UTAH'S AIR QUALITY

2022 Annual Report

UTAH DEPARTMENT *of*
ENVIRONMENTAL QUALITY
AIR
QUALITY

Contents

Acronyms

AO	Approval Order
AHERA	Asbestos Hazard Emergency Response Act
ATLAS	Air Toxics, Lead-Based Paint, and Asbestos Section
AMS	Air Monitoring Section
AQI	Air Quality Index
BACT	Best Available Control Technology
BVOC	Biogenic Volatile Organic Carbon
CAA	Clean Air Act
CAP	Compliance Advisory Council
CIA	Class I Area
CMPO	Cache Metropolitan Transportation Organization
CFR	Code of Federal Regulations
CO	Carbon Monoxide
DAQ	Division of Air Quality
EMP	Environmental Mitigation Plan
EPA	Environmental Protection Agency
EtO	Ethylene Oxide
EVSE	Electric Vehicle Supply Equipment
FIP	Federal Implementation Plan
FY	Fiscal Year
GVWR	Gross Vehicle Weight Rating
I/M	Inspection/Maintenance
LAER	Lowest Achievable Emission Rate
LBP	Lead-Based Paint
MAG	Mountainland Association of Governments
MEGAN	Model of Emissions of Gasses and Aerosols from Nature
Micron	One Millionth of a Meter
MTP	Metropolitan Transportation Plan
MPO	Metropolitan Planning Organization
NAA	Nonattainment Area
NAAQS	National Ambient Air Quality Standards
NEI	National Emissions Inventory
NH_3	Ammonia
NOI	Notice of Intent
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
NSR	New Source Review
NWF	Northern Wasatch Front
O_3	Ozone

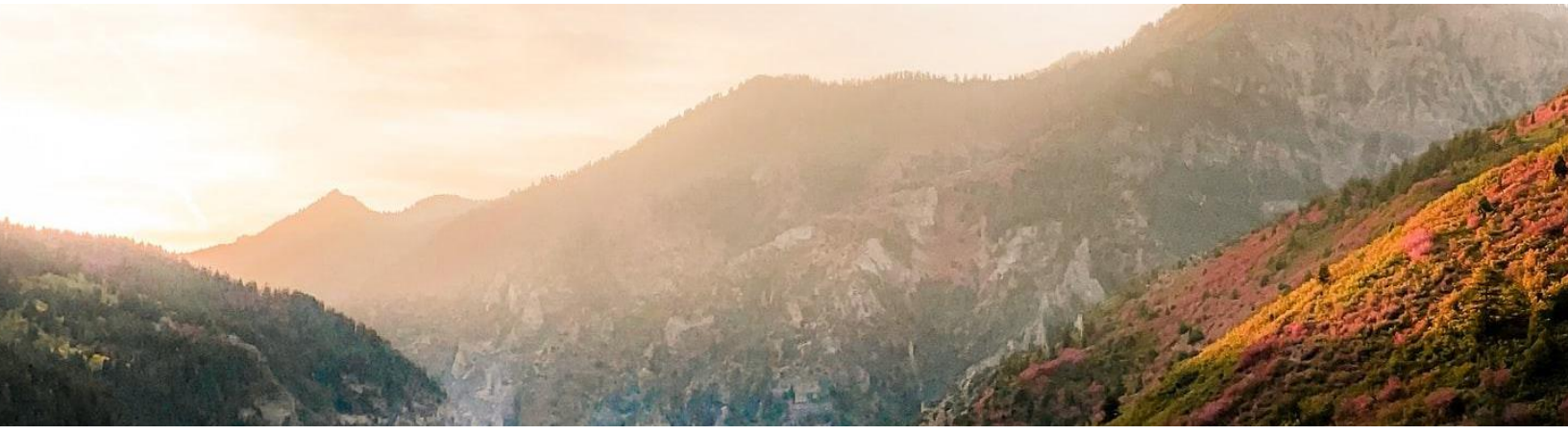
PAMS	Photochemical Assessment Monitoring Stations
Pb	Lead
PM	Particulate Matter
PM_{10}	Particulate Matter Smaller Than 10 Microns in Diameter
$PM_{2.5}$	Particulate Matter Smaller Than 2.5 Microns in Diameter
PPB	Parts Per Billion
PPM	Parts Per Million
RTP	Regional Transportation Plan
SBEAP	Small Business Environmental Assistance Program
SIP	State Implementation Plan
SMP	Smoke Management Plan
SO_2	Sulfur Dioxide
SWF	Southern Wasatch Front
UB	Uinta Basin
UDOT	Utah Department of Transportation
$\mu g/m^3$	Micrograms Per Cubic Meter
UTA	Utah Transit Authority
VOCs	Volatile Organic Compounds
VRRAP	Vehicle Repair and Replacement Assistance Program
VW	Volkswagen
WFRC	Wasatch Front Regional Council

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 DAQ's responsibility 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 pre-construction 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.



2022 Synopsis

The overall story of Utah's battle with wintertime air pollution is a story of success. Air quality along the Wasatch Front during winter months shows a clear trend of continued improvement over the past two decades despite a period of unprecedented growth in population and economic activity in the state. All nonattainment areas have now met the 2006 federal standard for fine particulate matter ($PM_{2.5}$) and significant progress is being made toward limiting the formation of ground-level ozone.

Despite these and other successes, in coming years Utah faces a growing list of challenges that threaten to unravel the progress that has been made. Summertime ozone is now the primary air quality concern along the Wasatch Front as concentrations are continually above the health standard. Utah is one of the fastest growing states and much of this growth is concentrated in urban centers along the Wasatch Front, producing an outsized negative impact on air quality in those areas. Changes in precipitation patterns associated with climate change will also negatively impact Utah's air quality. Persistent drought throughout the Western United States continues to produce large wildfire events with increasing frequency that significantly degrade air quality for Utah residents.

Receding water levels in the Great Salt Lake are exposing areas of lakebed contaminated with arsenic and other hazardous materials that are susceptible to transport into populated areas through dust storms. In addition, it is likely that the federal standards for $PM_{2.5}$ and ozone will be reduced in coming years, making it ever more challenging to meet and maintain compliance. Thus, despite a history of successes improving wintertime air quality, the state is at a tipping point regarding ozone. Future success will require a similar level of sustained and coordinated commitment to make summer air clean and healthy for generations to come.

The following is a brief list of notable air quality highlights from 2022:

Meeting National Ambient Air Quality Standards

- The Southern Wasatch Front Ozone Nonattainment Area (SWF NAA) includes Utah County. Monitored data collected during the summers of 2018, 2019 and 2020 show that the area attained the ozone standard of 0.070 ppm by the attainment date of August 3rd, 2021. As a result, the SWF NAA remains classified as a marginal NAA and the state is not required to develop and submit a State Implementation Plan (SIP) for this area.
- The Northern Wasatch Front Ozone Nonattainment Area (NWF NAA) includes Davis, Weber, Salt Lake, and portions of Tooele County. Monitored data shows that the area did not attain the ozone standard by the attainment date, and the area was reclassified from marginal to moderate nonattainment, effective November 7, 2022. With the reclassification comes a requirement to submit a SIP that details how area emissions will be reduced to meet the health standard. DAQ has spent several years planning and preparing the SIP that will be presented to the Air Quality Board in the summer of 2023. Monitored ozone data already shows that the

area will be reclassified beyond moderate to serious, which comes with more emission reduction requirements.

- The Uinta Basin Ozone Nonattainment Area (UB NAA) includes portions of Uintah and Duchesne counties. The area is classified as a marginal nonattainment area due to unusual wintertime ozone issues caused by emissions from oil and gas extraction in the area. The area will remain classified as marginal due to several one-year extensions to the attainment date and monitored data that shows that the area attained the standard.
- In November of 2020, the Environmental Protection Agency (EPA) proposed to redesignate the Salt Lake City and Provo $PM_{2.5}$ nonattainment areas to attainment. EPA received adverse comments on the proposal. EPA and DAQ continue working through how to address the adverse comments so that the areas can be redesignated.

Regional Haze

- DAQ's Second Implementation Period Regional Haze SIP revision was adopted by the Air Quality Board on July 6, 2022 and submitted to the EPA on July 26, 2022. EPA determined that the submitted SIP was complete on August 24, 2022. Several controls were identified to improve visibility, including mass-based limits of nitrogen oxides (NO_x) at two coal-fired power plants. The SIP shows continued protection of visibility in Utah's National Parks.

Monitoring

- The legislature appropriated $3,236,000 to DAQ during the 2022 general session for six Photochemical Assessment Monitoring Systems to be purchased and installed throughout the ozone nonattainment areas on the Wasatch Front. Due to inflation, the number of new sites will be reduced to five at most, and DAQ spent the year purchasing the equipment and determining site locations. The information from these new monitors will help DAQ understand how and what precursors are interacting in the atmosphere to cause ozone production. Eventually, this information can be used to tailor pollution control strategies and improve photochemical modeling for regulatory purposes.
- DAQ also received funding from the legislature to install ambient air monitoring systems in Wasatch and Summit counties. DAQ is working on equipment purchases and siting for these monitors.

Permitting

- The DAQ issued 171 permits during 2022, with an average of 165 days to issue the permit from Application
- The DAQ permitting dashboard was developed for the regulated sources and public to view the status of any pending permit near real-time. The dashboard includes contact information, a flow chart of the permitting timelines and where the project currently is in the process.
- The DAQ successfully implemented a review of the Approval Orders (AOs) to stationary sources that were issued over 10 years ago. During this evaluation period, the division has reviewed and updated 66 of these AOs.
- The Operating Permits Section reopened many of the Utah Title V landfill permits this year to incorporate the Landfill Federal Plan 40 Code of Federal Regulations (CFR) 62 Subpart OOO.

Compliance

- 963 site inspections were conducted in 2022.
- The DAQ and EPA conducted joint inspections of numerous oil and gas facilities in the Uinta Basin finding violations of environmental laws. These violations resulted in DAQ and EPA issuing joint notices of violations against the companies and ultimately settling the cases in 2022. DAQ received over $1.8 million in penalty payments and deposited $1.5 million into the Environmental Mitigation Fund to disburse for projects that will improve air quality in the Uinta Basin. The Division has been working with the Tri-County Health Department to identify and prioritize relevant projects. Projects include building a trail to Vernal Elementary School to minimize idling and improve safety, installing additional EV fast charging stations in the area, and funding diesel to electric school bus replacement for the Uintah School District (10 buses projected to be replaced with electric buses in 2023 in conjunction with EPA clean school bus funding).
- A settlement with Utah Valley University resulted in the replacement of 25% of the 2-stroke gas powered blowers and trimmers on the main campus being replaced with battery powered units. UVU will calculate the emissions reduction and reliability of the battery powered units and provide that information to DAQ.

Air Quality Research Projects

- DAQ conducted ethylene oxide (EtO) monitoring near two medical sterilization facilities in Salt Lake County. EtO poses a cancer risk and is known to be emitted from such facilities. Measurements of EtO were collected during the winter and summer of 2022. Preliminary monitoring results show greater EtO concentrations near the medical sterilization facilities compared to locations further away. Information on how ethylene oxide impacts the health of local residents and actions that are taken to reduce that risk was shared through public community meetings. The medical sterilization facilities in Salt Lake County have committed to installing additional fugitive emission controls as early as 2023, which will significantly reduce risk when implemented. This work was funded through a competitive EPA grant ($328,459). A final report that details the study's findings will be made available in 2023.
- DAQ recently received two EPA competitive grant awards totaling $784,587. DAQ will use this funding to enhance air quality monitoring in and near underserved communities, enable communities to monitor their own air quality, and promote air quality monitoring partnerships between communities and state/local governments. Work on these two projects will start Spring of 2023.
- In 2022, DAQ awarded three applied research grants. Two of these projects will help advance DAQ's understanding of wildfire impacts on summertime ozone pollution in Northern Utah. The third project will greatly improve DAQ's estimation of natural ozone-causing emissions from

trees and vegetation along the Wasatch Front. It's expected that results from all three projects will enhance DAQ's ozone modeling efforts and provide policy guidance.

Air Quality Incentive Programs

- 2,600 lawnmowers were removed from the Northern Wasatch Front Ozone Nonattainment Area (NWF NAA) and replaced with electric mowers of residents' choice with a $299 online coupon code. Funding for this project came from the GM Ignition Switch Settlement fund in addition to contributions from Salt Lake City.
- As of December 5, 2022, 68 electric vehicle charger projects have been completed, with 335 Level 2 and 31 DC fast Electric Vehicle Supply Equipment (EVSE) installed throughout the State. UDAQ has also pre-approved an additional 24 projects.
- DAQ awarded Ace Recycling and Disposal over $231,000 to replace a 2002 diesel refuse truck with Utah's first all-electric refuse truck. Several heavy-duty truck manufacturers began to offer electric versions in 2022. As such, staff partnered with local dealerships to introduce available incentives to fleet owners for retiring diesel trucks and replacing them with electric.
- Salt Lake City School District is the first school district in Utah to begin converting their diesel fleet to all-electric school buses. They were awarded $1.725 million to replace 8 diesel school buses to all-electric.

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 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 (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM), sulfur dioxide (SO_2), and lead (Pb). Each of these pollutants is addressed in greater detail later in this report. 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 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

EPA Designated Criteria Pollutants			
Name	**Sources**	**Health Effects**	**Welfare Effects**
Carbon Monoxide (CO), a clear, colorless, odorless gas.	Burning of gasoline, wood, natural gas, coal, oil, etc.	Reduces the ability of blood to transport oxygen to body cells and tissues. May be particularly hazardous to people who have heart or circulatory (blood vessel) problems and people who have damaged lungs or breathing passages.	
Nitrogen Dioxide (NO_2) (one component of NO_x) smog-forming chemical.	Burning of gasoline, natural gas, coal, oil, and other fuels; Cars are also an important source of NO_2	Can cause lung damage, illnesses of breathing passages and lungs (respiratory system).	An ingredient of acid rain (acid aerosols) which can damage trees, lakes, flora, and fauna. Acid aerosols can also reduce visibility.
Ozone (O_3) (ground-level ozone is the principal component of smog)	Chemical reaction of pollutants; 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 plants 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.	Ingredients of acid rain (acid aerosols) which can damage trees, lakes, flora, and fauna. Acid aerosols can also reduce visibility.
Lead (Pb)	Paint (houses, cars), smelters (metal refineries); manufacture of lead storage batteries. Note: burning leaded gasoline was the primary source of lead pollution in the 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

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

Utah's Ambient Air Quality Monitoring Network

The Air Quality Monitoring Network currently operates monitors at 23 locations statewide. Two of the monitoring sites have been established to fulfill the Utah Senate Bill 144, which directs the Department of Environmental Quality to establish and maintain monitoring facilities to measure the environmental impact from the Inland Port development project. These sites are the Lake Park Site and the new Prison Site.

The DAQ monitoring stations are strategically situated to measure both local and regional levels of air pollutants, including PM, gaseous pollutants, and meteorological variables. Currently, $PM_{2.5}$ is measured at 19 locations, PM_{10} is monitored at seven locations, O_3 is monitored at 20 locations,

NO_X/NO/NO_2 is measured at nineteen locations, CO is monitored at seven locations and SO_2 at four locations. Fourteen out of nineteen $PM_{2.5}$ monitoring sites and all PM_{10} sites use filter-based equipment, additionally; all the sites monitoring $PM_{2.5}$ and PM_{10} are equipped with continuous monitors. Meteorological parameters, wind speed, wind direction, temperature, relative humidity, and solar radiation are measured at most sampling sites.

Moreover, the network includes stations that participate in the National Core, Speciation Trends Network, Chemical Speciation Network, Photochemical Assessment Monitoring Stations (PAMS), National Air Toxics Trends and near-road station EPA monitoring programs.

Data collected at these stations is primarily used for the following objectives:

- Evaluating population exposure to air pollutants
- Tracking the spatial distribution of air pollutants
- Assessing historical trends in air pollution
- Supporting compliance with ambient air quality standards (primary and secondary)
- Supporting air quality models and research studies
- Informing the public of air pollution levels via mobile apps and web pages
- Developing SIPs and legislative air pollution control measures
- Tracking the effectiveness of air pollution control strategies
- Activating control measures during high air pollution episodes, such as restricting wood burning during winter-time inversions
- Monitoring of specific emission sources and air pollutants

Table 3 shows the monitoring station locations and monitored constituents for stations operated in 2022.

Table 3: Utah Monitoring Network Stations

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
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

Prison Site	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

Photochemical Assessment Monitoring System (PAMS)

The PAMS network is an ozone precursor monitoring network operated by state and local agencies. The PAMS program was originally started in the early 1990s to meet the requirements of Section 182(c)(1) of the CAA. Revisions to the PAMS requirements (40 CFR part 58, Appendix D) were made as part of the 2015 Ozone NAAQS review. UDAQ now operates one PAMS site at Hawthorne, located in Salt Lake County. The objective of the PAMS program is to produce an air quality database to be used to evaluate and refine ozone prediction models. In addition, the program will help identify and quantify ozone precursors, establish the temporal patterns, and associated meteorological conditions to assist and refine the control strategies. UDAQ is measuring the following parameters at the PAMS required site:

- Carbonyls
- Meteorological parameters
- Speciated VOCs
- True NO_2
- NO/NO_x
- Ozone

The DAQ-PAMS site collects hourly speciated VOC measurements, operating on a year-round basis. Carbonyl species are collected in three 8-hour averaged samples per day on a 1-in-3-day schedule from June 1 to August 31 and 1 in 24-hr on a 1-in-3-day for the remaining part of the year. The legislature appropriated $3,236,000 to DAQ during the 2022 general session for six PAMS to be purchased and installed throughout the ozone nonattainment areas on the Wasatch Front. Due to inflation, the number of new sites will be reduced to five at most, and DAQ spent the year purchasing the equipment and determining site locations.

Criteria Air Pollutants

The CAA has three different designations for areas based on whether 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, or insufficient 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, with some criteria pollutants having a nonattainment or maintenance classification as discussed below.

Ozone (O_3)

Ozone is a highly reactive, colorless gas composed of three molecules of oxygen bonded together. Ground level ozone is identical to ozone found in the stratospheric ozone layer located about 15 miles above the earth's surface. However, ozone found at these elevated elevations is generally considered good since it does not come into direct contact with human activities and protects human health by shielding the earth from cancer-causing ultraviolet radiation. In contrast, ground-level ozone is regulated by the EPA as a NAAQS due to its harmful effects to human health. Ground level ozone is not directly emitted but is rather formed in the atmosphere by complex chemical reactions involving VOCs and NO_x in the presence of sunlight.

Major sources for both VOCs and NO_x can include 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.

$$\text{VOC} + \text{NOx} \xrightarrow{\text{Sunlight}} \text{Ozone}$$

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.

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 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 NO_x 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 1 shows that the Uinta Basin often experiences a greater increase in ozone in the winter months than summer months, whereas higher values on the Wasatch Front are typically only observed in the summer.

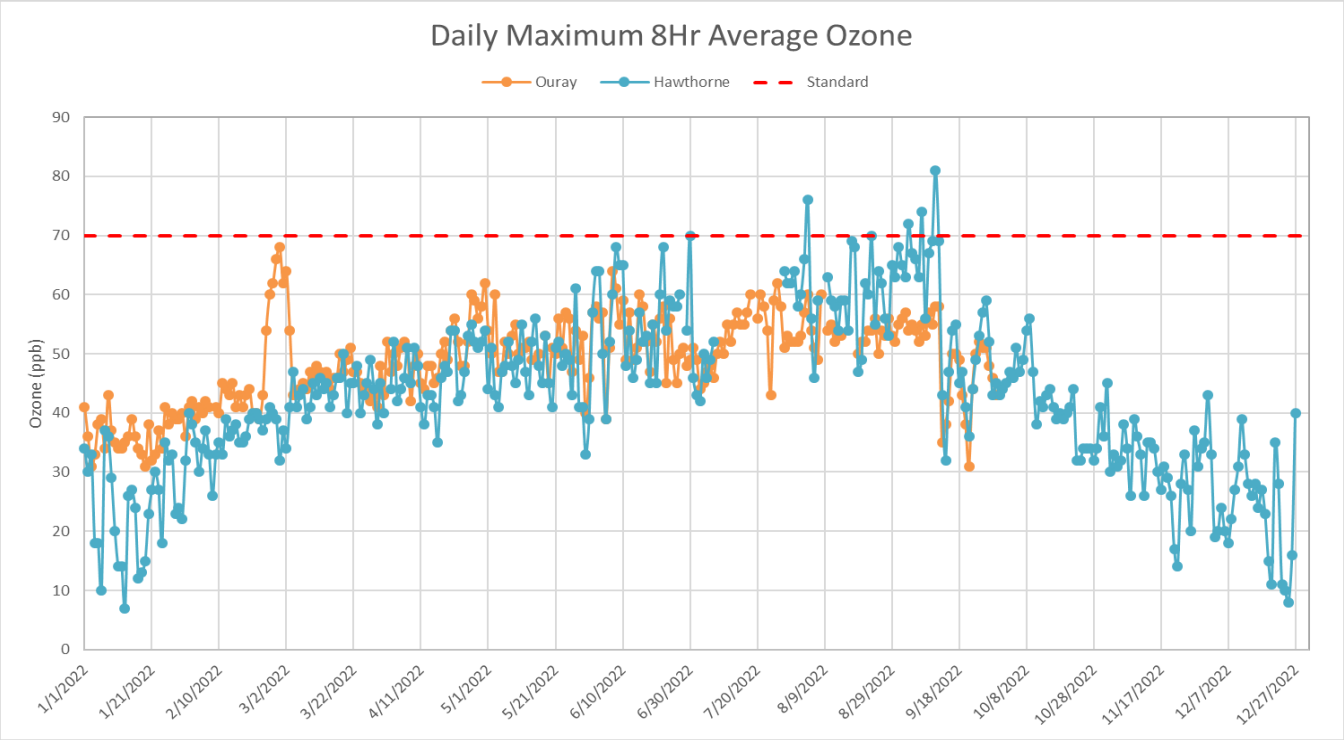


Figure 1: Daily Maximum 8-hour Ozone measurements at Hawthorne and Ouray

NAAQS Standards and Monitored Data

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, Utah County, and the Uinta Basin as nonattainment areas for ozone.

Figures 2-5 show the annual 4th highest 8-hour ozone concentrations at monitoring locations throughout the state, in the Uinta Basin, and along the Wasatch Front. In each of these figures, dashed lines indicate the NAAQS standard, with the red dashed line indicating the current NAAQS of 0.070 ppm.

In 2022, DAQ monitors showed multiple exceedances of the 2015 standard in all monitored counties along the Wasatch Front. While the area experienced multiple days that exceeded the standard, 2022

saw far fewer exceedances relative to 2021 in large part due to fewer instances of days impacted by wildfire smoke.

The Uinta Basin did not exceed 0.070 ppm more than 4 times in 2022 and thus continued its trend of remaining below the NAAQS.

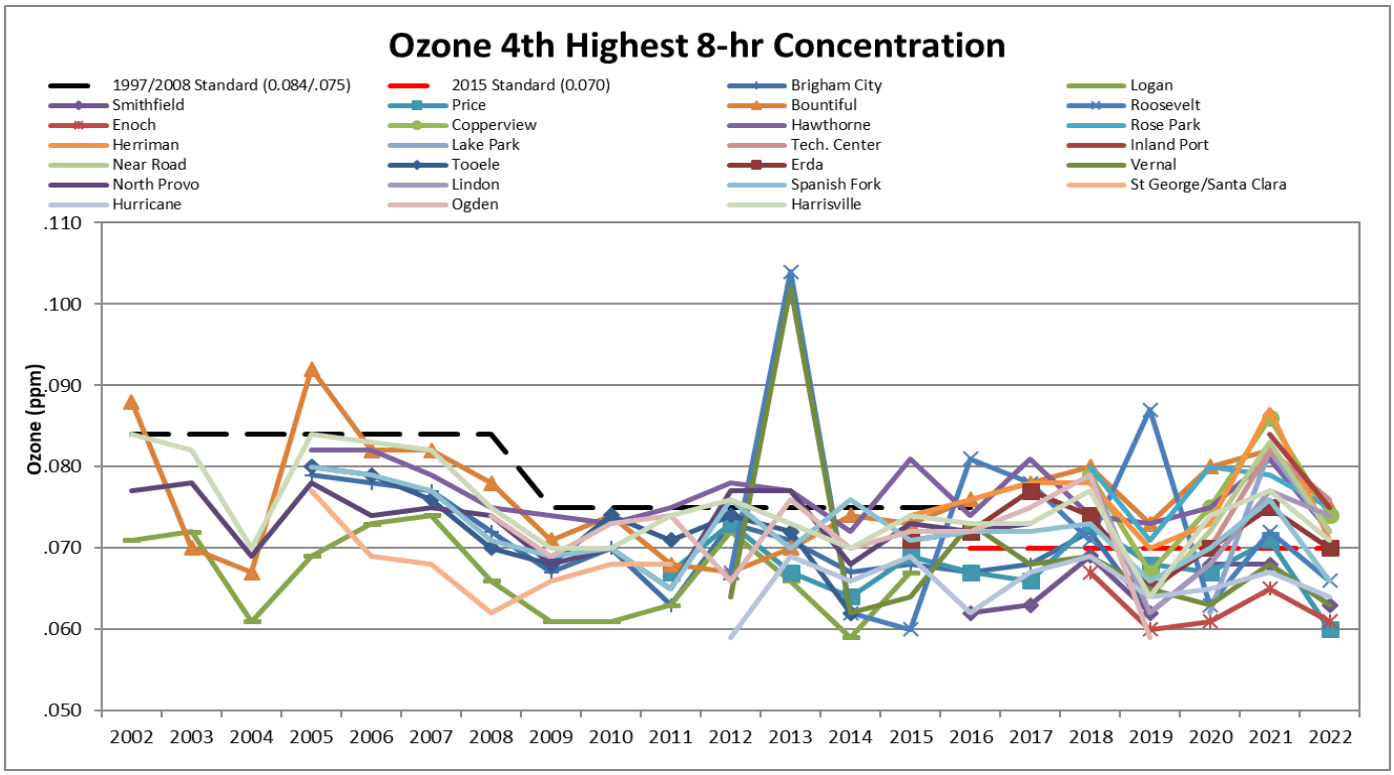


Figure 2: 4th Highest Daily Maximum 8-hour Average Ozone

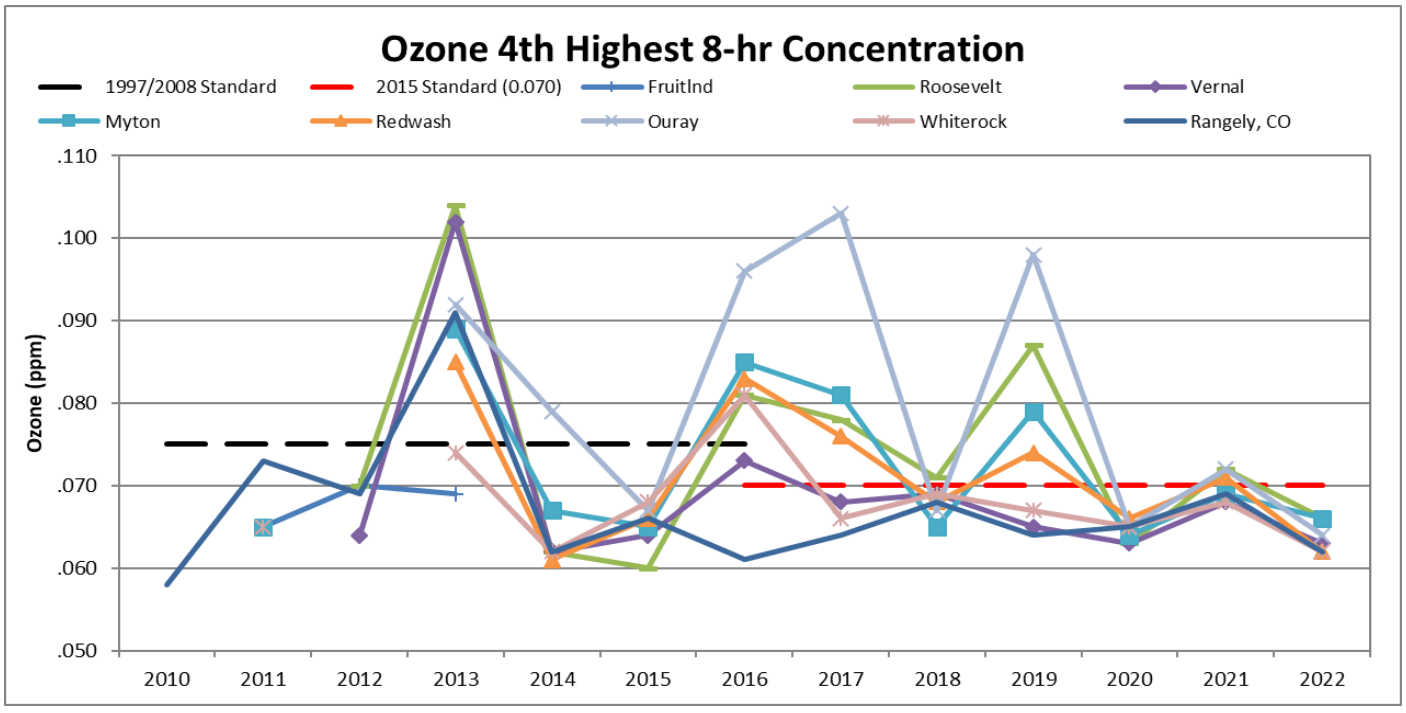


Figure 3: 4th Highest Daily Maximum 8-hour Average Ozone Uinta Basin

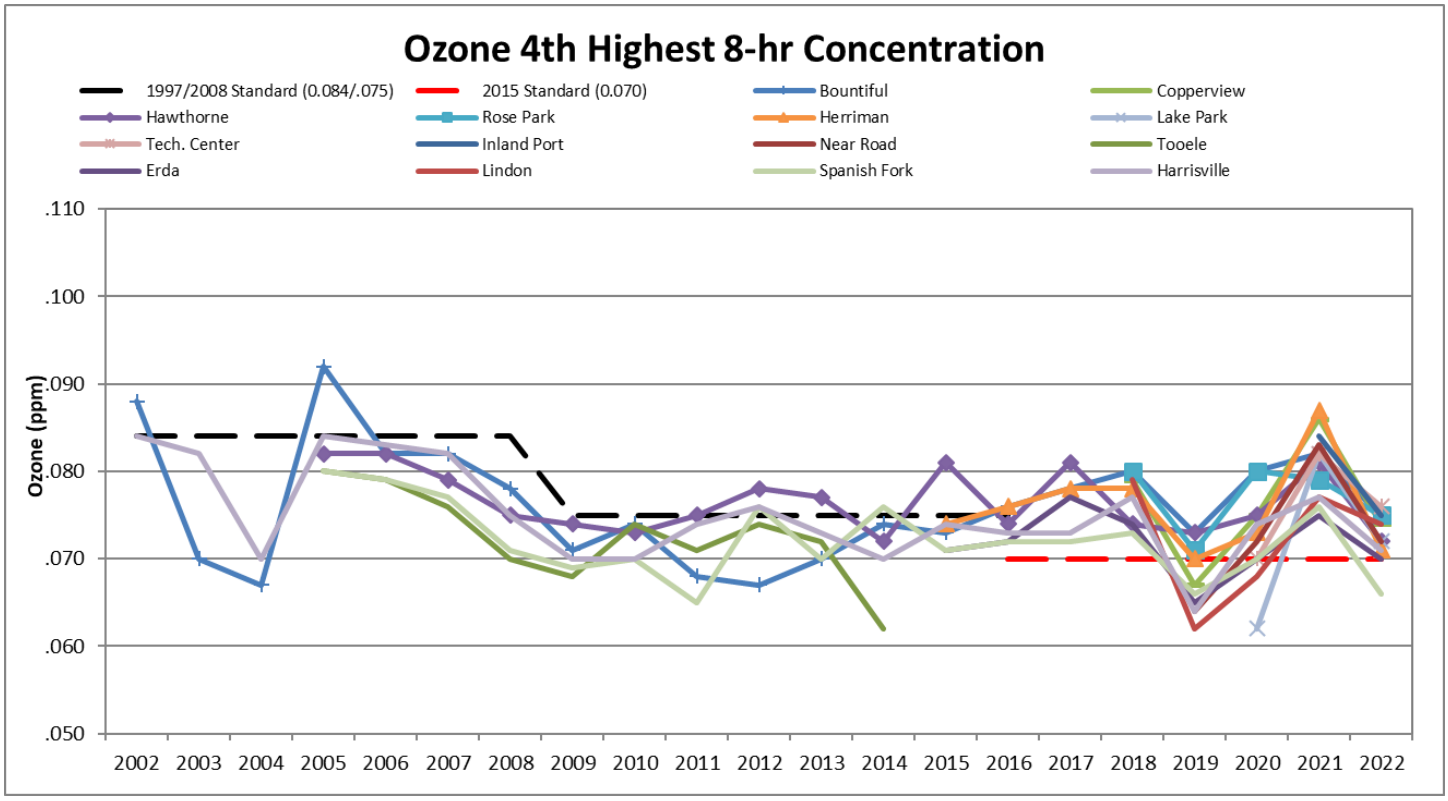


Figure 4:4th Highest Daily Maximum 8-hour Average Ozone Wasatch Front

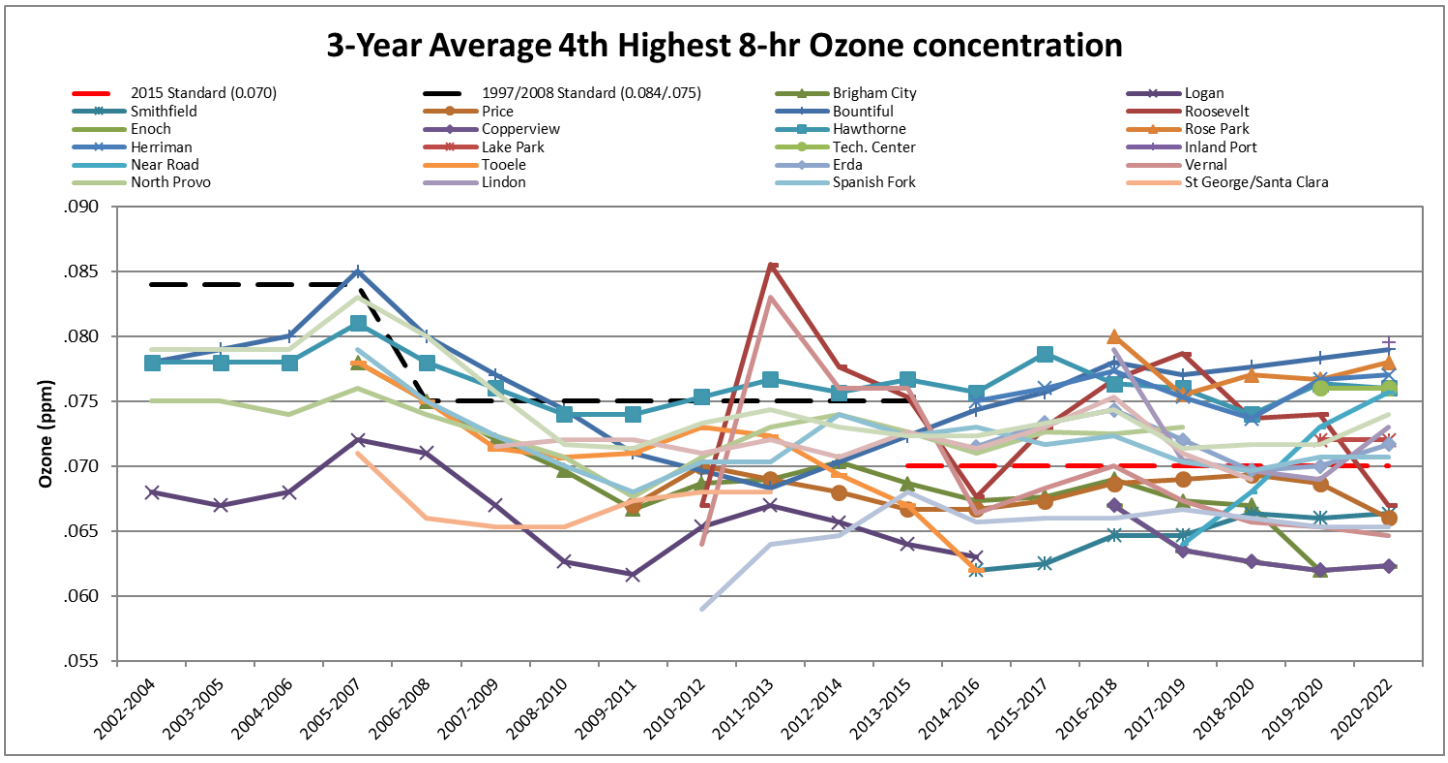


Figure 5: Three Year Average of the 4th Highest Daily Maximum 8-hour Average Ozone

Ozone Updates

On August 3, 2018, the EPA designated three regions of Utah as marginal NAAs for the 2015 NAAQS at 0.070 ppm. These areas include the Northern and Southern Wasatch Front, as well as the Uinta Basin (83 FR 25776).

Northern Wasatch Front Ozone Nonattainment Area

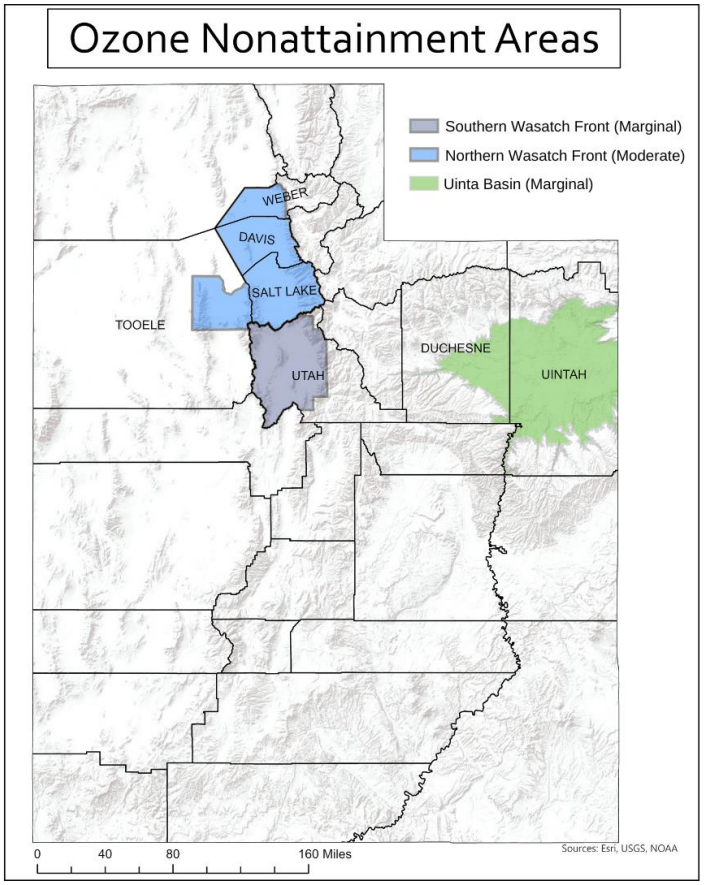


Figure 6: Ozone Nonattainment Areas

The NWF NAA includes all of Salt Lake and Davis counties, as well as portions of Tooele and Weber counties (Figure 6). After its initial designation as a marginal area, the NWF NAA failed to attain the standard by the attainment date of August 3rd, 2021 and was subsequently redesignated to a moderate NAA on November 7th, 2022 (87 FR 60897). As a moderate area, the DAQ is required to develop and submit a SIP showing how the state will reduce ozone forming emissions and meet the standard. This SIP is due on January 1st, 2023, and work demonstrating how the State will meet the CAA requirements that are part of this SIP is ongoing. Given the substantial emission reductions associated with previous $PM_{2.5}$ SIP submissions, a significant challenge facing this SIP development is identifying and implementing a 15% reduction in anthropogenic VOC emissions. Additional ongoing SIP efforts include further development of an area specific photochemical model and substantially refined emission inventories.

Ozone monitoring data collected throughout the summer of 2022 continue to show exceedances of the quality standards in all four of the NWF counties, however the area experienced substantially fewer exceedances than observed during the 2021 season. Data collected during the summers of 2021 and 2022 indicate that the area is unlikely to attain the standard by the moderate attainment date of August 3rd, 2024, and the area is likely to be reclassified to serious nonattainment status, requiring another SIP with more emission reductions.

Due to the complexities of ozone formation, and challenges associated with addressing ozone in the Intermountain West, DAQ plans to focus much of its upcoming research efforts to better understand ozone along the Wasatch Front. These efforts include a better understanding of how wildfire and

biogenic emissions impact ozone formation, the important role of halogen emissions in local ozone formation, as well as an intensive field campaign currently planned for the summer of 2024.

Southern Wasatch Front Ozone Nonattainment Area

The SWF NAA includes the populated regions of Utah County along the Wasatch Front. Monitored data collected during the summers of 2018, 2019 and 2020 show that the area attained the NAAQS of 0.070 ppm by the attainment date of August 3rd, 2021. As a result, the SWF NAA remains classified as a marginal NAA and the state is not required to develop and submit a SIP for this area. However, given the proximity to the NWF and the rate of population growth associated with this area, emission reduction strategies being developed for the NWF NAA SIP could be extended to include the SWF.

Uinta Basin Ozone Nonattainment Area

The UB NAA designated in August 2018 is a unique ozone NAA in many ways. It has a designation area based upon elevation, areas in Uintah and Duchesne County below 6,250 feet above sea level. It is a rural area with a small population, however the geography and weather conditions combined with the presence of significant oil and gas production emissions of VOCs and NO_x, creates occasional high levels of ozone exceeding the standard. These ozone events occur in the winter months during a cold air inversion trapping emissions in the basin with snow on the ground reflecting the UV radiation from the sun creating the radiant energy needed to combine VOC and NO_x to ozone. However, recent reductions in oil and gas production and changing climate have resulted in less incidents of ozone exceedances and allowed the DAQ to request two one-year extensions to the original attainment date of August 3, 2021. The first one-year extension was granted, and it is anticipated that the second one-year extension will be approved thus extending the attainment date to August 3, 2023. This would result in using the monitoring data from 2020, 2021 and 2022 to determine if the area attained the 2015 ozone standard. Though 2022 monitoring data has yet to be certified, it appears that the Uinta Basin has attained the standard and will be able to move into a maintenance status.

Though the area has met the ozone standard, to continue to ensure healthy air quality in the area and support growth of the oil and gas industry DAQ will continue to work on emission reductions. Areas of focus continue to be emissions from storage tanks and natural gas engines that support pumpjacks as the largest contributors to VOC emissions under state jurisdiction. New proposed rules by EPA on methane and VOC emissions associated with new and existing oil and gas production will support emission reductions along with the final Federal Implementation Plan (FIP) for the Uintah and Ouray Indian Reservation just finalized by Region 8. The FIP reflects current standards established by DAQ on state regulated lands, creating parity among the different jurisdictions. With these federal actions and the continued focus of DAQ to work with industry and other stakeholders on solutions to lower emissions there will be continued good air quality and economic growth in the Uinta Basin.

Particulate Matter (PM)

Regulated PM is a complex mixture of extremely small particles of solid or semisolid 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. The coarse fraction of PM_{10}, which is larger than 2.5 microns (one millionth of a meter), 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. $PM_{2.5}$, or fine particulate, is a subset of PM_{10} that measures 2.5 microns in diameter or less. Primary $PM_{2.5}$ is directly emitted into the atmosphere from combustion sources such as black carbon from cars and trucks, and soot from fireplaces and woodstoves. These particles are so small that they can become embedded in human lung tissue, exacerbating respiratory diseases and cardiovascular problems. Other negative effects are reduced visibility and accelerated deterioration of buildings. The majority of Utah’s $PM_{2.5}$ is called secondary aerosol, meaning that it is not emitted directly as a particle, but is produced when gasses such as SO_2, NO_x, and VOCs react with other gasses in the atmosphere, such as ammonia (NH_3), to become tiny particles.

Wintertime temperature inversions not only provide ideal conditions for the creation of secondary aerosols, but 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 $PM_{2.5}$.

NAAQS Standards and Monitored Data

PM_{10}

The EPA established the 24-hour air quality standard for PM_{10} in July 1987 as 150 $\mu g/m^3$, and the standard has been retained after reviews in 1997, 2006, 2012, and 2020. 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.

SIPs 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.

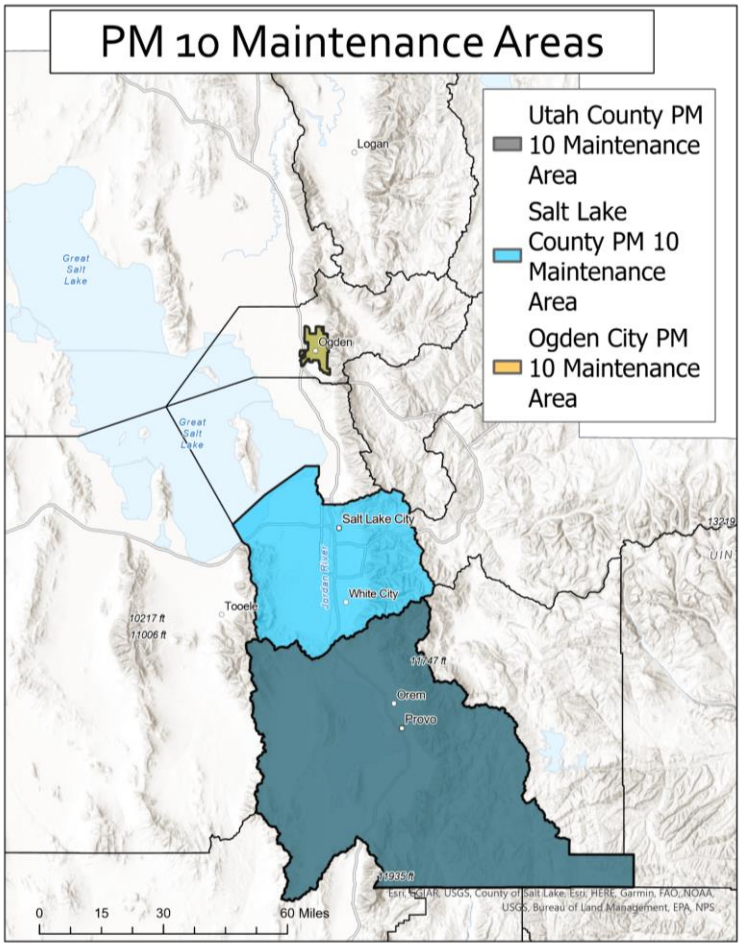


Figure 7: PM_{10} Maintenance Areas

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 14 years, none resulted in a violation of the NAAQS. Figure 8 shows the PM_{10} estimated exceedances at monitored sites in Utah since 2000.

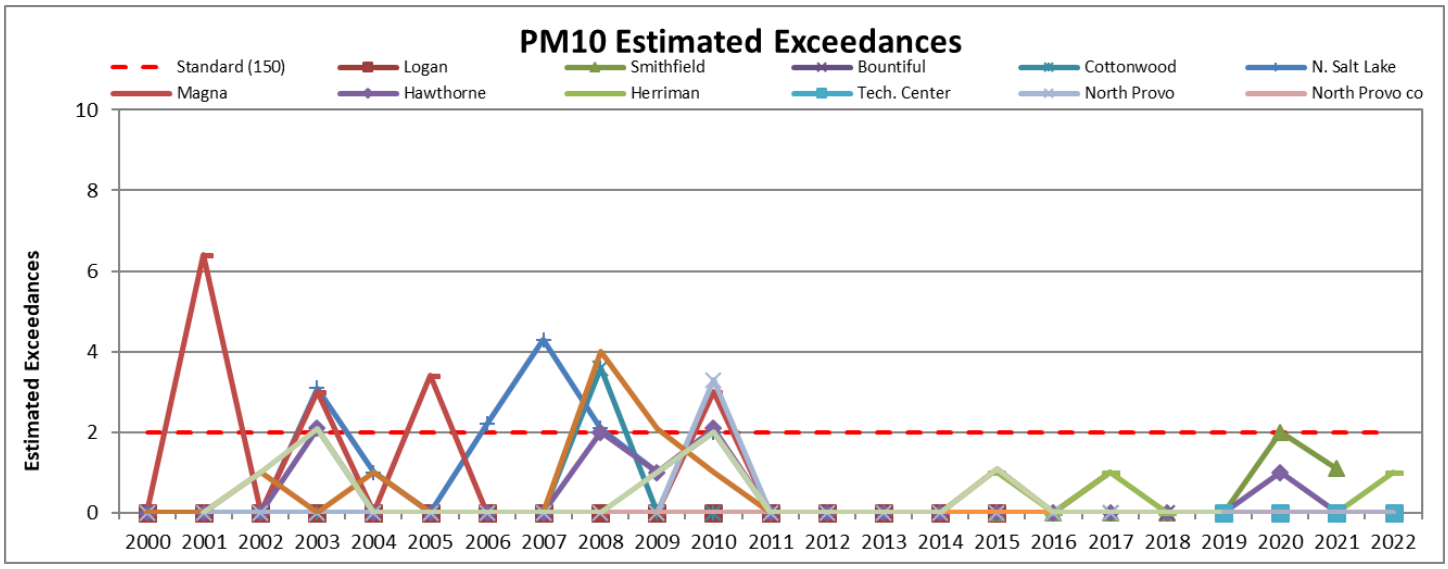


Figure 8: PM_{10} Estimated Exceedances

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

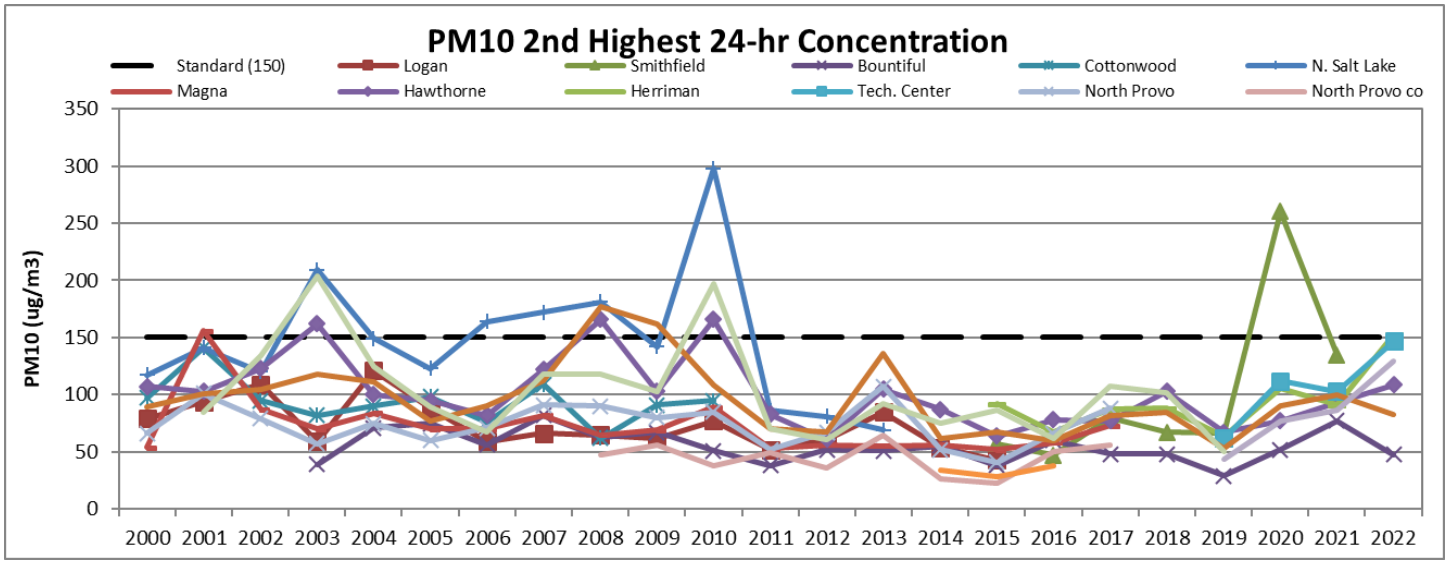


Figure 9: PM_{10} Second Highest 24-Hour Concentration

$PM_{2.5}$

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. The standard is evaluated by averaging 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 the data recorded at a given monitor, such that the values of at least 98 percent of all that data are of a lower concentration.

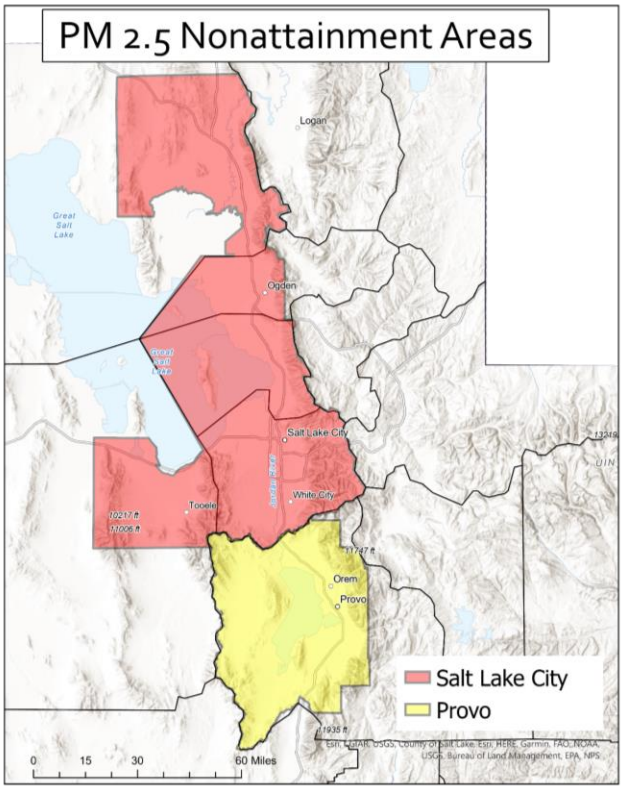


Figure 10: $PM_{2.5}$ Nonattainment Areas

Figure 11 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. The Inland Port monitoring location was not included in the graph as it only has two years of data.

The annual standard is met when the three-year average of annual mean concentrations is no greater than 12µg/m^3. Figures 12 and 13 show that all locations meet the annual standard. Also illustrated in these figures 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.

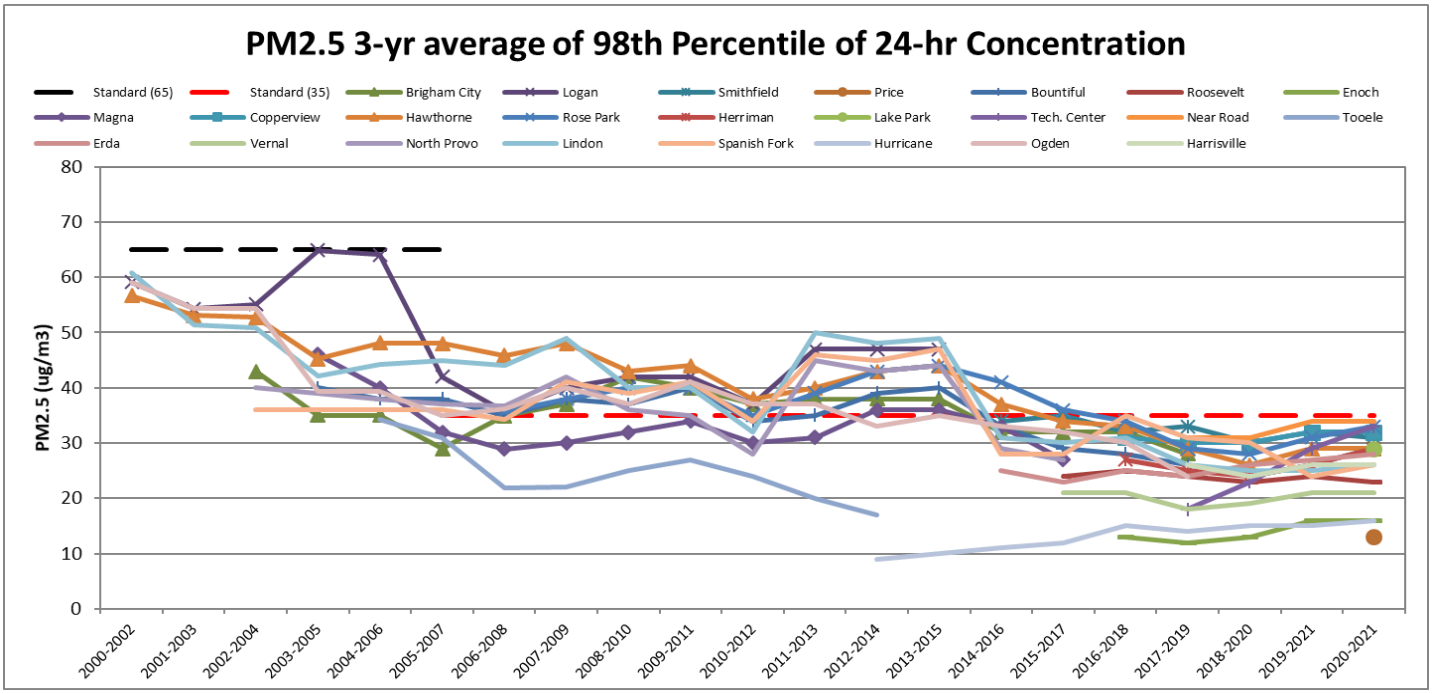


Figure 11: $PM_{2.5}$ Three-Year Average 98th Percentile 24-Hour Concentration

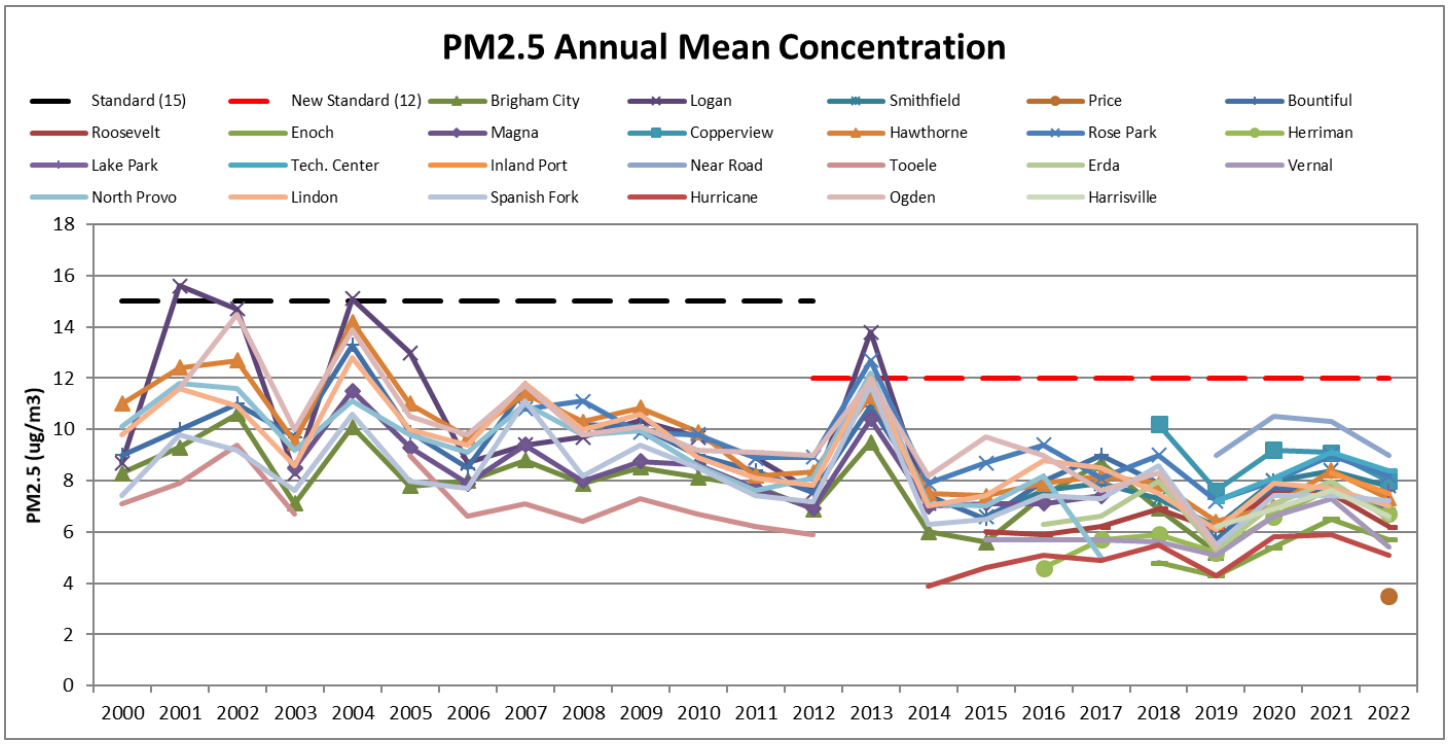


Figure 12: $PM_{2.5}$ Annual Mean Concentration

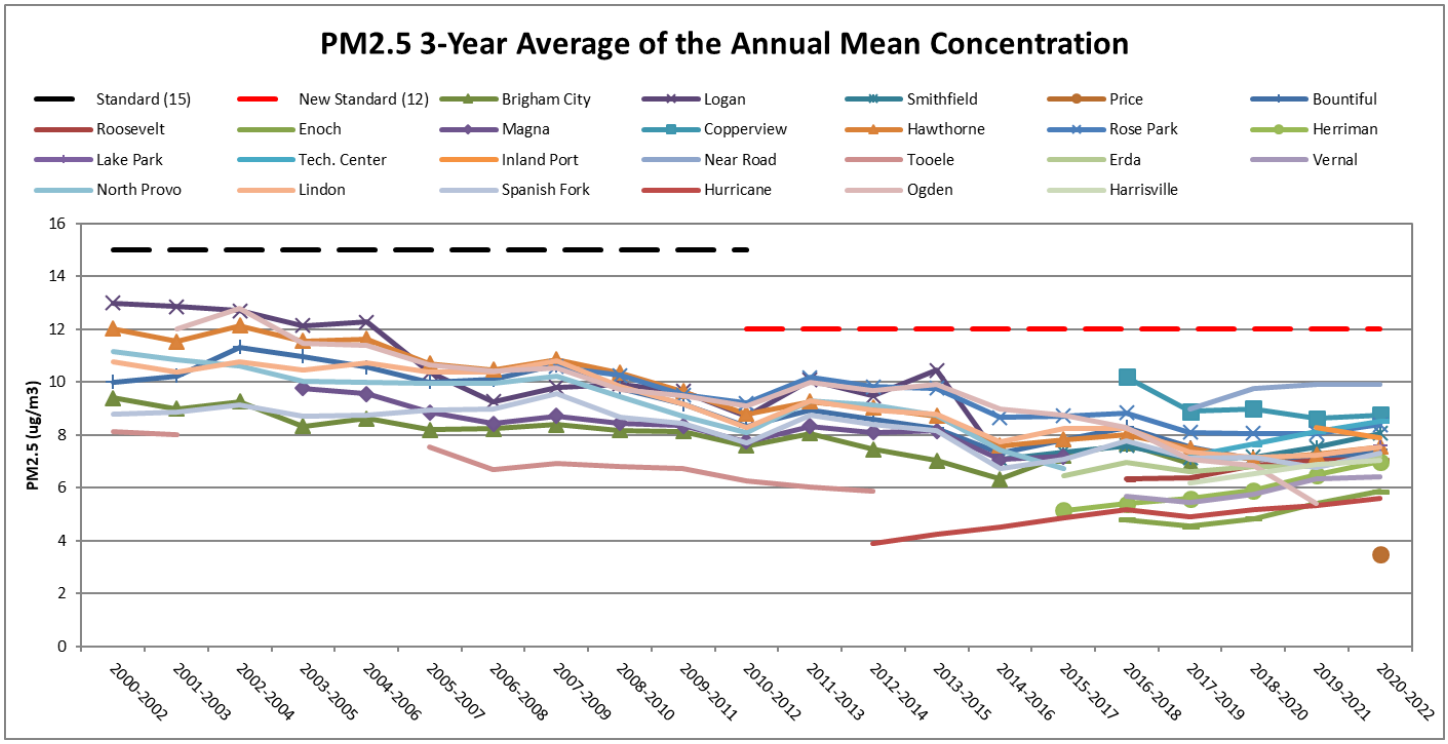


Figure 13: $PM_{2.5}$ Three-Year Average of the Annual Mean Concentration

Particulate Matter Updates

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 µg/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 DAQ 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, and
5. a fully approved maintenance plan.

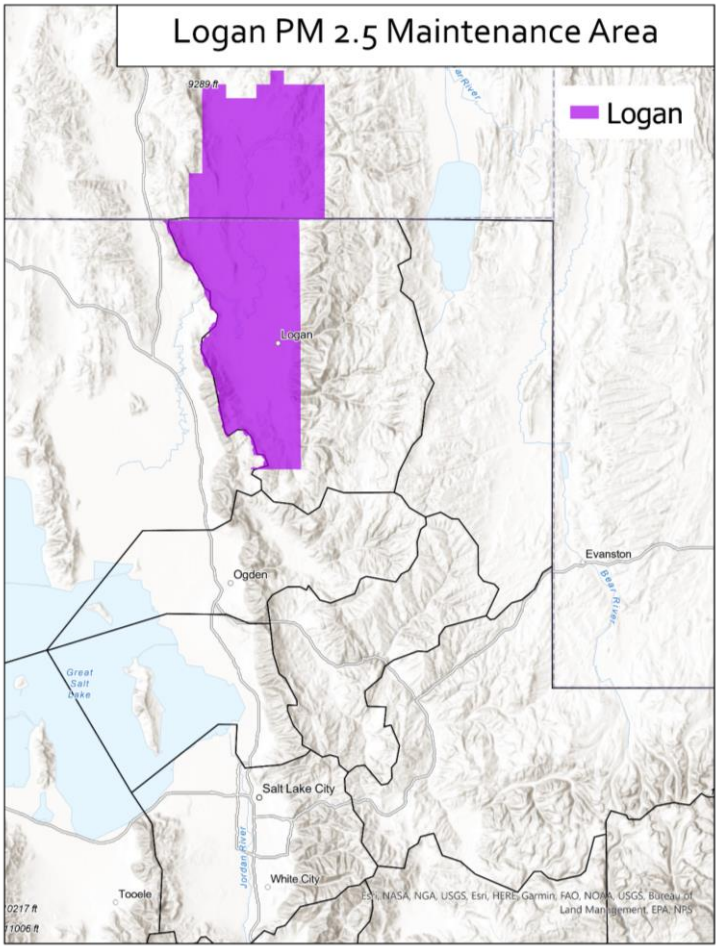


Figure 14: Logan $PM_{2.5}$ Maintenance Area

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, DAQ 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. In November of 2020, the EPA proposed to redesignate the Salt Lake City and Provo $PM_{2.5}$ nonattainment areas to attainment. EPA received adverse comments on the proposal, and EPA and DAQ continue to work through how to address the adverse comments so that the areas can be redesignated to attainment.

Sulfur Dioxide (SO_2)

SO_2 is a colorless gas with a pungent odor. In the atmosphere, SO_2 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 SO_2 in the atmosphere.

NAAQS Standards and Monitored Data

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. 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.

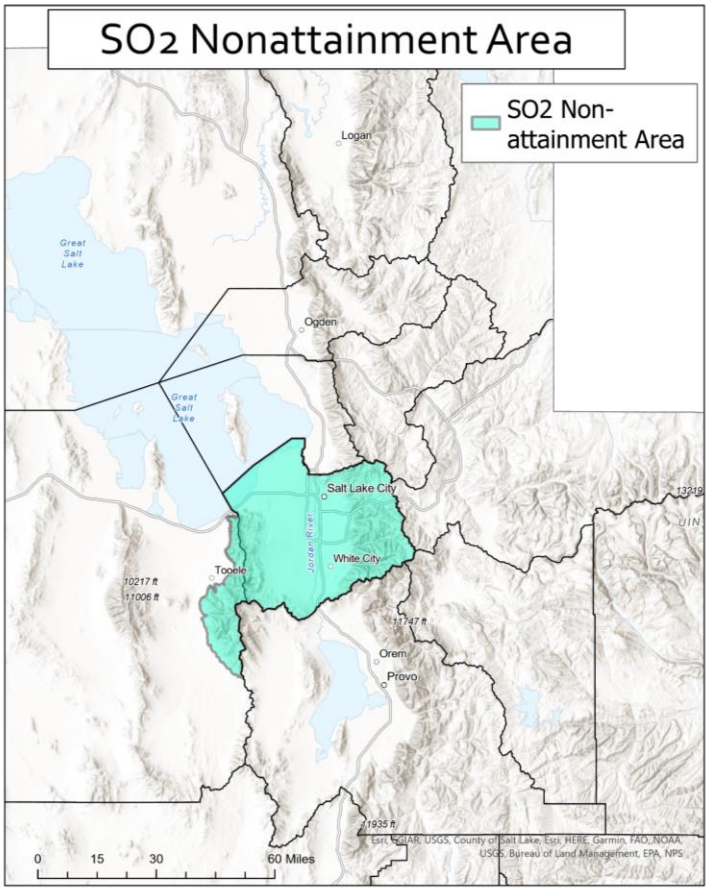


Figure 15: SO_2 Nonattainment Area

Utah submitted an SO_2 Maintenance Plan and redesignation 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 redesignation request. DAQ is currently working with EPA to develop a new maintenance plan and redesignation request to address the 1971 standard. DAQ will conduct modeling and other analyses in 2023 with the goal of submitting an approvable maintenance plan and redesignation request to EPA upon completion.

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. 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 16 shows the most current measurements to compare against the primary SO_2, NAAQS of 75 ppb.

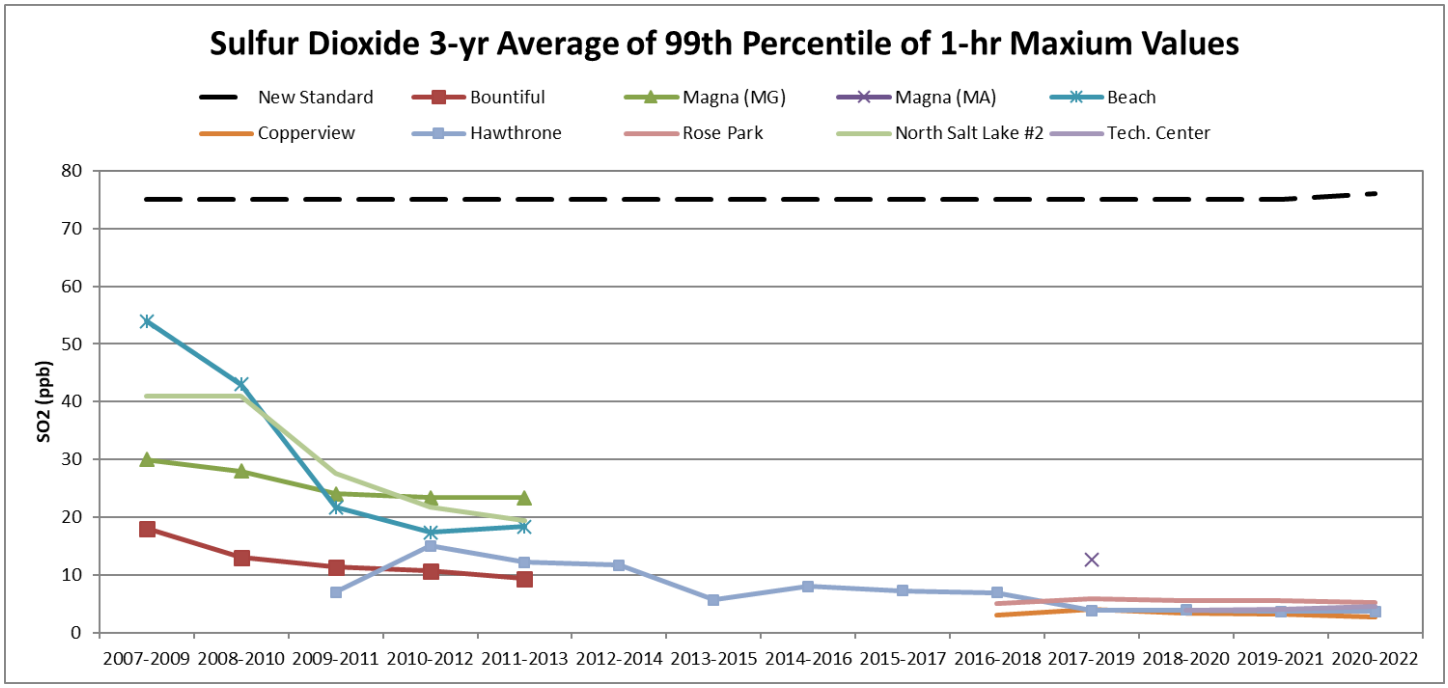


Figure 16: Three Year Average of the 99th Percentile of the Daily Maximum 1-hour Average SO_2

Carbon Monoxide (CO)

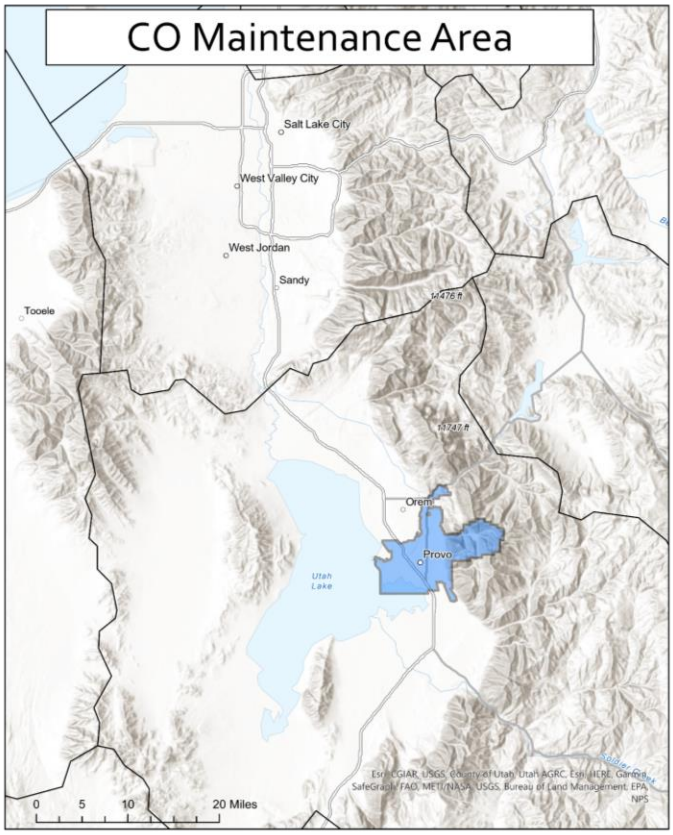


Figure 17: Carbon Monoxide Maintenance Areas

CO is a colorless and odorless gas formed by the incomplete combustion of carbon-based fuels. CO is primarily produced from on-road motor vehicles. Other significant sources of CO 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 CO, the highest concentrations occur during morning and evening rush hours near high-traffic areas. The worst problems occur when there are large numbers of slow-moving vehicles in large parking lots, busy intersections, and traffic jams. Historically, as exhibited in the CAA, it was the EPA's presumption that all elevated CO levels were the result of mobile source emissions, and a state had to go through a rigorous demonstration to prove otherwise. In Utah, areas of elevated CO concentrations were typically found near roadways. CO 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 CO and other pollutants.

NAAQS Standards and Monitored Data

The EPA has developed two NAAQS for CO. They are 35 ppm of CO averaged over a one-hour period, and 9 ppm of CO averaged over an eight-hour period. A violation of the NAAQS occurs with the second exceedance of either standard at a single location in a calendar year. Once a location is in violation, it is designated as nonattainment.

Three cities in Utah (Salt Lake City, Ogden, and Provo) were at one time designated as nonattainment areas for CO. Due primarily to improvements in motor vehicle technology, Utah has been in compliance with CO standards since 1994 (Figure 18 and Figure 19). 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 CO until 2026.

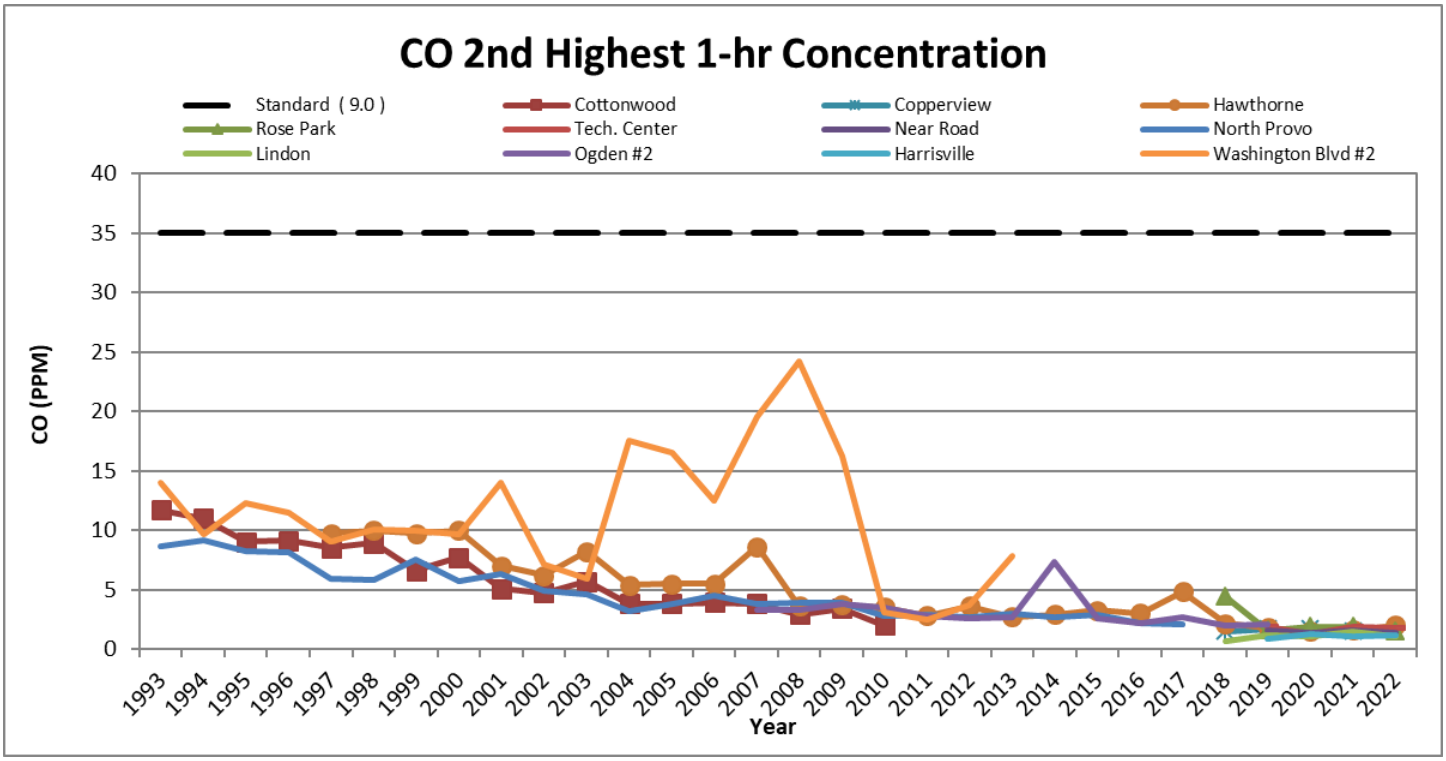


Figure 18: Carbon Monoxide Second Highest 1-Hour Concentration

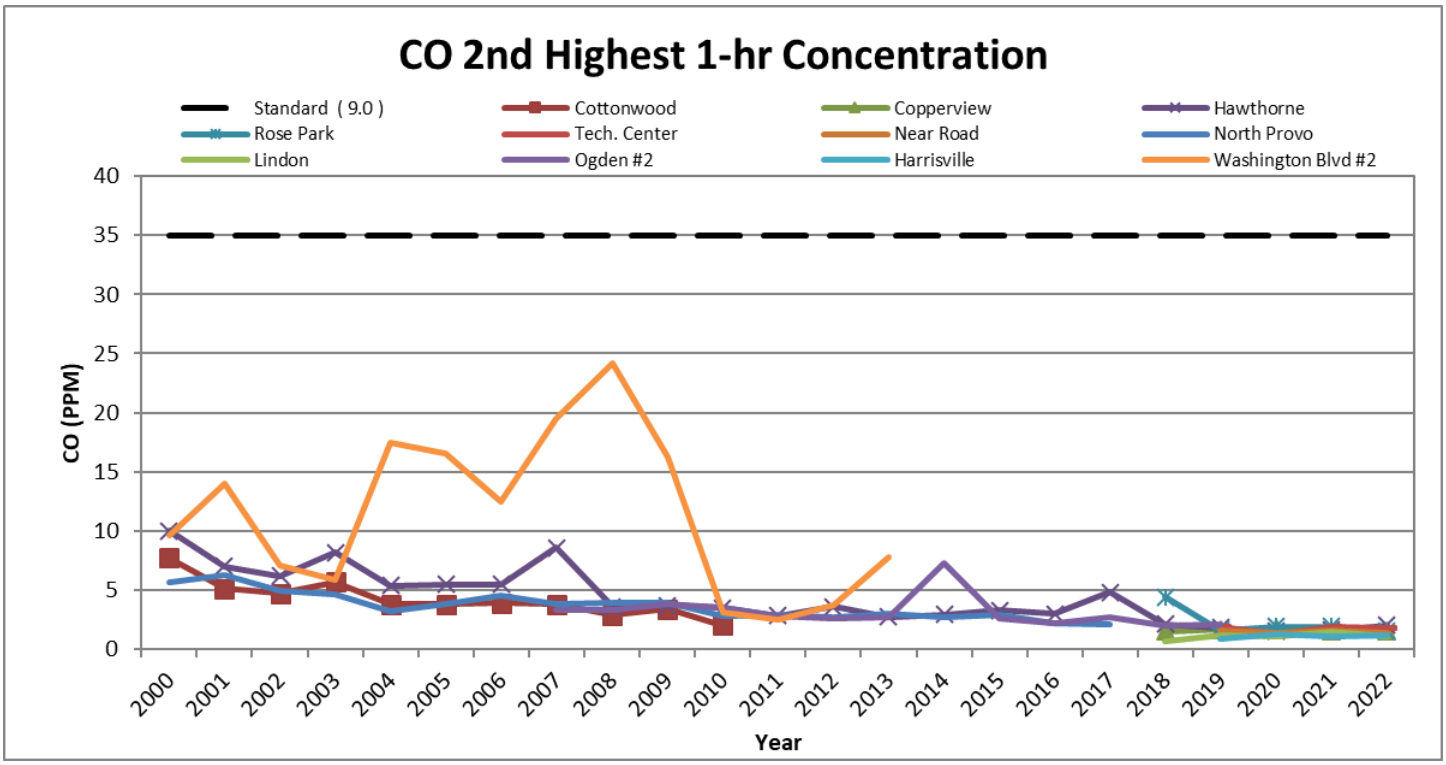


Figure 19: Carbon Monoxide Second Highest 8-Hour Concentration

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 VOCs lead to the formation of ground-level ozone. In the winter, NO_2 can undergo a series or reactions to form nitric acid which then reacts with NH_3 to form $PM_{2.5}$. Both seasonal scenarios can result in increased pollution and violations of the NAAQS. Utah continues to have difficulty with both the ozone and PM standards; and because of this, the DAQ is mindful of the trend in NO_2 concentrations as illustrated in Figure 20.

NAAQS Standards and Monitored Data

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 21. The DAQ monitors the concentrations of NO_2 at various locations throughout the state.

As shown in these figures, Utah has never exceeded the standards for NO_2.

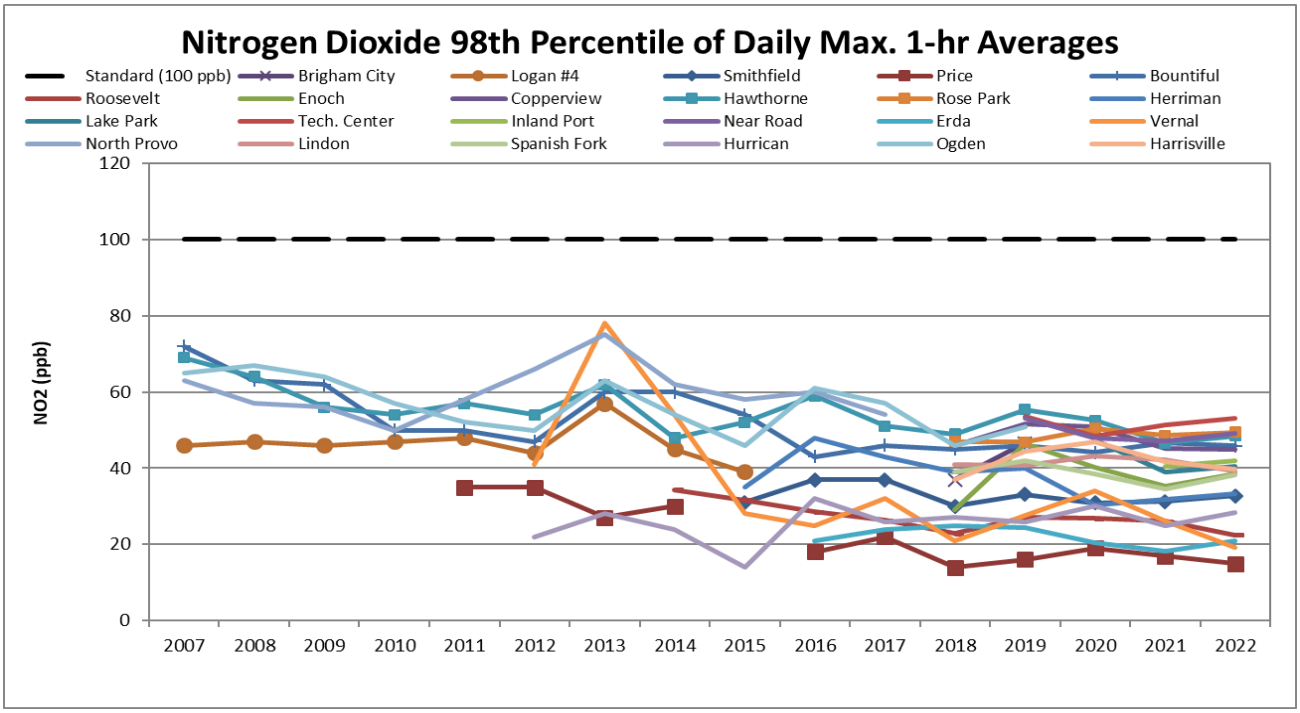


Figure 20: NO_2 98th Percentile of Daily Max 1-hr Averages

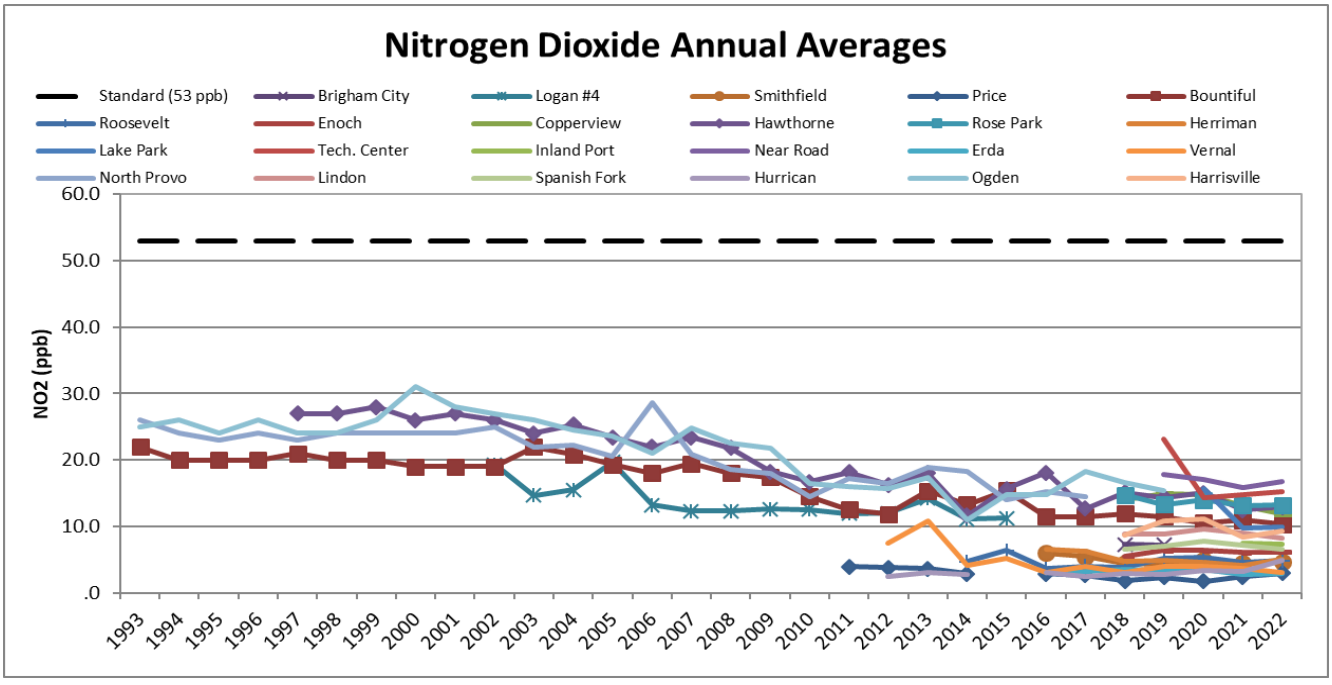


Figure 21: NO_2 Annual Averages

Lead (Pb)

Lead in the ambient air exists primarily as PM 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.

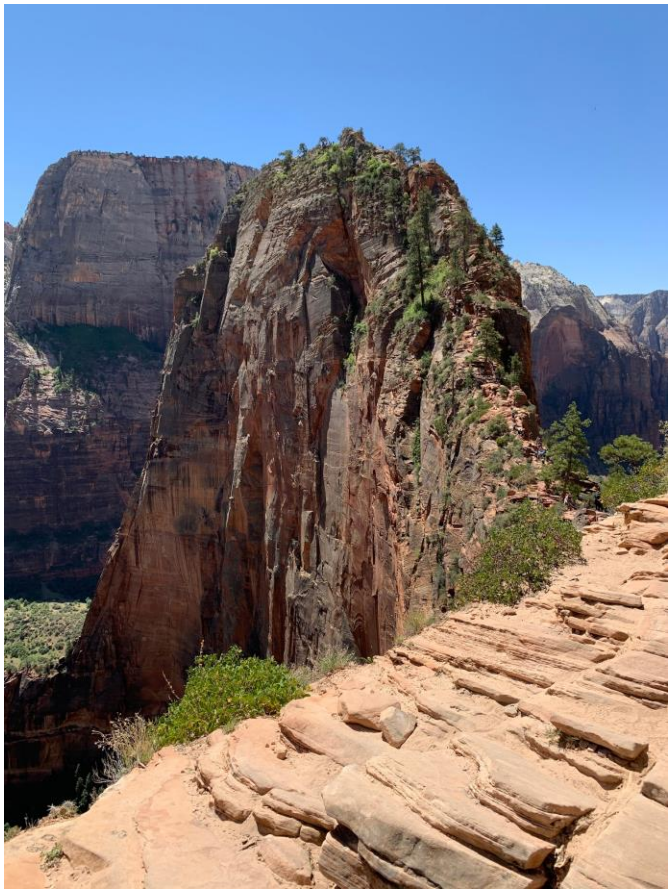
Utah has not exceeded the health standard for lead since the late 1970s, and the EPA authorized the discontinuation of lead monitoring in Utah in 2005; however, in both 2008 and 2010, the EPA set new monitoring requirements for lead, and the DAQ resumed monitoring in 2010.

NAAQS Standards and Monitored Data

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, measured as a three-month rolling average. The new standard included a new monitoring requirement, so the DAQ began lead monitoring again at the Magna station near the Kennecott copper smelter. 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.

Regional Haze

The Regional Haze Rule requires Utah to address regional haze in each mandatory Class I Area (CIA) located within Utah and in each mandatory CIA located outside Utah that may be affected by pollutants emitted from sources within Utah. The objectives of the Regional Haze Rule 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. More information on Utah's regional haze history can and current developments can be found here.



Regional Haze Updates

DAQ's Second Implementation Period Regional Haze SIP revision was adopted by the Air Quality Board on July 6, 2022 and submitted to the EPA on July 26, 2022. In this revision, DAQ used an emission over distance analysis to determine which facilities had the highest potential visibility impact on Utah's CIAs and control potential. These facilities include the Ash Grove Cement Company Leamington Cement Plant, the Graymont Western US Inc. Cricket Mountain Plant, the PacifiCorp Hunter and Huntington Plants, the Sunnyside Cogeneration Associated Sunnyside Cogeneration Facility, and the US Magnesium LLC Rowley Plant. DAQ required each facility to conduct a four-factor analysis of the following criteria: 1) cost of compliance, 2) time necessary for compliance, 3) energy and non-air quality environmental impacts, and 4) remaining useful life.

As a result, DAQ identified several existing measures necessary for reasonable progress, including federal on-road and non-road vehicle and equipment standards, Best Available Control Measures and Best Available Control Technology included in the recently completed Serious Area $PM_{2.5}$ SIP for the Salt Lake Nonattainment Area, as well as the following first implementation period regional haze controls:

- Existing NO_x control rate-based limits and Hunter power plant
- Existing NO_x control rate-based limits and Huntington power plant
- Existing SO_2 limits for Hunter power plant (Section 309 control added to SIP in round 2)
- Existing SO_2 limits for Huntington power plant (Section 309 control added to SIP in round 2)
- Closure of the Carbon power plant

DAQ also identified and included the following existing control measures to ensure ongoing enforceability in the second implementation period:

- Ash Grove Cement Company - Leamington Cement Plant
- Graymont Western Midstream LLC - Lisbon Natural Gas Processing Plant
- Sunnyside Cogeneration Associates - Sunnyside Cogeneration Facility
- US Magnesium LLC - Rowley Plant
- Intermountain Power Service Corporation - Intermountain Generation Station

Finally, DAQ identified and included the following new control measures as necessary for reasonable progress:

- A plantwide enforceable mass-based NO_x limit on Hunter power plant
- A plantwide enforceable mass-based NO_x limit on Huntington power plant
- Installation of Flue Gas Recirculator on the US Magnesium Rowley Plant Riley Boiler
- An enforceable closure date for Units 1 and 2 of the Intermountain Generation Station.

Division Organization

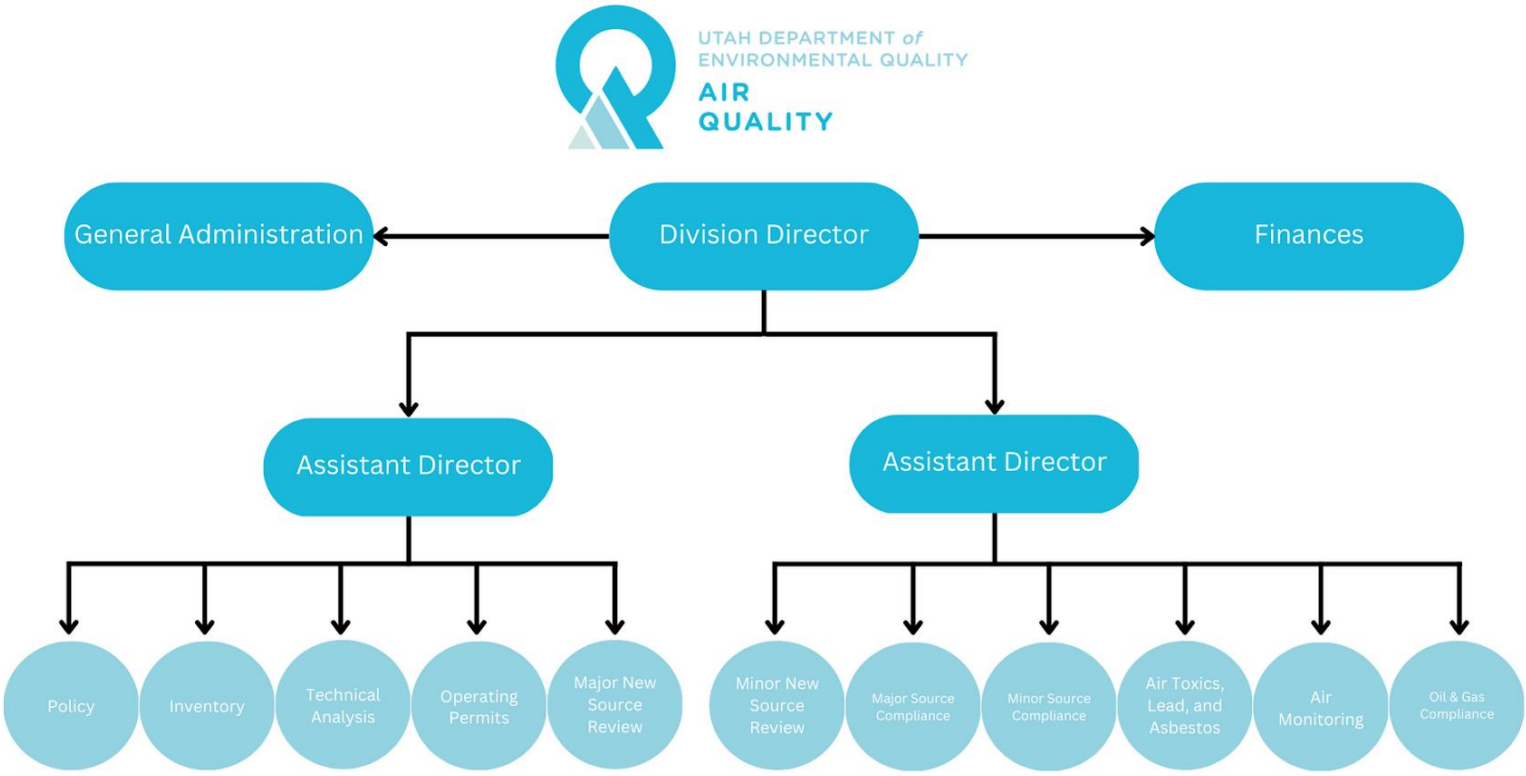


Figure 22: Division of Air Quality Organization

Permitting Program

The DAQ Operating Permit Section, Major New Source Review Section, and Minor New Source Review Section are responsible for implementing state and federal air permitting programs that are intended to control air emissions from new and modified stationary sources.

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 division issues two types of permits. New Source Review (NSR) permits, also known as AOs, are pre- construction- type permits for new and modified sources of air emissions. These are issued by the NSR Sections and have been required in Utah since 1969.

The 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 75 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 DAQ permitting sections process several smaller actions such as de minimis 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, a 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 emission 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 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 DAQ NSR Sections recently implemented a review of the AOs to stationary sources that were issued over 10 years and older. Any new rules that now apply to the stationary source are highlighted in the permit. The contact information is also updated in the permit to assist in contacting the source in the future. Any grammatical or typographical errors are also corrected. These reviews allow DAQ to update the permitting database with updated emission estimates and permitted equipment. These updates allow DAQ to pull accurate data and reports from the database to assist in air quality planning efforts.

The DAQ also developed a permitting dashboard to track the NOI applications through the permitting process in near real-time. The dashboard provides transparency for the public and allows the regulated sources to view the permitting process flow for each project. The dashboard includes contact information, a flow chart of the permitting process and where the project currently is in the process. The permitting dashboard improves communication between permitting engineers, the regulated community, and the public.

Operating Permits (Title V)

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 Title V 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, National Emission Standards for Hazardous Air Pollutants, and Maximum Available Control Technology.

The 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 and any other new requirements (such as new Maximum Available Control Technology Standards) are included.

The Operating Permits Section reopened many of the Utah Title V landfill permits this year to incorporate the Landfill Federal Plan 40 CFR 62 Subpart OOO. Utah currently permits 12 landfills and many of them were required to be updated. Utah will develop a state plan in the future at which point these landfills will be reopened to switch over to the state plan requirements.

Compliance Program

The Compliance Program comprises four sections: Major Source Compliance, Minor Source Compliance, Minor Source Oil and Gas and Air Toxics, Lead-Based Paint (LBP), and Asbestos (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, plan and report reviews, accreditation and certification programs, compliance assistance/outreach activities, and, when necessary, enforcement actions.

Major, Minor and Minor Oil & Gas Source Compliance

The Major, Minor, and Minor Oil & Gas 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, open burning, and any associated enforcement. The Minor Oil & Gas Compliance Section is responsible for inspections and report/plan reviews at oil and gas related facilities, audits, stack tests and gasoline transport/filling station vapor recovery.

Table 4: 2022 Major, Minor, and Minor Oil and Gas Source Compliance Summary

Major & Minor Compliance	Count
Source Inspections	720
On-Site Stack Test/CEM Audits	41
Stack Test/CEM Reviews	461
Emission Reports Reviewed	193
Temporary Relocations Accepted	91
Fugitive Dust Control Plans Accepted	1634

Soil Remediation Report Reviews	31
Open Burn Permit Application Completed Online	7192
Misc. Inspections	202
Complaints Received	221
Wood Burning Complaints	27
Breakdown Reports Received	11
Compliance Actions Resulting from a Breakdown	0
VOC inspections	0
SCAN/Warning Letters	34
NOV's	3
Compliance Advisories	58
No Further Action Letters Issued	34
Settlements	15
Penalties assessed	$3,734,888.50
Total Inspections	963

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

ATLAS determines compliance with multiple regulations involving asbestos and LBP. ATLAS is responsible for the following programs:

Lead-Based Paint

Title IV, 40 CFR Part 745 and UAC R307-840, 841, and 842. Under this program, ATLAS performs regulatory oversight 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 5: 2022 ATLAS Activity Summary Table

Activity	Count
Asbestos Demolition/Renovation NESHAP Inspections	167
Asbestos AHERA Inspections	149
Asbestos State Rules Only Inspections	28
Asbestos Notification Forms Accepted	1629
Asbestos Telephone Calls	4036
Asbestos Individuals Certifications Approved	865
Asbestos Company Certifications/Re-Certifications	26/72
Asbestos Alternate Work Practices Approved/Disapproved	41/0
LBP Inspections	7
LBP Notification Forms Approved	10
LBP Telephone Calls	515
LBP Letters Prepared and Mailed	60
LBP Courses Reviewed/Approved	9
LBP Course Audits	4
LBP Individual Certifications Approved	190
LBP Firm Certifications	88

Notices of Violation Sent	0
Compliance Advisories Sent	73
Warning Letters Sent	35
Settlement Agreements Finalized	9
Penalties Agreed to	$20,675.00

Small Business Environmental Assistance 507 Program (SBEAP)

The CAA 507 Programs consist of three parts: A Small Business Ombudsman to act as an advocate for small business, a 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 annually.

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 or payment to the DEQ Environmental Mitigation Fund may be used to offset a portion of any cash payments for stipulated penalties. All collected cash 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, or payment to the DEQ Environmental Mitigation Fund to offset a portion of any cash payments for stipulated penalties. All collected cash 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 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.

Emissions Inventories

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 data is used for SIP planning purposes as well as to meet EPA inventory reporting requirements. 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. Inventories entirely collected by the state (such as the point source inventory) are generally available two years following the year of collection, however, inventories dependent on EPA-controlled calculations are available an additional six months later. For example: the 2020 point inventory is collected in 2021 and will be available in 2022 and area and mobile NEI inventories will be available in early 2023. 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.

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. 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 traveled, 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 6: 2017 Triennial Inventory 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 6: 2017 Triennial Inventory

2017 Triennial Inventory (tons/year)						
County Name	**CO**	**NO_x**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**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.

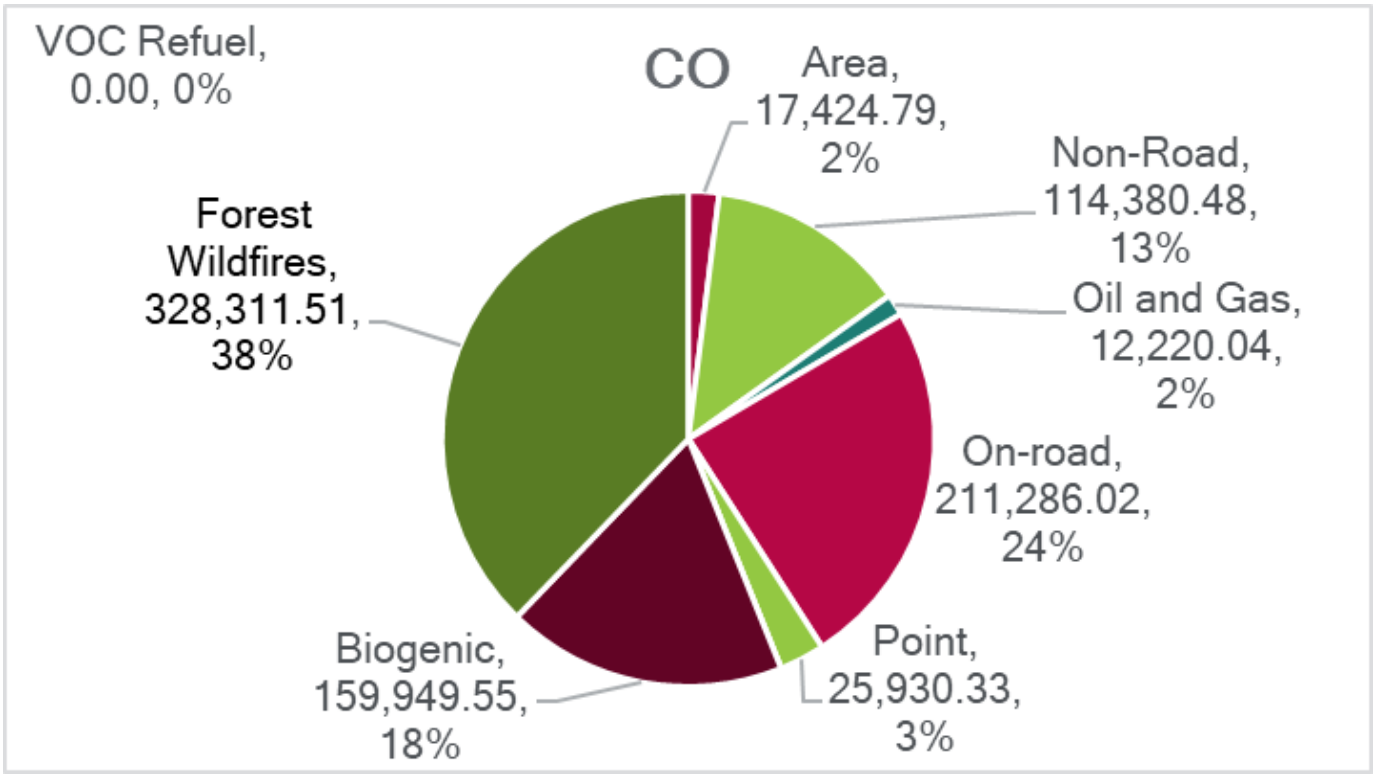


Figure 23: CO Triennial Emissions Inventory

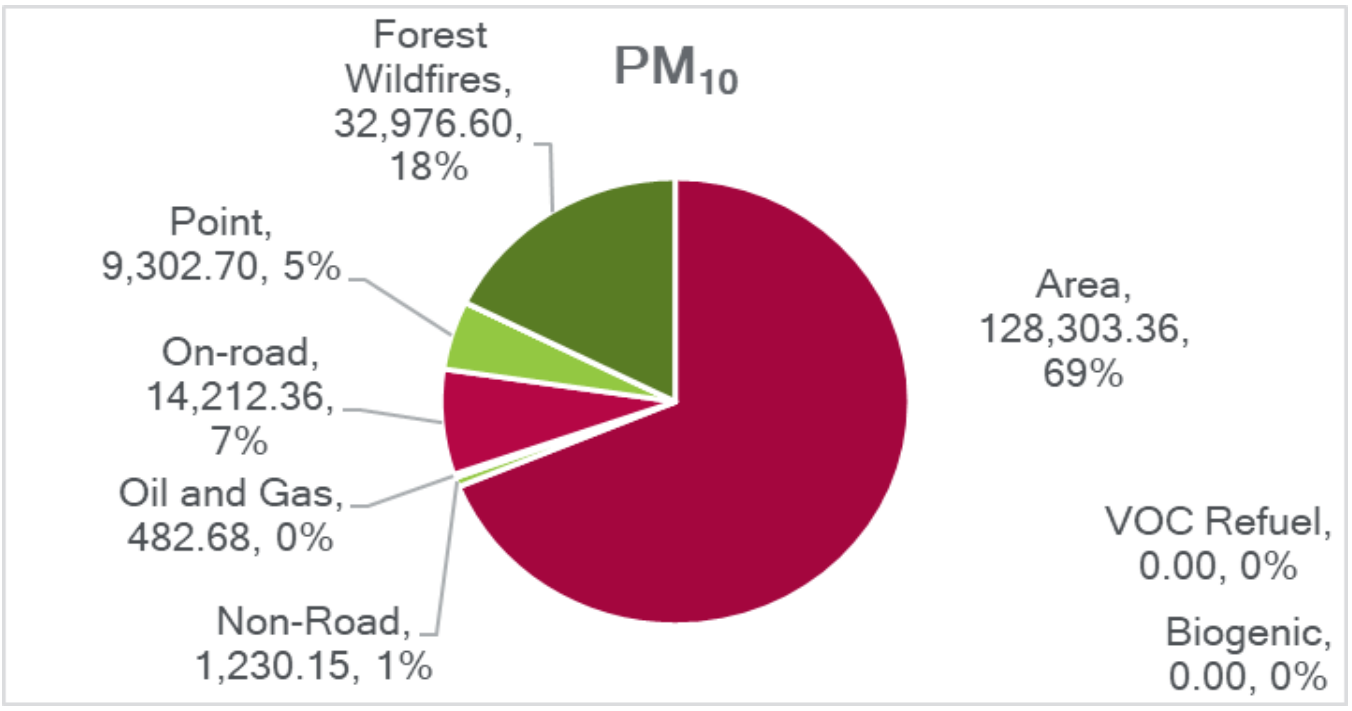


Figure 24: PM10 Triennial Emissions Inventory

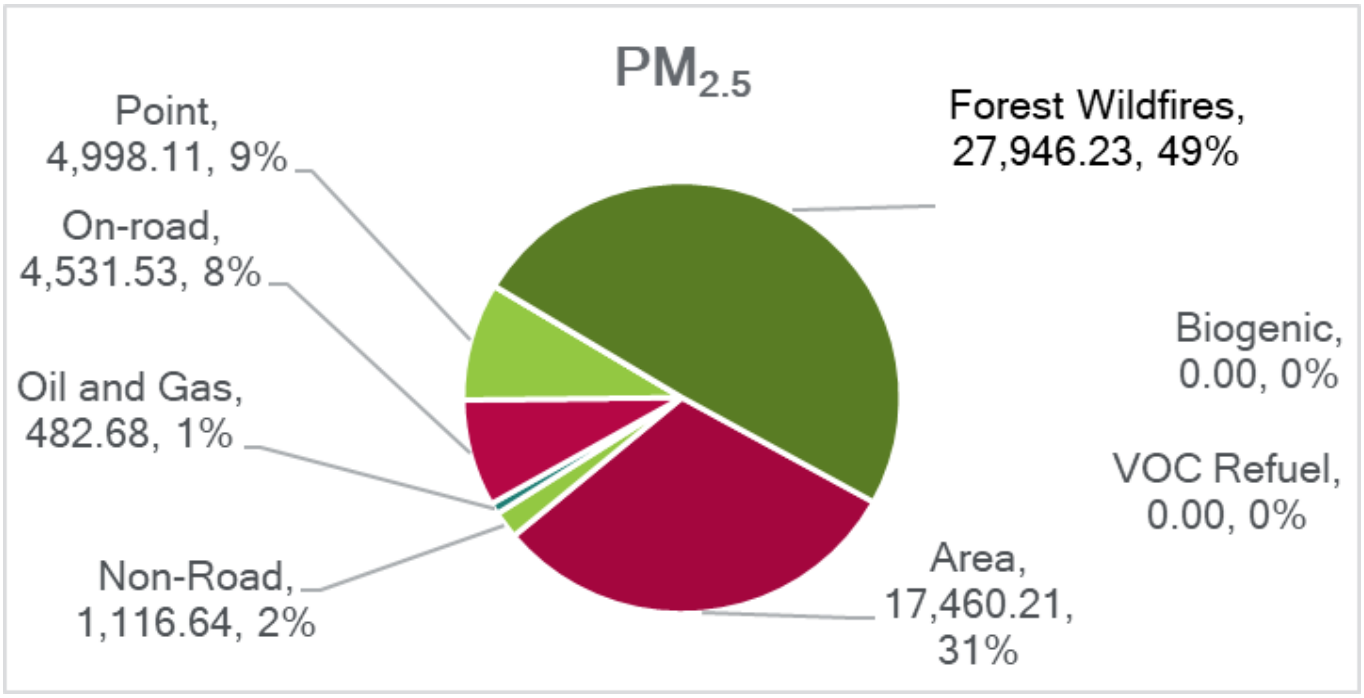


Figure 25: PM2.5 Triennial Emissions Inventory

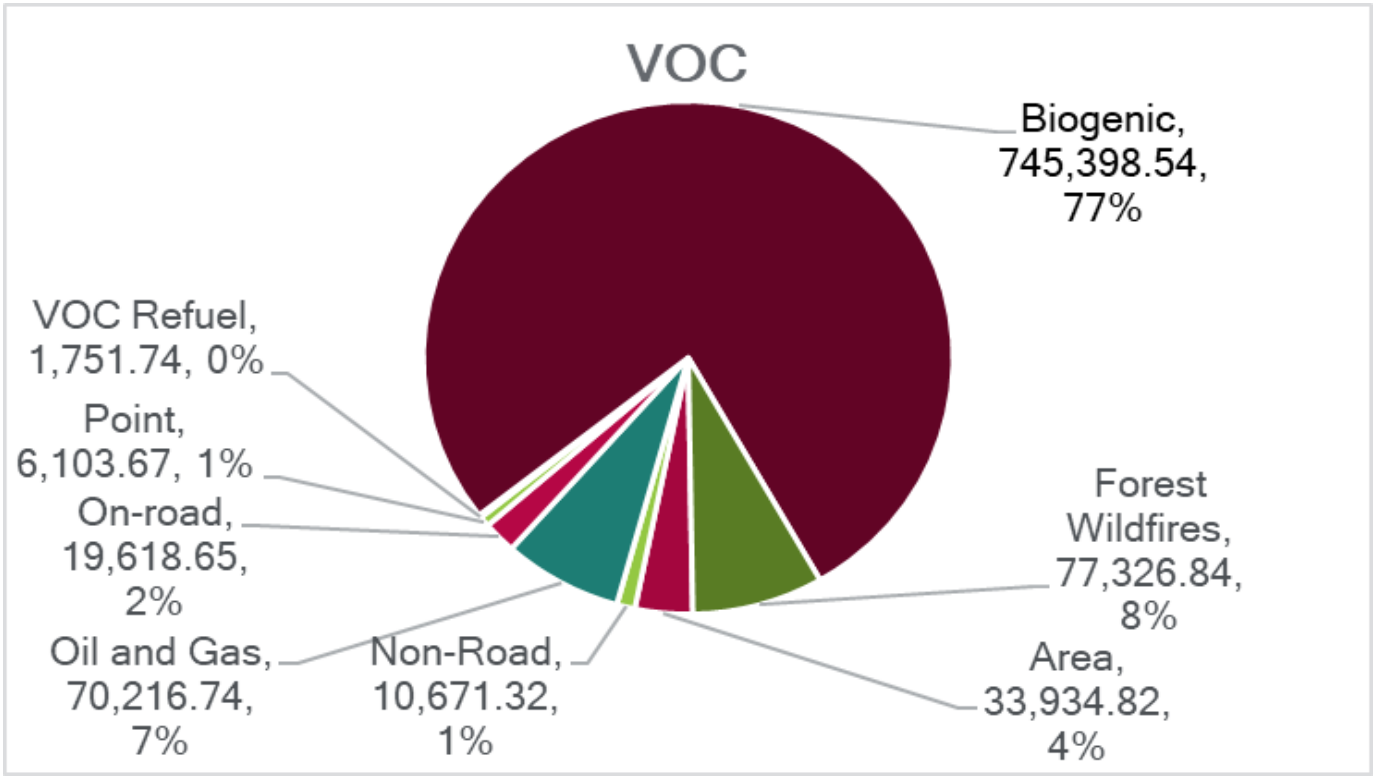


Figure 26: VOC Triennial Emissions Inventory

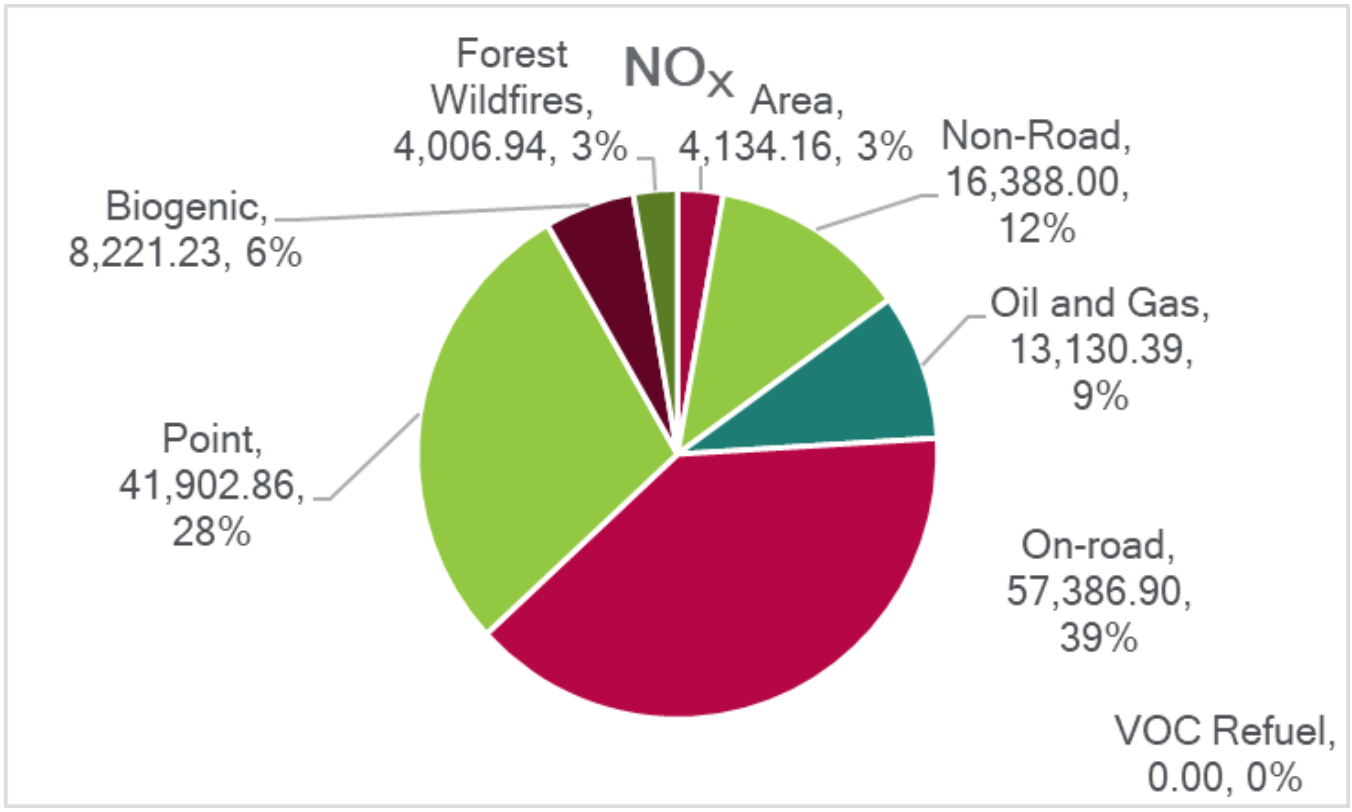


Figure 27: NO_x Triennial Emissions Inventory

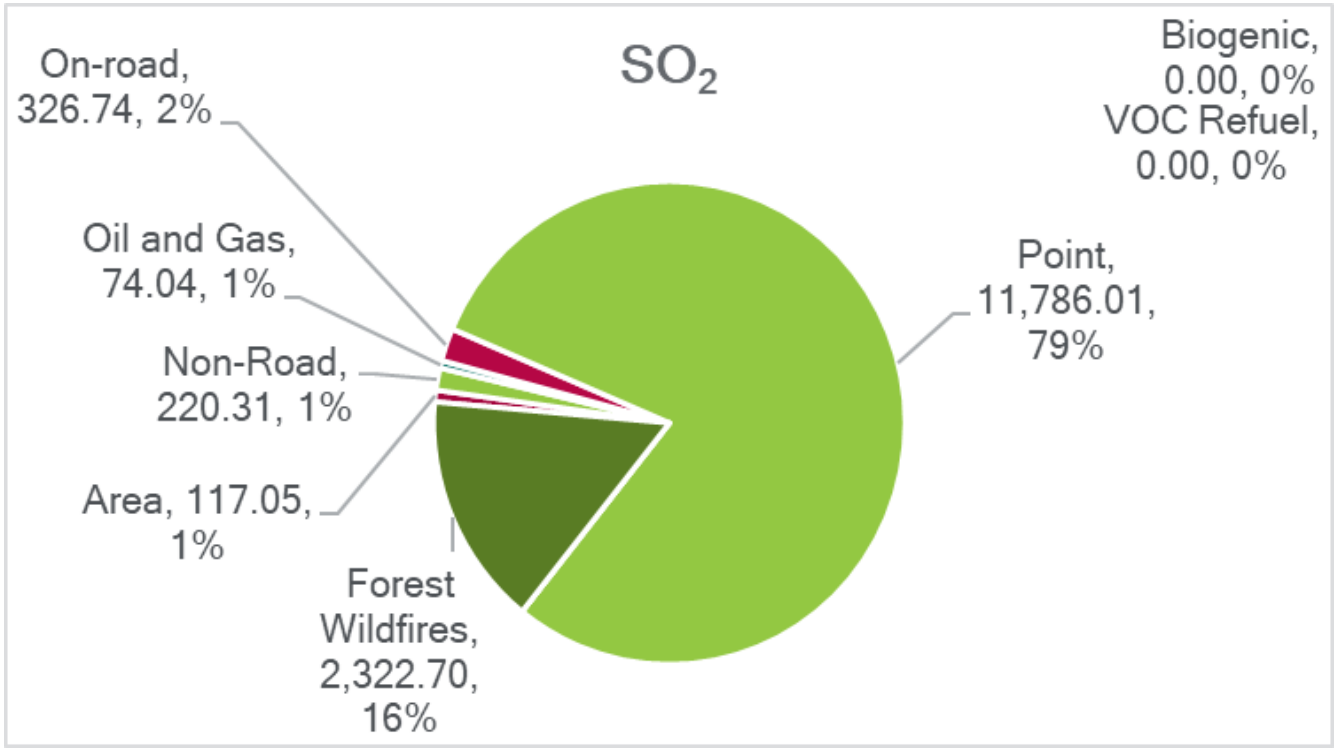


Figure 28: SO2 Triennial Emissions Inventory

Air Quality Modeling

The Technical Analysis Section uses advanced air quality models to prepare attainment demonstrations for SIPs and to meet other federal regulatory requirements. Using computer models, advanced data visualization and statistical techniques, the modeling team evaluates the impacts of control strategies as well as new and existing sources of air pollution on air quality in Utah's nonattainment areas. The modeling work also helps improve our understanding of the coupling between source emissions, meteorology, and chemistry, all of which are drivers of air pollution formation in Utah valleys. Findings from this work help us better understand past and current pollution episodes and better predict future pollution events. The modeling team is committed to continued improvement of their technical expertise and skillset. The team uses available air monitoring data, most recent model developments, sophisticated analysis methods and programming languages, and findings from projects funded through DAQ's "Air Quality Research" program to inform and continually improve the air quality modeling platform. This includes refining emission inventories, meteorological processes, and chemistry pathways. The team also works closely with local researchers, the EPA, and model developers to further refine the air quality models they use to better predict air pollution episodes and identify effective regulatory control strategies.

Air Quality Research

Federally funded research projects and initiatives

DAQ has a history of applying for and successfully obtaining competitive federal grant awards to improve our understanding of air pollution formation, monitor levels of air toxics and criteria pollutants, and conduct public outreach in impacted communities. Findings from these projects support the development of targeted regulations to help meet federal air quality standards and help track changes in air toxic levels and their impact on local air quality and nearby communities. Projects currently funded through federal grants are described below. For detailed information about DAQ's applied air quality research projects, please visit our website here.

Current projects

Ambient Monitoring and Health Risk Assessment of Ethylene Oxide from Medical Sterilization Facilities

In 2016, the EPA updated the toxicity value for EtO - an air toxic pollutant - increasing its cancer risk potency through inhalation by 30-60 times. Medical device sterilization facilities are one of the few quantified point sources of EtO, and Salt Lake County has two of these facilities. EPA modeling found that over 500 Sandy residents were being exposed to levels of EtO that increased their lifetime cancer risk. DAQ was awarded EPA funding to estimate the potential health risk from exposure to EtO in communities near these facilities through actual measurements and additional modeling. For

this project, DAQ monitored EtO at 16 sampling sites near the two medical sterilization facilities in Salt Lake County. DAQ also monitored EtO at background locations such as near freeways, rural areas, and industrial/residential areas. 24-hour measurements of EtO were collected every three days at these locations during two periods: January-March and July-August 2022. Locations for EtO measurements were carefully chosen based on DAQ air dispersion modeling using source-specific emissions information. Preliminary results show greater concentrations and cancer risk close to the facilities compared to background locations.

During the project, DAQ participated in a collaborative community outreach effort that included representatives from EPA, Sandy City, Salt Lake County, and the Utah Department of Health and Human Services. Information on how ethylene oxide impacts the health of local residents and actions that are taken to reduce that risk was shared through public community meetings. A final report that details the study's findings will be made available in 2023.

Although stricter EPA emissions standards for medical sterilization facilities won't be official for many years, both medical sterilization facilities in Salt Lake County have committed to installing additional fugitive emission controls as early as 2023. These controls will significantly reduce risk from exposure to EtO.

Upcoming projects

Recently, DAQ received two EPA enhanced community monitoring grant awards. These two grants are funded via the federal American Rescue Plan and Inflation Reduction Act. The objective of these grants is to enhance air quality monitoring in and near underserved communities, enable communities to monitor their own air quality, and promote air quality monitoring partnerships between communities and state/local governments. These two grant awards bring a total of $784,587 to DAQ. Each grant award will fund one project. Work on these two projects will start Spring of 2023. These projects are detailed below:

Addressing Air Pollution Inequities in the Salt Lake Valley through Community-Engaged Particle Monitoring

DAQ will be partnering with Dr. Kerry Kelly (University of Utah) to expand $PM_{2.5}$ and PM_{10} monitoring around the Great Salt Lake, Inland Port, and Beck Street areas in the Salt Lake Valley. DAQ and Dr. Kelly will develop community specific $PM_{2.5}$ and PM_{10} assessments, identify air pollution hotspots, and provide communities with localized real-time pollution measurements. For this study, forty $PM_{2.5}$ and ten PM_{10} sensors will be deployed in underserved communities located on the west side of Salt Lake City. The data from these sensors will inform real-time $PM_{2.5}$ and PM_{10} visualizations and maps that will be made available through a public-facing website. This effort will increase community awareness on air quality challenges related to PM.

Combining Community Partnerships and Mobile Monitoring to Address Inequities in Exposure to Hazardous Air Pollutants (HAPs) along Utah's Wasatch Front

For this project, DAQ will be expanding VOC monitoring in underserved communities along the Northern Wasatch Front. DAQ will assess VOC variability at the neighborhood-level, identify VOC emission hotspots, and assess changes in VOC levels over time. VOC emissions not only contribute to ozone pollution, but high levels of VOCs can be toxic. DAQ will conduct neighborhood-level mobile monitoring for two-week periods every six weeks for three years. For each period, DAQ will focus on one region and repeat mobile routes at different times of day. Mobile routes will be designed following feedback from local communities. This effort will provide localized VOC measurements that will be used to develop interactive maps that can be used to inform impacted communities. DAQ will be partnering with UCAIR for this project.

State funded research projects and initiatives

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.

Current Projects

Three air-quality research projects were funded for fiscal year (FY) 2023 by the state legislature through the Science for Solutions Research Grant:

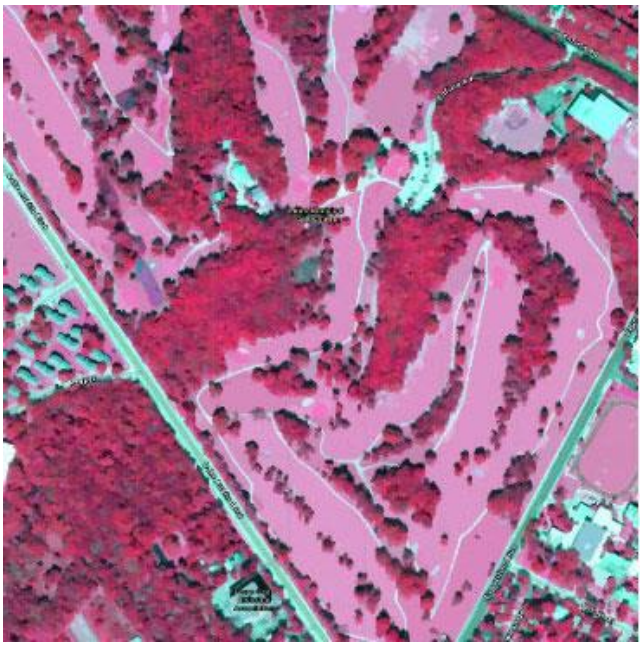
The Salt Lake Regional Smoke, Ozone and Aerosol Study

The University of Washington, Utah State University and the University of Montana are collaborating to conduct a detailed study of ozone and $PM_{2.5}$ in the Salt Lake Valley. Using new volatile organic carbon (VOC) observations, plus existing measurements of NO_x, CO and $PM_{2.5}$, they will use a variety of analyses to understand O_3 formation and the sources of $PM_{2.5}$ in the Salt Lake Valley during the summertime season. In addition, they will conduct photochemical modeling and statistical/machine learning analyses to improve our understanding of O_3 photochemistry. DAQ expects to gain significant new policy-relevant insights on what controls O_3 pollution in the Salt Lake Valley during both smoke-influenced and non-smoke conditions.

Improving Smoke Detection and Quantifying the Wildfire Smoke Impacts on Local Air Quality Using Modeling and Machine Learning

The University of Utah is working on a project to quantify the impacts of wildfire smoke to high urban ozone pollution along Utah's Northern Wasatch Front. Although it is apparent that wildfire smoke has negative impacts on urban air quality, there is no tool to quantitatively measure wildfire impacts, nor to identify whether exceedance days are due to wildfire smoke or other emissions. The first scope of this study will develop a new smoke plume rise model to estimate the plume injection heights for large wildfires, which will improve simulations of smoke transport and downwind air pollution concentrations. The second scope of this work is to use an ensemble of chemical transport model simulations to determine wildfire smoke contributions to Northern Wasatch Front air quality using source apportionment techniques. The last scope of this work is to develop a fast-response software tool that identifies high ozone pollution days that are specifically caused by wildfire smoke. It is a tremendous benefit to DAQ to be able to numerically determine when high ozone days are primarily caused by wildfire smoke as opposed to local urban emissions. Such determinations could have economic impacts in environmental planning.

Improved Vegetation Data for the Wasatch Front Biogenic Emission Inventory



Ramboll US Consulting is working on a project that will improve numerical predictions of regional ozone and $PM_{2.5}$ by developing more accurate estimates of biogenic volatile organic carbon (BVOC) emissions for the urban areas along Utah's Northern Wasatch Front. Biogenic emissions specify those emissions that come from living organisms such as trees and vegetation. Specifically, this project will upgrade modeled Model of Emissions of Gasses and Aerosols from Nature (MEGAN) BVOC emission estimates by analyzing high-resolution satellite imagery using machine learning, object-based classifications that are calibrated and assessed by field observations. Such techniques have successfully been applied in Texas and California. Furthermore, these techniques will improve MEGAN land cover inputs for the Northern Wasatch Front region including time-varying Leaf Area Index, growth form fractions (tree, shrub, crops, herbaceous plants) and tree species composition (e.g., relative abundance of oaks, poplars, pines, spruce, etc.). The benefit of this project will be an improved biogenic emission model that is available for use in DAQ's air quality modeling, which is critical for the scientific understanding of regional pollution and the development of effective regulatory strategies.

Upcoming Projects

DAQ is placing emphasis on studying regional ozone pollution during the 2024 FY to improve efforts in addressing high summertime ozone pollution along Utah's Northern Wasatch Front. DAQ is learning that many unique factors contribute to high summertime ozone pollution along the Northern Wasatch Front. Such unique factors include impacts from the Great Salt Lake, the presence of abundant halogen emissions (e.g., chlorine, bromine) in the airshed, interbasin/canyon pollutant transport, and urban growth. Several smaller state-funded projects have successfully identified areas of great interest to regulatory planning. However, the immediate need for finding effective and efficient solutions to meet federal ozone standards prompts the need for a larger, more exhaustive study of summertime ozone pollution along the Northern Wasatch Front. DAQ is currently in discussions with air quality researchers from federal and in-state academic institutions to develop a large-scale study that will answer key questions relevant to regulatory planning.

Air Quality Incentive Programs

The Air Quality Policy Section develops SIPs and coordinates the rule-making activities of the Division. The Policy Section also applies for pollution reduction grants and administers incentive programs that 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 here.

Targeted Airshed 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 Airshed 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 UB NAA for wintertime ozone.

School Bus and Heavy-Duty Truck Replacement Programs

In 2017, $3,184,875 was awarded to UDEQ for heavy-duty diesel truck replacements in the Logan, UT, nonattainment area. Through this award, Cache County School District will replace 8 diesel school buses, Cache County will replace 2 heavy-duty diesel trucks, Hyrum City will replace 1 heavy-duty diesel truck, Logan City will replace 9 heavy-duty diesel trucks, and Nibley City will replace 2 heavy-duty diesel trucks with this funding, while just over $920,000 is still available for new projects. The diesel truck and bus replacement projects are estimated to reduce emissions over 94 tons per year and nearly 1,800 tons over the lifetime of the projects.

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 grant is a $5 million dollar program to reduce emissions from oil and gas production in Uintah and Duchesne counties.

Participation requires replacing natural gas engines on pump jacks with electric engines. Eligible costs include auxiliary components necessary for the new equipment to run. Project planning, design, and permitting are not covered. For an engine to qualify, it must be operating and have 3 years left in its life. Producers will be required to contribute a minimum of 60% of the project cost and destroy the gas engine within 3 months after the electric engine is in service. DAQ will host an open application period and make awards to eligible grantees on a first-come, first-served basis until the funds run out. Emissions reductions resulting from the project will be required and reported to EPA. DAQ staff will calculate the reductions of pollutants including NO_x and VOCs. Grant recipients will not be given priority based on their level of emissions reductions, but rather on eligibility status and order the application was received. For more information, please visit our webpage.

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, 2022, the VRRAP has repaired 1,105 and replaced 247 vehicles. These activities are anticipated to reduce emissions annually by 17.00 tons of NMOG, NO_x, and PM and reduce lifetime emissions of NMOG, NOx, and PM by 121.95 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, 2022, the Salt Lake City VRRAP has repaired 110 and 41 replaced vehicles. These activities are anticipated to reduce emissions annually by 1.03 tons of NMOG, NOx, and PM and reduce lifetime emissions of NMOG, NOx, and PM by 10.56 tons.

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. 2,552 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 Legislature subsequently re-allocated $2 million in 2021 towards air quality monitoring, reducing the program funding to $7 million.

The program has become very popular with the public and participation response to the programs have exceeded all expectations. As of December 2, 2022, the DAQ has completed 3,777 projects with the combined funding. More information on the program, including eligibility requirements and registration dates, is available at stoves.utah.gov.

Volkswagen (VW) Settlement

In 2015, the 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 NO_x emissions allowed by federal law.

Utah received approximately $35 million from a nationwide settlement with VW for violations of the CAA. Utah's portion will help offset excess NO_x emissions from the approximately 7,000 VW, Audi, and Porsche vehicles in the state affected by the automaker's 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 $PM_{2.5}$ under the NAAQS.

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 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 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.

[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).

- 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 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 NO_x, cost-per-ton of NO_x reduced, value to the nonattainment areas and community benefits. Successful projects are shown in Table 7, below. Awardees have three years to complete their projects. More information on the VW Settlement is available here.

Table 7: 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	2	Class 8 Local Freight Truck
Canyons School District	Diesel to Diesel	$826,000	14	School Buses
Davis School District	Diesel to Diesel	$136,260	2	School Buses
Jordan School District	Diesel to Diesel	$138,992	2	School Buses
North Salt Lake City	Diesel to Diesel	$108,741	1	Class 8 Local Freight Truck
Orem City	Diesel to Diesel	$1,070,000	5	Class 8 Local Freight Truck and Shuttle Bus
Park City Municipal Corp	Diesel to Electric	$3,129,449	5	Transit Buses
Pleasant Grove City	Diesel to Diesel	$410,112	5	Class 8 Local Freight Truck

Salt Lake City Corp	Diesel to Diesel	$956,503	7	Class 4-7 Local Freight Trucks
Salt Lake City School District	Diesel to Electric	$699,660	4	Class 8 Local Freight Truck
Salt Lake Urban Search and Rescue	Diesel to Diesel	$86,740	1	School Buses
Tooele County School District	Diesel to Diesel	$132,000	2	Class 8 Local Freight Truck
UDOT	Diesel to Diesel	$2,604,948	22	School Buses
UTA	Diesel to Electric	$13,079,240	20	Class 8 Local Freight Truck

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 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 and DC fast charging EVSE.

The program began to accept applications on September 16, 2019. As of December 5, 2022, 68 projects totaling just over $2,247,040 have been completed, with 335 Level 2 and 31 DC fast EVSE installed throughout the State. DAQ has pre-approved an additional 24 projects encumbering approximately $935,600 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, 91 Dual-port level 2, and 26 DC fast chargers throughout Utah. As of December 9, 2022, 85 Level 2 and 28 DC fast chargers have been installed. More details on the VW Settlement awards are provided in the table below.

Table 8: State of Utah VW Settlement Awards

Light Duty Zero Emission Vehicle Supply Equipment Category					
Awardee/Locations	**Award Amount**	**EVSE Type**	**Number of EVSEs**	**Number EVSE Installed**	**Dollars Paid for Projects Completed**
Clinton City	$60,129	Level 2	3	3	$46,808.38
Davis Technical College	$49,000	Level 2	4	4	$46,037.00
Utah DFCM	$49,401	Level 2	11	12	$49,401.00
Kamas City	$41,227	Level 2	1	In Process	In Process
Kaysville City	$69,988	Level 2	9	9	$69,572.00
Lehi City	$16,755	Level 2	1	1	$16,775.00
Murray City Power	$157,608	Level 2	2	2	$141,992.86
		DC Fast Chargers	1	1	
Orem City	$308,269	DC Fast Chargers	4	4	$270,675.00
Provo City	$752,500	Level 2	20	16 (4 in process)	$222,030
S.L. Co. Health Dept.	$603,095	Level 2	8	8	$577,771.88
		DC Fast Chargers	2	2	
Sandy City	$118,982				$118,982.00
Saratoga Springs	$26,788	DC Fast Chargers	3	3	$26,788.00
South Salt Lake City	$136,517	Level 2	3	3	In Process
Timpanogos Cave	$10,966	Level 2	4	In Process	$7,860.80
UDOT	$1,047,623	Level 2	1	1	$940,240
		DC Fast Chargers	11	18	
Utah Valley University	$99,000	Level 2	16	17	$99,000
Weber State University	$143,694	Level 2	6	6	$76,912.00
West Valley City	$140,564	Level 2	4	Withdraw	Withdraw Project
Total	**$3,832,106**	**Level 2**	**92**	**86**	**$2,710,845.92**
		DC Fast Chargers	**26**	**28**	

Utah Clean Diesel Program

The Utah Clean Diesel Program targets emissions from heavy- duty diesel vehicles and equipment that operate in the State's nonattainment areas. Roughly $9 million in federal funding is available to fleet owners for replacing diesel short-haul delivery trucks, refuse haulers, school buses, and non-road equipment with newer, cleaner versions. Up to 45 percent toward the purchase of new vehicles and equipment is available upon scrapping the original diesel vehicle or equipment.

Recent projects include an award of $231,900 to Ace Disposal and Recycling for replacing their 2002 diesel refuse truck with a new electric refuse truck. The project reduced emissions by 672 tons per year, the equivalent to removing 33 passenger cars off the road.

Early retirement of older diesel trucks 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. Replacing diesel vehicles and equipment with electric achieves 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 $2,024,515 for the replacement of diesel non-road vehicles, refuse trucks, Class 5-8 trucks, and school buses. VW Settlement funding of $1,913,767 will provide added funds for these projects for a total of $4,699,249. DAQ is currently partnering with Salt Lake City School District who will be awarded $1,525,000 to replace eight diesel school buses with electric school buses, Waste Management of Utah who will be awarded $350,000 to replace ten diesel refuse trucks with CNG refuse trucks, Weber Fire who will be awarded $200,000 to replace one Class 8 diesel fire truck with diesel, and United States Cold Storage who will be awarded $145,000 to replace two non-road diesel terminal tractors to all-electric through this program.

Over $25 million in federal funding has been awarded to UDEQ for the Utah Clean Diesel Program since 2008.

State of Utah Online Electric Lawn Mower Discount Program

On April 4th, 2022, residents of the summertime ozone nonattainment counties (Weber, Davis, Salt Lake, Utah, and Tooele counties) entered a drawing to participate in the 2022 Lawn Mower Exchange. DAQ partnered with Salt Lake City to offer over 2,600 Utahns a discount on the purchase of an electric lawn mower. 4,500 people were randomly selected to participate. Priority was given to: SLC's target zip codes: 84104 and 84116; Salt Lake City residents; and EJ areas. The EJ areas were determined using the EPA EJ screen tool, which identified areas in the 90th percentile or above for summertime ozone, relative to the state of Utah.

Those who 1) entered the drawing, 2) were randomly selected, and 3) recycled a gas-powered lawn mower received a $299 online coupon code to be used on the online purchase of an electric lawn mower at one of three vendors: Home Depot, Lowe's or Redback Tools.

Participants took their gas-powered lawn mowers to a metal recycler and received a 'ticket' for recycling. 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. A ticket was also provided to anyone using this service. Each ticket contained a unique code that was used to unlock the $299 online discount. The following 14 metal recyclers partnered with DEQ and distributed recycling tickets: Bloom Recyclers, Clearfield Recycling, Custom Industries, Green Box Recycling, MCR, Metro SLC, Metro Ogden, Midvale Recycling, Ogden Recycling, Redwood Recycling, Utah Metal Works, Wasatch Metal and Western Metals SLC, and Western Metals Provo.

Over 2,600 gas powered lawn mowers were recycled and 2,603 online coupons were used at Lowes, Home Depot, and Redback Tools in 2022. Redback Tools contributed $50 toward the cost of each coupon used on their products. Salt Lake City contributed $160,886 toward the cost of 539 coupons for residents of their jurisdiction and DEQ contributed $616,173 to cover the cost of coupons in the remaining eligible areas. The total cost of the 2022 Lawn Mower Exchange was $777,059. Funding to support the lawnmower discount program is from various settlement funds.

Alternative Fuel Heavy-Duty Vehicle Tax Credit Program

The state provides an income tax credit for the qualified purchase of a natural gas, a 100% electric, or a hydrogen-electric heavy-duty vehicle which is defined in 59-7-618.1 and 59-10-1033.1 UCA as a commercial category 7 or 8 vehicle that has never been titled or registered. Class 7 and Class 8 vehicles are classified by the gross vehicle weight rating, which is also known as their GVWR. A

Class 7 vehicle has a GVWR between 26,001 and 33,000 pounds. A Class 8 vehicle has a GVWR higher than 33,000 pounds. These vehicles usually have three axles, but some will have five axles in order to haul a trailer with substantial weight on it. Some examples would be a 5-axle tractor-trailer (Semi or 18-wheeler), cement trucks, dump trucks, and refuse haulers. Operators of Class 7 and 8 trucks must have a commercial driver's license, also called a CDL.

The Utah Legislature authorized the credit during the 2021 General Session for the tax year 2021 through 2030. The following table shows the tax credit for each tax year.

Table 9: Tax Credits Per Tax Year

Tax Year	Credit
2021	$15,000
2022	$13,500
2023	$12,000
2024	$10,500
2025	$9,000
2026	$7,500
2027	$6,000
2028	$4,500
2029	$3,000
2030	$1,500

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 PM season. In 2022, DAQ funded an additional four free fare days, including two as part of Free Fare February and another two in early-September. Funding remains for approximately two more days at recent foregone revenue levels. 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 August of 2019 and the 2023-2028 TIP in June 2022: Cache County, Utah portion of the $PM_{2.5}$ moderate nonattainment.
- MAG established conformity for the 2050 RTP and the 2023-2027 TIP in August 2022: Provo\Orem City CO maintenance area; Utah County PM_{10} and $PM_{2.5}$ moderate nonattainment area; SWF, UT Ozone marginal nonattainment area (portion of Utah County).\
- WFRC established conformity for the 2023-2028 TIP in October 2022 and the 2050 RTP Amendment #3 in September 2021: Salt Lake County and Ogden City PM_{10} nonattainment areas; Salt Lake $PM_{2.5}$ moderate nonattainment 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 Uinta 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, fireplaces, 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, PM, CO, SO_2, and NO_2. 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 103,000 mobile devices.

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 provides a five-year view of the number of prescribed burn days and acres burned across Utah.

Table 10: 2022 Five-Year Review of Prescribed Burn Days and Acres Burned in Utah

Year	Acres Burned	Number of Prescribed-Burn Ignition Days
2018	12,802	188
2019	18,171	164
2020	5,636	120
2021	11,818	245
2022	17,750	268

Each dot in the figure below represents a prescribed fire burn day in Utah in 2022.

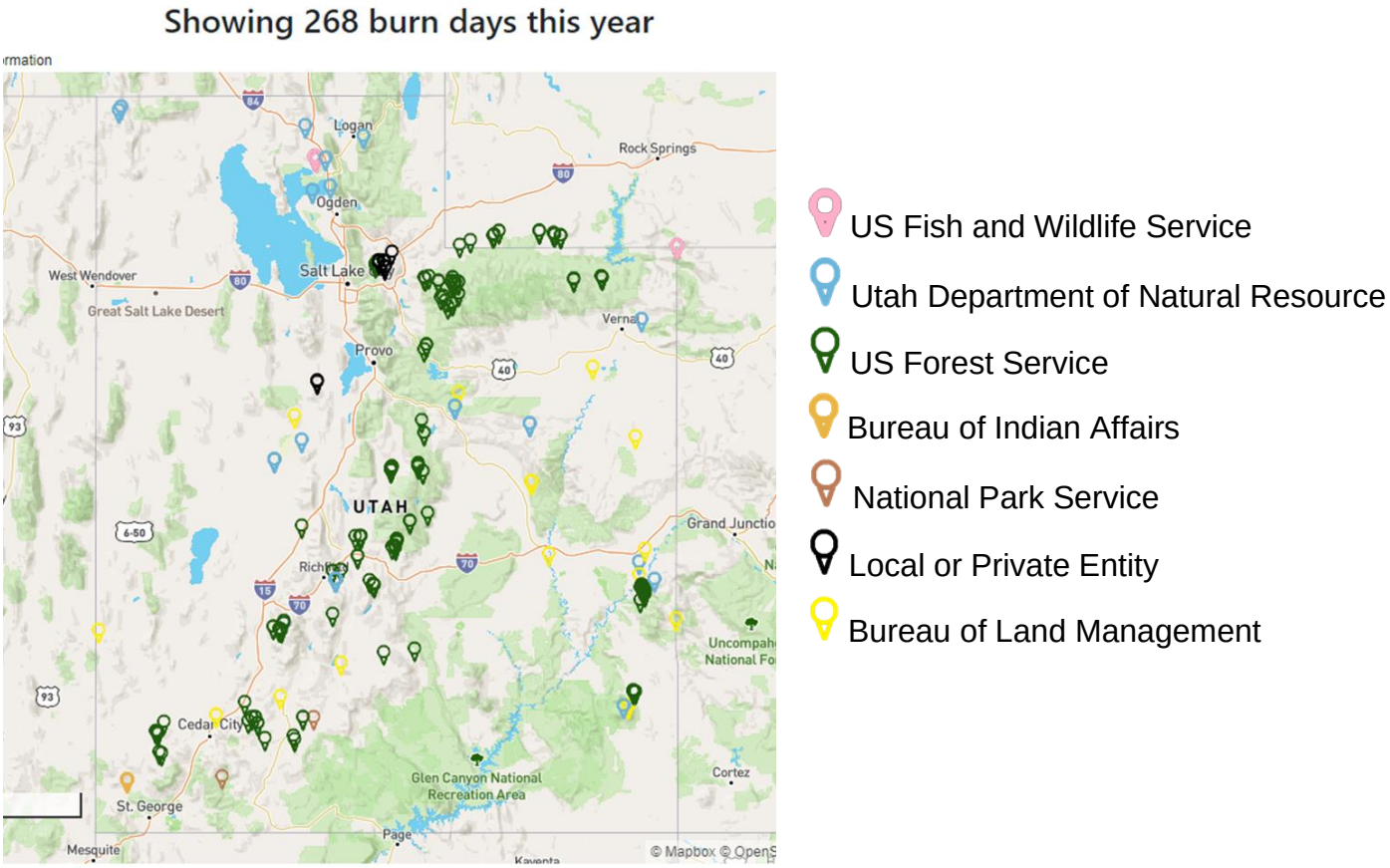


Figure 29: 2022 Utah Prescribed Burn Days

Vehicle Inspection/Maintenance Programs

Inspection/Maintenance (I/M) programs were adopted in the early 1980s as a required strategy to attain the ozone and CO NAAQS. These programs were very effective in improving air quality. They have played an important role in reducing emissions that contribute to ozone and CO. 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. GVWR 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

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

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, 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.