truck
Utah Transit Authority	Diesel to Electric	$13,079,240.00	20	Transit Buses

Utah Clean Diesel Program

The Utah Clean Diesel Program aims to cut emissions from heavy- duty diesel vehicles and equipment that operate in the State's nonattainment areas. In 2021, the EPA awarded the Utah Clean Diesel Program $2.6 million to replace diesel short-haul delivery trucks and refuse haulers with newer, cleaner versions. Fleet owners receive up to a 45 percent incentive toward the purchase of new vehicles and equipment that meet the cleanest emissions standards with electric vehicles and equipment receiving the highest incentive

Retiring engine model years 2009 and older diesel trucks that are currently operational and have a minimum of three years remaining in their useful life and replacing them with current model years can achieve approximately 71 to 90 percent reductions in NO_x, 97 to 98 percent reductions in $PM_{2.5}$, and 89 to 91 percent reductions in VOCs, according to the EPA Emissions Standards for Heavy-Duty Highway Engines and Vehicles. Electric replacement vehicles achieve 100 percent reductions in emissions.

EPA provides a separate allocation of clean diesel funding for participating states, known as the State Clean Diesel Grant program, that UDEQ will use to offer $760,967 for the replacement of diesel school buses to all-electric school buses and another $1,493,257 for the replacement of diesel non-road vehicles, refuse trucks, Class 8 trucks, and school buses. VW Settlement funding of $1,217,300 will provide added funds for this project for a total of $1,559,595. DAQ is currently partnering with Salt Lake City School District who will be awarded $1,525,000 to replace seven diesel school buses with electric school buses and Waste Management of Utah who will be awarded $350,000 to replace ten diesel refuse trucks with CNG refuse trucks through this program.

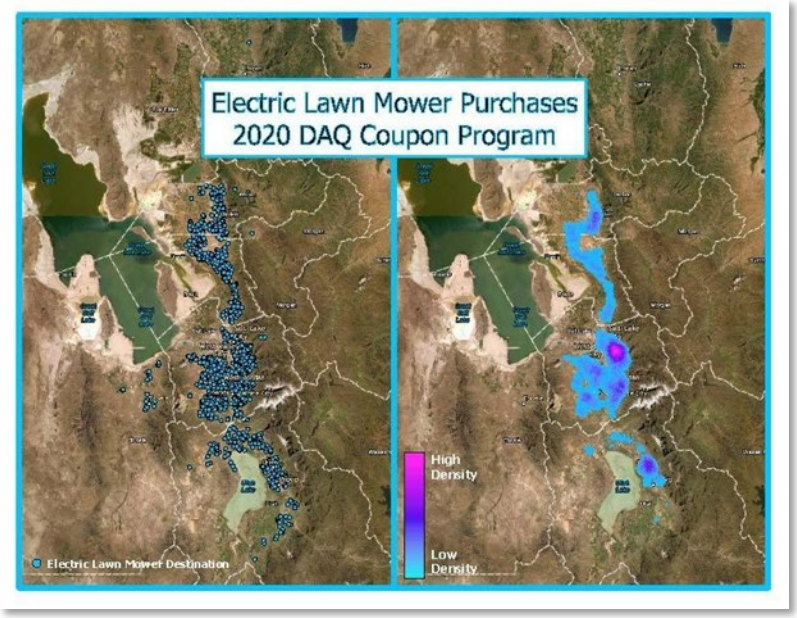
Over $25 million in federal grants have been awarded through the Utah Clean Diesel Program since 2008, resulting in thousands of tons reduced from diesel emissions.

Electric Snow Blower Exchange

A snow blower exchange *was not planned during 2021* due to COVID-19 concerns and registration system maintenance. DAQ plans to bring the program back in Fall 2022.

State of Utah Online Electric Lawn Mower Discount Program

DAQ partnered with Salt Lake City, Weber State University, Davis County Health Department, and Weber-Morgan Health department to offer 2,500 Utahns a discount on the purchase of an electric lawn mower. Residents of the ozone nonattainment area (Davis, Salt Lake, Weber, Tooele, and Utah Counties) were eligible to receive a discount in the form of a rebate check. Online registration opened Monday, April 5, 2021, on a first-come, first-serve basis. Twenty-five hundred registrations were filled within the first 3 hours. Registered participants had until mid-June to complete the process of purchasing an electric mower, recycling a gas mower (optional), and providing copies of the receipt(s). Those who turned in valid receipts of purchase and recycling were mailed a rebate check valued up to $300 if they recycled a gas-powered lawn mower, and up to $150 if they did not. The value of the rebate check did not exceed the amount paid for the electric lawn mower. Those living in Salt Lake City were offered a complimentary collection of their gas-powered lawn mower via the Salt Lake City Call 2 Haul Service. Call 2 Haul picked up lawn mowers from participants' homes and recycled them locally. 1,990 gas powered lawn mowers were recycled and 2,245 rebates were mailed.



Free-Fare Day Pilot Project

During the 2019 Legislative Session, the Legislature appropriated $500,000 to the DAQ to administer a Trip Reduction Program. A primary component of the Trip Reduction Program is a Free-Fare Day Pilot Project. The DAQ has worked closely with the Utah Transit Authority (UTA) to provide free fares during inversion periods when pollution concentrations are increasing and projected to reach levels that are harmful to human health. The DAQ originally anticipated the provision of seven free fare days over the life of the program. However, due to

ridership changes associated with the COVID-19 pandemic, the total number of free fare days will be determined based upon estimated foregone fare revenues and remaining available funding. As a result of favorable air quality conditions, no free fare days were implemented in 2020. In 2021, UTA implemented four free days, including two during the summer ozone season and two during the winter particulate matter season. At the end of the project, the DAQ will provide a report to the Legislature that analyzes the air quality benefits of the program. The UTA will provide much of the data necessary for the report, including ridership data and results from surveys administered on Free-Fare days.

Ancillary Programs

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 the EPA to ensure that the relevant planning and air quality regulations have been adequately addressed. The Utah Department of Transportation (UDOT) is responsible for transportation conformity within isolated rural nonattainment areas when a non-exempt FHWA/FTA project(s) needs funding or approval.

- CMPO, MAG, and WFRC demonstrated conformity to the SIP for the Plans and TIPs for their respective areas.
- CMPO established conformity for the 2050 RTP in June of 2019 and the 2022-2027 TIP in June 2021: Cache County, Utah portion of the $PM_{2.5}$ moderate nonattainment.
- MAG established conformity for the 2050 RTP in June 2019 and the 2021-2025 TIP in August 2020: Provo\Orem City CO maintenance area; Utah County PM_{10} and $PM_{2.5}$ moderate nonattainment area; Southern Wasatch Front, UT Ozone marginal nonattainment area (portion of Utah County).
- WFRC established conformity for the 2022-2027 TIP and the 2050 RTP in June of 2021: Salt Lake County and Ogden City PM_{10} nonattainment areas; Salt Lake $PM_{2.5}$ moderate non-attainment area (Davis, Salt Lake, and Weber Counties and portions of Box Elder and Tooele Counties); Northern Wasatch Front, UT Ozone marginal nonattainment area (Davis, Salt Lake, and Weber Counties and portions of Box Elder and Tooele Counties);
- UDOT was not required to establish conformity for the Uintah Basin, UT Ozone marginal nonattainment area (portions of Duchesne and Uintah Counties).

Utah Air Quality Public Notifications

The 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, and to advise the public and industrial sources to act to reduce their pollution footprint during these events.

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 Air Quality Index (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 DAQ also sponsors an electronic mail server (Listserv). Subscribers are automatically notified by e-mail when unhealthy air pollution levels are forecast throughout Utah and when action alerts are issued. The *National Center for Automotive Sciences and Technology* at Weber State University developed a mobile app called Utah Air for the DAQ. 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. As of December 2021, the application has been downloaded onto over 100,000 mobile devices.

Choose Clean Air

The DAQ continues to emphasize the Choose Clean Air program and has developed an interactive website containing information about ways individuals can help improve air quality by making smart choices in their personal lives. The website can be found at http://www.cleanair.utah.gov/.

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, instead of waiting until an area is exceeding a standard, action alerts are called when the DAQ meteorologists see that we are in the early building stages of an inversion that will likely lead to pollution concentrations at or above the trigger level of 25µg/m^3. 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.

Smoke Management in Utah

Utah's first Smoke Management Plan (SMP) was written in 1999. The plan is designed to meet the requirements of Title R307, state administrative rule for air quality; Regional Haze Rule, 40 CFR 51.309(d)(6); and the policies of the EPA Interim Air Quality Policy on Wildland and Prescribed Fires. The signatories to the SMP are: US Forest Service, Bureau of Land Management, National Park Service, US Fish and Wildlife Service, Bureau of Indian Affairs, and the Utah Division of Forestry, Fire, and State Lands.

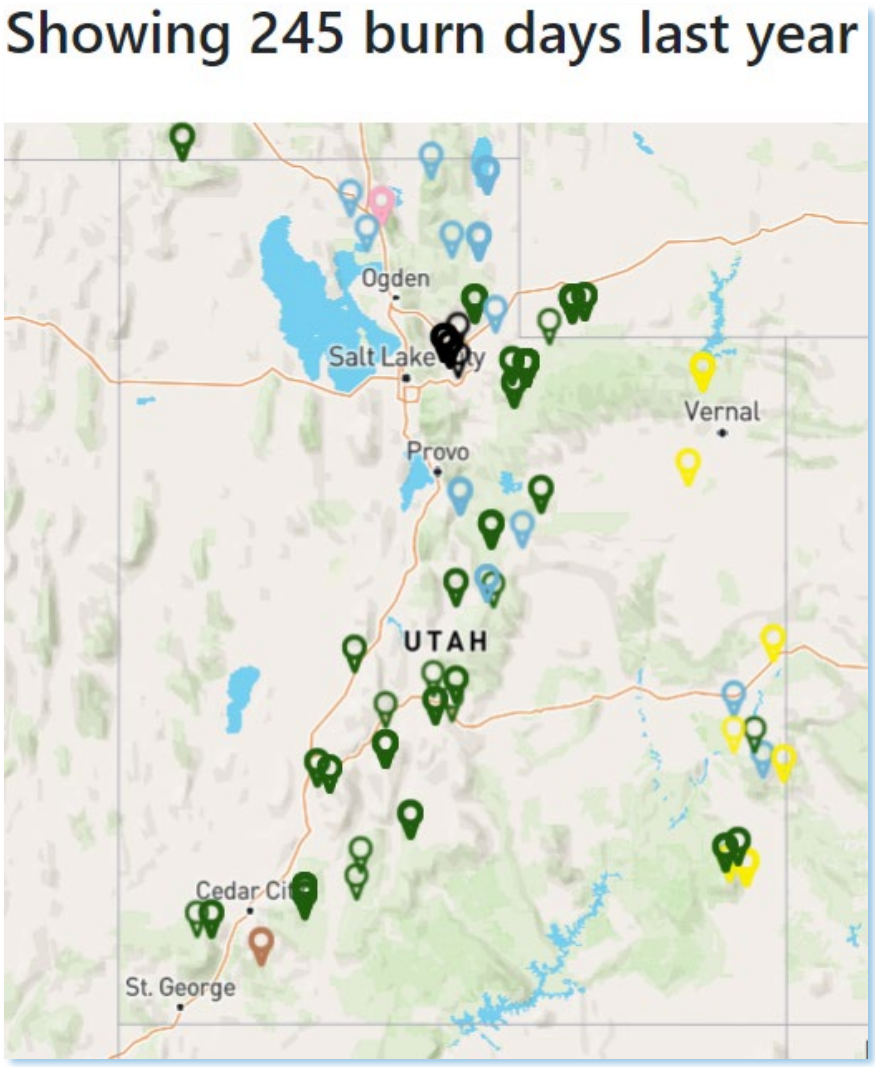
The SMP serves as an operational plan for the state administrative rule, R307-204 Emission Standards: Smoke Management, by providing direction and operating procedures for all organizations involved in the management of prescribed fire. R307-204 establishes by rule the procedures and the permitting process that land managers are required to follow to mitigate the impact of smoke on air quality and visibility in the State.

The following table provide a 5-year view of the numbers of permitted prescribed burns and acres burned across Utah.

Table 7: Prescribed Burns and Acres Burned 2017-2021

Table 7: Prescribed Burns and Acres Burned 2017-2021

Year	Acres Burned	Number of Prescribed Burn Projects
2017	13,019	171
2018	12,802	188
2019	18,171	164
2020	5,636	120
2021	11,818	245



Each green dot pictured in the figure above represents a prescribed fire in Utah in 2021.

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. They 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. The county health departments administer these programs.

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. In 2017, Weber County implemented a revised I/M program that includes diesel vehicles. For diesels less than 14,000 lbs. GVW manufactured between 1998 and 2006, they perform a visual inspection to verify the vehicle's emission controls have not been tampered with. For 2007 and newer vehicles, they perform a full On-Board Diagnostics test. Weber County Health Department has found that about 20% of the tested vehicles are failing. During the 2018 General Legislative Session HB 101 passed which created a pilot program requiring Utah County to require a diesel emissions inspection program. This program started on January 1, 2019 and during the 2021

General Legislative Session SB146 passed, which made this program permanent.[2]

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. There were two bills passed during the 2015 General Legislative Session that helped enhance the smoking vehicle programs in the state:

- HB17 clarified that visible emissions from gas or certain diesel-powered vehicles are not allowed on Utah roads.
- HB110 gave the Utah Division of Motor Vehicles the authority to suspend a vehicle's registration if the vehicle does not meet air emissions standards.

The DAQ worked with the local health departments, Utah Division of Motor Vehicles, and Utah Highway Patrol to develop a method of enforcing these laws. People who spot a vehicle producing excessive smoke can report it through a statewide smoking vehicle hotline at 385-GOTSMOG (468-7664) or 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

Salt Lake County Health Department applied for and was awarded a grant to create a statewide smoking vehicle hotline. This program created a single number *(385) GOT-SMOG (468-7664)* to report vehicles that have visible emissions. They also created a webpage, utahsmokingvehicles.org, which includes the information needed to report a smoking vehicle as well as direct links to each respective county health department's smoking vehicle reporting webpage. Salt Lake County worked with the other local health departments to create and implement the program during 2018.

[2] See Utah Code Section 41-6a-1642 (7)

Compliance Branch

The Compliance Branch is comprised of three sections: Major Source Compliance, Minor Source Compliance, and the ATLAS. These 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.

Major and Minor Source Compliance

The Major and Minor Source Compliance sections are responsible for ensuring compliance at more than 4,500 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 continuous emission monitoring systems, 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 8 summarizes the compliance activities of these two sections for 2021

Table 8: Major and Minor Source Compliance Summary

Table 8: Major and Minor Source Compliance Summary	
TASK	**2021**
Source Inspections	654
On-site Stack Test/CEM Audits	40
Stack Test/CEM Reviews	385
Emission Reports Reviewed	165
Temporary Relocations Accepted	69
Fugitive Dust Control Plans Accepted	1732
Soil Remediation Report Reviews	12
Open Burn Permit Application Completed Online	137
Miscellaneous Inspections	276
Complaints Received	184
Wood Burning Complaints	0
Breakdown Reports Received	12
Compliance Actions Resulting from a Breakdown	0
VOC Inspections	0
SCAN Warning Letters	13
Notices of Violation	3
Compliance Advisories	45
Settlements	19
Penalties Assessed	**$306,498.60**

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

ATLAS determines compliance with multiple regulations involving asbestos and lead-based paint (LBP). ATLAS is responsible for the following programs:

Lead-Based Paint

Toxic Substances Control Act (TSCA) Title IV, 40 CFR Part 745 and, Utah Administrative Code (UAC) R307-840, 841, and 842. Under this program, ATLAS performs regulatory oversite of training providers, regulated projects subject to the LBP Activities Rule and the LBP Renovation, Repair, and Painting Rule, certification of individuals and firms, and lead-based paint outreach activities.

Asbestos in Schools

TSCA Title II Asbestos Hazard Emergency Response Act (AHERA), 40 CFR Part 763 and, UAC R307- 801-4. Under this program, ATLAS deals with the review and approval of AHERA Management Plans, performs inspections of buildings subject to AHERA, and inspections and asbestos abatement for structures subject to AHERA.

Asbestos NESHAP and State Asbestos Work Practices

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

Table 9: ATLAS Activity Summary

Table 9: ATLAS Activity Summary	
TASK	**2021**
Asbestos NESHAP Inspections	70
Asbestos AHERA (School) Inspections	65
Asbestos State Rules (Only) Inspections	5
Asbestos Notifications Accepted	763
Asbestos Telephone Calls	1882
Asbestos Individuals Certifications	418
Asbestos Company Certifications	55
Asbestos Alternate Work Practices	28
Lead-Based Paint Inspections	10
Lead-Based Paint Abatement Notifications	6
Lead-Based Paint Telephone Calls	275
Lead-Based Paint Letters Prepared & Mailed	4
Lead-Based Paint Course Audit	8
Lead-Based Paint Individual Certifications	117
Lead-Based Paint Firm Certifications	62
Notices of Violations	0
Compliance Advisories	62
Warning Letters	11
Settlement Agreements	5
Penalties Collected	**$20,817.75**

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. The Division supports the Task Force in the preparation of public announcements and media communication relating to the risks of asthma symptoms associated with air pollution.

The goal of the DAQ for 2022 is to work with the Asthma Task Force to clarify the two causal connections between adverse asthma effects and air pollution. Namely, the neuromuscular reflex that causes constriction of bronchi and upper respiratory airways characteristic of acute asthma attacks, and secondly, the exacerbation of chronic airway inflammation that makes asthma patients more susceptible to the full range of adverse health effects associated with exposure to air pollution.

Small Business Environmental Assistance 507 Program (SBEAP)

The CAA 507 Programs consist of three parts: A Small Business Ombudsman (SBO) to act as an advocate for small business, a Small Business Environmental Assistance Program

(SBEAP) to provide technical support, and a Small Business Compliance Advisory Panel (CAP) to provide feedback and help identify small business issues. The SBEAP helps small businesses understand and comply with state environmental regulations including air quality rules. The SBEAP continues to assist small businesses by providing web resources, responses to email and telephone inquiries and assistance with permitting through a pre-design program. The Small Business CAP remains active with meetings scheduled quarterly.

Enforcement Actions

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

- Warning Letter—a notification sent to violators to resolve minor, and/or first-time violations.
- Early Settlement Agreement – a less formal administrative resolution of an alleged violation(s) in which the 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 used to offset a portion of any cash payments for stipulated penalties. All collected penalties become part of the State General Fund.
- 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.
- Settlement Agreement – a resolution of a Notice of Violation and Order for Compliance. The DAQ and the recipient agree to specific actions taken to correct the potential violation(s). No discounts of stipulated penalties are offered. The DAQ legal costs may also be collected. 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 to resolve a compliance issue, procedures are in place for Board hearings/administrative law judge review or formal judicial action. Environmental criminal cases are referred to the appropriate law enforcement agency.

Permitting Branch

The DAQ Permitting Branch is responsible for implementing state and federal air permitting programs that are intended to control air emissions from new and modified stationary sources that emit air pollutants. Permits are legally enforceable documents that specify the size and number of allowable emission units, operational limits of permitted emission units and emission limits for each permitted source. Permitted emission limits can be emission limitations (mass or concentration) 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. Permits include testing and monitoring requirements. The results of the tests and the monitoring data are used to determine if a source of air pollution is operating in compliance with the permit and the rules.

The branch issues two types of permits. New Source Review (NSR) permits, also known as Approval Orders (AOs), 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. An Operating Permits Section issues the Title V Operating Permits to the “major” stationary sources in the state, as required in Title V of the federal CAA. There are currently 76 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 AO before it is allowed to begin construction. For areas that are not in compliance with the NAAQS, an NSR permit 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, an NSR permit 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 major sources in nonattainment areas, state-of-the-art technology is known as lowest achievable emissions

rate (LAER). For areas in attainment of the NAAQS and for minor sources in nonattainment areas, 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 considers the technical feasibility of implementing the control, the cost and the environmental benefits of the control equipment, while LAER technology considers only technological feasibility and environmental benefits.

The general public and the EPA are given an opportunity to review the proposed AO before it is issued. The Utah Air Quality Rules specify the criteria indicating which sources must obtain an AO. The New Source Review permitting program issued 105 permits during 2021. It took an average of 155 days to issue the permit from the submission of an application. Potential applicants are encouraged to contact the DAQ prior to submitting the necessary paperwork.

Operating Permits

Congress created Title V of the CAA 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 permits, SIPs, federal New Source Performance Standards (NSPS) and National Emission Standards for Hazardous Air Pollutants (NESHAP), and Maximum Available Control Technology (MACT). Like the AOs, 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 the DAQ 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.

An operating permit has a life of only five years. These permits, both initially and upon renewal, are complex and care must be taken to ensure that federal requirements for the Compliance Assurance Monitoring Rule (CAM) and any other new requirements (such as new MACT Standards) are included.


UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY