UTAH

Division of Air Quality

ANNUAL REPORT

2005

February 2006

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Division of Air Quality
2005 Annual Report

Introduction

Utah Division of Air Quality

The mission of the Utah Division of Air Quality (DAQ) is to protect public health and the environment from the harmful effects of air pollution. To carry out this mission, Utah implements programs to ensure that Utah's air quality meets the health standards set by the U.S. Environmental Protection Agency (EPA).

In the past 25 years, Utah has made enormous strides in improving air quality. In the early 1980s, the health standards for four of the six criteria pollutants identified by EPA were violated in one or more Utah counties. Today, all Utah counties attain current federal air quality standards, even after experiencing significant population growth.

Two of the six criteria pollutants identified by EPA, ozone and particulate matter (PM), occasionally reach levels that can affect the health and well being of Utah's urban residents who are more sensitive to pollution, such as children, the elderly, and those with chronic health problems. These pollutants can aggravate respiratory disorders during high pollution episodes and lead to chronic illness.

In all rural areas of the state, air quality meets the health standards. However, areas located far from major population centers can be affected by industrial, automotive, or other air pollution that may contribute to health or visibility problems, or reduced crop yields.

Many DAQ resources are spent administering the federal Clean Air Act (CAA). Congress delegated authority to operate many programs to each of the states, with oversight by EPA. In Utah, authority resides with the Utah Air Quality Board (the Board), and DAQ serves as staff for the Board. Board membership is structured so as to provide representation to a diverse sampling of Utah's industries, local governments, environmental groups, and residents. The Director of the DAQ is the Board's Executive Secretary. A listing of UAQB members may be found at http://www.airquality.utah.gov/Air-Quality-Board/Air-Quality-Board-Members.htm

The Utah Air Quality Rules (available on-line at http://www.airquality.utah.gov/Planning/Rules/index.htm) set forth the requirements of the state air program, and illustrate the many ways in which DAQ interfaces with industry, other government agencies, and residents of the state. The air program mirrors the federal program to a large degree, but also includes oversight of air pollution sources not considered large enough by federal standards.

2005 Synopsis

The year 2005 saw the continuation of an ongoing trend of progress toward compliance with all of the federal health standards for criteria air pollutants. Despite ever increasing numbers of people and their cars, Utah remained in compliance with both the 1-hour and the 8-hour ozone standards. Our air monitors showed that we are very close to the standards, but measures taken in the past as well as continued cooperation by local residents on "no drive days" keeps us in compliance.

The same can be said of our efforts to curb the levels of particulate matter. Throughout the state, we remained within the federal health standards for both PM_{10} and $PM_{2.5}$. Nevertheless, high concentrations of particulate matter are brought on by wintertime episodes of air stagnation and temperature inversion. As such, there are always periods during the winter months when ambient concentrations approach the standards. Continued cooperation by the public on "no-burn days" has been a large part of our success. Particulate studies of Logan and the surrounding Cache Valley area were begun in 2004, continued through 2005, and are continuing in 2006. These on-going studies are done in cooperation with Utah State University (USU) and the State of Idaho and will help to determine the causes of elevated levels of PM_{10} in the Cache Valley, as well as identify control measures that could be implemented to reduce particulate concentrations if the standard is violated.

Historically, Utah had problems meeting the National Ambient Air Quality Standard (NAAQS) for CO; however, it has been many years since violations occurred. The re-designation request and associated maintenance plan that was submitted to EPA for Provo City in March 2004 was approved in December 2005 and became effective on January 3, 2006. The plan demonstrated that there was no longer a need for oxygenated fuels, and revised the transportation conformity budget to be consistent with EPA's latest mobile emissions model, MOBILE6. All areas with historic CO problems are now designated as attainment areas for CO.

In 2004, DAQ secured contract services for a Business Process Analysis and Database Development project called TEMPO. The project aims to provide a streamlined, accurate, and logical business data system through which customers and division employees can produce expedient business transactions. The system design is flexible and capable of supporting new functionality as DAQ business requirements and goals evolve. TEMPO is currently on schedule and should move into production by summer of 2006.

In May 2005, the Utah Energy Office was dissolved as a result of S.B. 199. Several Utah Energy Office (UEO) programs were distributed among various state agencies. Two such programs – the Clean Fuel Vehicle Fund (CFVF) and the PowerForward electricity conservation/peak-shifting campaign – were transferred to the Utah Department of Environmental Quality where they are currently being administered by the Division of Air Quality. In 2005, DAQ partnered with Utah Power and the city of St. George to achieve a successful PowerForward summer session. DAQ is working to strengthen the program in 2006 through the involvement of additional utility partners. In addition, DAQ

is working with CFVF stakeholders to modify the existing statutory language governing the fund to improve the effectiveness of the program. DAQ anticipates initiating the rulemaking process for the CFVF following the 2006 Legislative General Session.

Division Organization

The DAQ is divided into three separate branches: Permitting, Planning, and Air Standards. The *Permitting Branch* is responsible for issuing two kinds of permits. Construction permits are issued to new or modified sources of air pollution through the New Source Review program. Operating permits are issued, on an ongoing basis, through Title V of the CAA.

The *Planning Branch* is responsible for developing comprehensive plans to reduce air pollution. Emissions inventories are routinely compiled in order to understand the origins of the various contaminants detected in the air. Computer models are used to evaluate the impacts of new and existing sources of air pollution, and to understand the relationship between the emissions, meteorology, and pollutant concentrations measured in the air. The branch is also involved in identifying the air quality impacts of transportation issues which include vehicle inspection and maintenance, clean fuels, and highway construction. This information must be considered in the development of State Implementation Plans (SIPs) in order to ensure that Utah's ambient air remains in compliance with the federal health standards, even as our population and our economy continue to grow.

The *Air Standards Branch* is responsible for ensuring that industries and residents are complying with Utah's air quality requirements. In addition to the criteria pollutants, this includes activities associated with hazardous air pollutants (HAPs), asbestos, and lead based paints. The Air Standards Branch also includes the Air Monitoring Center, which operates a network of air quality monitors throughout the state. The Small Business Assistance Program has been set up within the Air Standards Branch to help small businesses deal with the many requirements surrounding air quality, including the various permitting requirements.

Ambient Air Quality in Utah

Air Quality Standards

The EPA has established health-based National Ambient Air Quality Standards (NAAQS) for six pollutants known as "criteria pollutants." These are carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, sulfur dioxide, and volatile organic compounds. Each of these pollutants is addressed in greater detail later in this chapter, but Table 1 provides a brief description of each.

Criteria Pollutants

Name	Sources	Health Effects	Environmental 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; cells and tissues need oxygen to work. Carbon monoxide may be particularly hazardous to people who have heart or circulatory (blood vessel) problems and people who have damaged lungs or breathing passages.	Global climate change
Lead (Pb)	Paint (houses, cars), smelters (metal refineries); manufacture of lead storage batteries; note: burning leaded gasoline was the primary source of lead pollution in the US until unleaded gasoline was mandated by the federal government.	Lead damages nervous systems, including brains, and causes digestive system damage. Children are at special risk. Some lead-containing chemicals cause cancer in animals.	Lead can harm wildlife
Nitrogen Dioxide (NO_2 one component of NO_x); smog-forming chemical	Burning of gasoline, natural gas, coal, oil, etc. Cars are an important source of NO_2	Nitrogen dioxide can cause lung damage, illnesses of breathing passages and lungs (respiratory system).	Nitrogen dioxide is 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; VOCs and NO_x	Ozone can cause breathing problems, reduced lung function, asthma, irritated eyes, stuffy noses, and reduced resistance to colds and other infections. It may also speed up aging of lung tissue.	Ozone can damage plants and trees; smog can cause reduced visibility
Particulate Matter (PM_{10}, $PM_{2.5}$); dust, smoke, soot	Burning of wood, coal, diesel and other fuels; industrial plants; agriculture (plowing, burning fields); unpaved roads, mining, construction activities. Some particles are formed from the reaction of VOCs, NO_x, SO_x and other pollutants in the air.	Particulate matter can cause nose and throat irritation, lung damage, bronchitis, and early death.	Particulates are the main source of haze that reduces visibility
Sulfur Dioxide (SO_2)	Burning of coal and oil (including diesel and gasoline); industrial processes.	Sulfur dioxide can cause breathing problems and may cause permanent damage to lungs.	SO_2 is an ingredient in acid rain (acid aerosols), which can damage trees, lakes, flora and fauna. Acid aerosols can also reduce visibility

Table 1.

The primary health standards are established by considering both the concentration level and the duration of exposure that may be incurred by an individual. Pollutant concentrations greater than the NAAQS are considered unhealthy. The NAAQS also include secondary standards to protect public welfare.

The DAQ monitors each of these criteria pollutants, as well as several non-criteria pollutants for special studies.

Utah's Air Monitoring Network

The Air Monitoring Center operates a network of monitoring stations across the state. The monitors are situated to measure air quality in neighborhoods, industrial areas, and along heavily traveled roadways. Figure 1 shows the general location of currently active monitoring sites in Utah as well as the pollutants monitored. Additional information including actual data can be accessed at http://www.airmonitoring.utah.gov/utahmap.htm

In addition, meteorological data are collected at many locations to provide localized data for air quality modeling that is used to evaluate the impacts of new sources and to assess the effectiveness of regional mitigation strategies.

County	Station Name and Address	Monitoring Parameters
Cache County	**Logan - L4** 125 West Center St., Logan City	CO, O3, PM10, PM2.5, WS,WD, TEMP
Box Elder County	**Brigham City, BR** 140 West Fishburn, Brigham City.	O3, WS, WD, TEMP
Weber County	**Harrisville - HV** 425 West 2550 North, Harrisville	O3, WS,WD, TEMP
	Washington Blvd -W2 2540 Washington Blvd. Ogden City	CO
	Ogden#2 - O2 228 East 32nd Street, Ogden City	NO2, NOx, PM10, PM2.5
	Washington. Terrace - WT 4601 South 300 West, Washington Terrace	O3, WS, WD, TEMP
Davis County	**Bountiful - BV** 171W 1370 N Bountiful	NO2, O3, SO2, WS, WD, TEMP
Salt Lake County	**Hawthorne - HW** 1675 S. 600 E. Salt Lake City	PM2.5, PM10, CO, O3, NO2, WS, WD, TEMP
	Beach -B4 1200 South 12100 West, Magna	O3, SO2, WD, WS, TEMP.
	Cottonwood -CW 5715 South 1400 East, Holladay	CO, NO2, NOx,O3,WD, WS, TEMP
	Herriman - H2 5600 West 12950 South, Herriman	O3, WS, WD, TEMP
	Magna-MG 2935 South 8560 West, Magna	SO2, Pb,WS, WD, TEMP
	North Salt Lake - N2 1795 North 1000 West, Salt Lake City	SO2
	State St. -	CO

	S3 1401 South State St. Salt Lake city.	
	West Valley - WV 3275 West 3100 South, West Valley City	CO, O3, WS, WD, TEMP
Utah County	**Highland - HG** 10865 North 6000 West, Provo City	O3, WS, WD, TEMP
	Lindon -LN 50 North Main Street, Lindon	PM2.5, PM10, WS, WD, TEMP
	North Provo -NP 1355 North 200 West, Provo City	CO, NO2, O3, WS, WD, TEMP
	University Ave -U3 University Ave, Provo City	CO
	Spanish Fork - SF Air Port, Spanish Fork	O3, WS, WD, TEMP
Washington County	**St. George** 281 East 200 So.	NO2,NOx,O3, RH,TEMP, SWS, SWD

Figure 1.

Criteria Air Pollutants

Carbon Monoxide

Carbon monoxide (CO) is produced primarily by motor vehicles. Other significant sources of CO emissions are wood burning stoves and fireplaces. The remaining emissions come from industrial facilities, construction equipment, miscellaneous mobile sources and other types of space heating.

Because motor vehicle emissions are the major source of CO, the highest concentrations occur during the morning and evening rush hours. The worst problems are found near large concentrations of slow-moving vehicles: large parking lots, busy intersections, and traffic jams. Carbon Monoxide problems are greater in winter due to several factors: cold weather makes motor vehicles run less efficiently, wood burning and other space heating takes place in the winter, and cold weather temperature inversions trap CO near the ground.

The NAAQS for CO includes two standards: a 1-hour standard of 35 ppm, and an 8-hr standard of 9 ppm. Either of these values may be exceeded only once in a given year at any given location. Once a location measures a second exceedance of either standard, it is

considered to be in violation of that standard and becomes designated as a "nonattainment area." Three cities in Utah (Salt Lake City, Ogden, and Provo) were, at one time, designated nonattainment areas. Due primarily to improvements in motor vehicle technology, both Salt Lake City and Ogden were successfully redesignated back to "attainment" in recent years. DAQ submitted a re-designation request and associated maintenance plan for EPA's approval in March 2004 for Provo. This request was approved by EPA and Provo was redesignated as an "attainment" area effective January 3, 2006.

CO in 2005

By all accounts, Utah was in compliance with the CO standards in 2005. Not one monitor recorded an exceedance of either standard. Although the data from 2005 has yet to be quality assured, Figure 2 shows a 13-year trend in CO emissions. The steady decline is primarily due to improvements in vehicle emissions control technology.

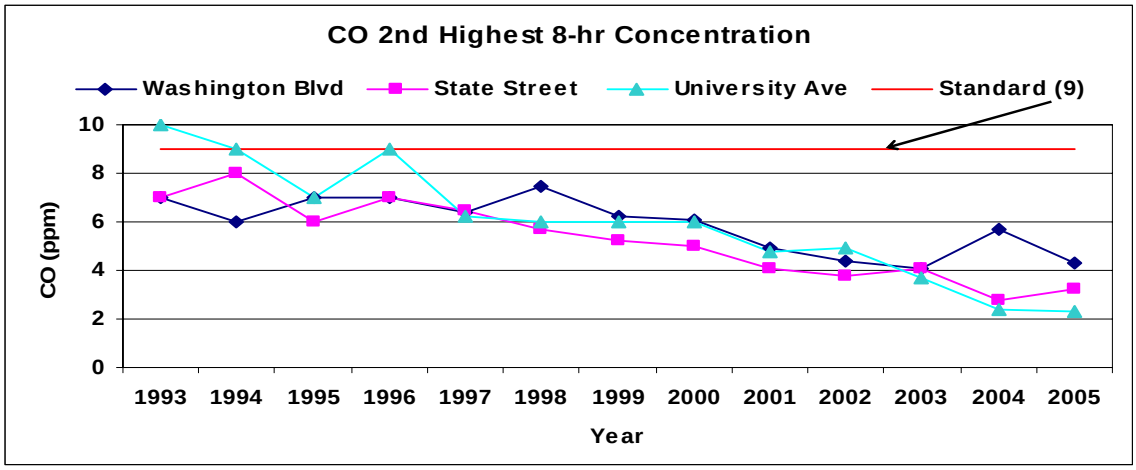


Figure 2.

Lead (Pb)

Lead in the ambient air exists primarily as particulate matter in the respirable size range. In the past, the major source of lead was from gasoline. However, because leaded gasoline for automobiles was completely phased-out in the United States at the end of 1995, this is no longer a significant problem. The extraction and processing of metallic ores is currently the major source of lead in Utah, and dust from the removal of lead-based paint is another.

The current standard for lead is a calendar quarter (3-month) average concentration, not to exceed 1.5 micrograms per cubic meter of air. Utah has not exceeded the health standard for lead since the late 1970s.

Nitrogen Dioxide (NO_2)

During high temperature combustion, the 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, nitrogen dioxide (NO_2), is considered a criteria pollutant.

The DAQ monitors the concentrations of NO_2 at various locations, but has never found there to be a likelihood of violating the annual standard of 0.053 ppm. However, these oxides of nitrogen tend to react with other air contaminants to form other criteria pollutants. In the summer, photochemical reactions between NO_2 and volatile organic compounds (VOCs) lead to ground-level ozone. In the winter, NO_2 reacts with ammonia to form fine particulate matter. Both of these scenarios, under proper conditions, can result in increased pollution.

Utah continues to struggle with both the ozone and particulate matter standards, and because of this, DAQ is mindful of the trend in NO_2 emissions illustrated in Figure 3.

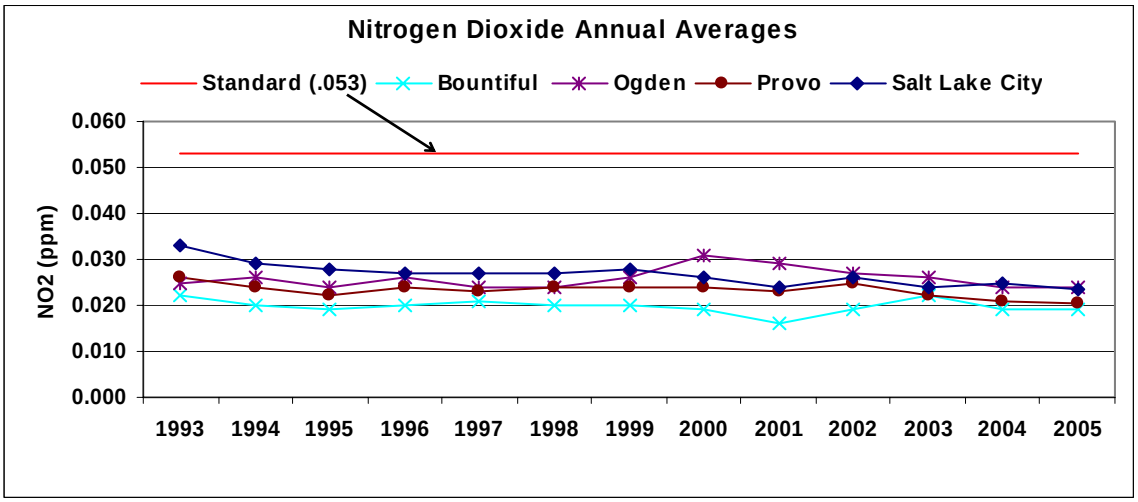


Figure 3.

Ozone (O_3)

Ozone is a gas composed of three oxygen atoms. Ozone at ground level, where it can be inhaled, is a pollutant. Ground-level ozone should not be confused with the stratospheric ozone layer that is located approximately 15 miles high in the atmosphere. It is this layer that shields the earth from cancer-causing ultraviolet radiation. Ozone is formed at ground level by a complex chemical reaction involving Volatile Organic Compounds (VOC) and Oxides of Nitrogen (NO_x) in the presence of sunlight and heat.

Ozone production is a year-round phenomenon. However, the highest ozone levels occur during the summer when strong sunlight, high temperatures, and stagnant meteorological conditions combine to drive the chemical reactions and trap the air within the region for several days. Some of the major sources for these pollutants are vehicle and engine exhaust, emissions from industrial facilities, gasoline vapors, chemical solvents, and biogenic emissions from natural sources. Sunlight is the major ingredient in the formula.

Without sunlight and its associated heating, there would be only cursory ozone formation. More ozone forms as the temperature increases. As temperatures reach and exceed 95 degrees Fahrenheit, based on the concentrations of VOC's and NOx in the air, the formation of ozone may reach levels that threaten the NAAQS.

In the 1970's and early 1980's Salt Lake and Davis Counties repeatedly violated the 1-hour ozone Standard of 0.12 ppm. In 1984 Utah submitted and the EPA approved an ozone SIP with sufficient control measures to attain and maintain the 1-hour standard. In 1990, Congress amended the CAA and, as a result, Salt Lake and Davis Counties were designated "moderate" non-attainment areas. In 1993 Utah submitted a formal redesignation request with an accompanying revision of the ozone SIP which was approved by the EPA.

On July 18, 1997 the EPA issued a new 8-hour ozone standard that would eventually replace the existing 1-hour standard. Following several years of litigation, the new 8-hour standard took effect on June 15, 2004 and is based on health studies that indicate long-term exposures to ozone are more harmful than shorter, 1-hour exposures.

Ozone in 2005

Utah remained in compliance with the old 1-hour standard as well as the new 8-hour standard, which is based on a three year average of the 4th highest ozone reading at each monitor, but once again the margin of safety was slim. Effective June 15, 2005 the 1-hour standard was officially revoked by the EPA. Utah's compliance to the ozone NAAQS is now based entirely on the 8-hr standard.

The following charts illustrate recent trends in ozone concentrations along the Wasatch Front. Figure 4 examines the new 8-hour standard (0.08 ppm) by looking at the 4th highest readings at selected monitors for the past eleven years. Although we continue to comply with this standard, it is not uncommon to record yearly maximum values that are greater than the NAAQS. Figure 5 presents a closer depiction of the 3-year average of the 4th highest 8-hour ozone concentration.

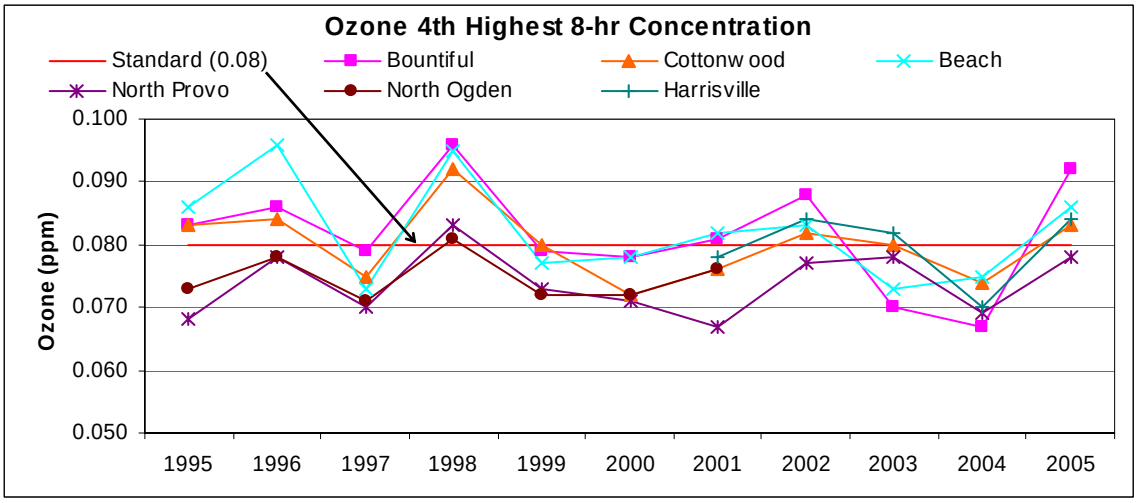


Figure 4.

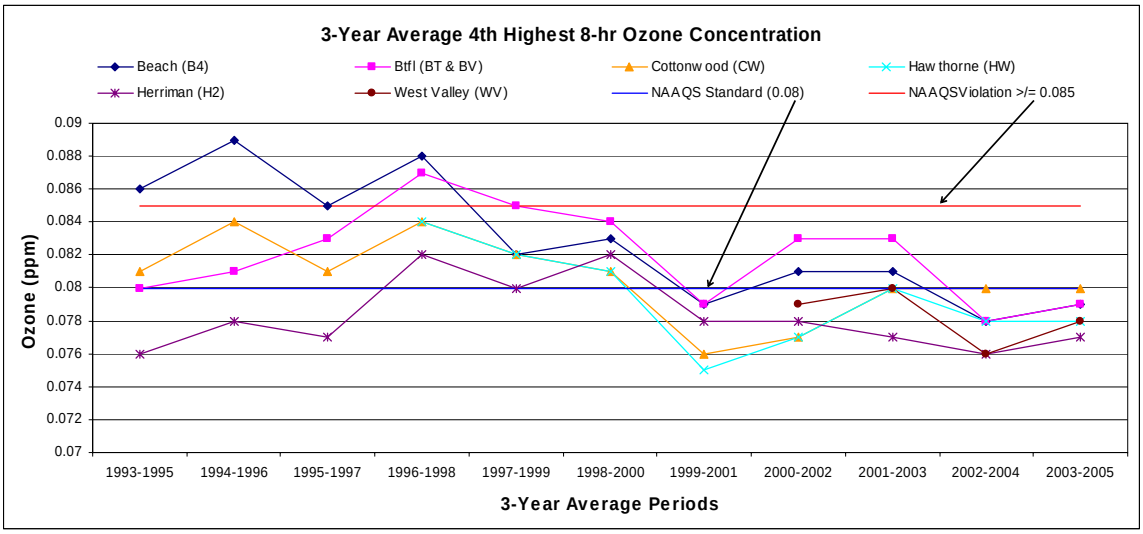


Figure 5.

Particulate Matter: PM_{10} and $PM_{2.5}$

Particulate matter is the term given to the tiny particles of solid or semi-solid material found in the atmosphere. Particles ranging in size from less than a tenth of a micron (a micron is one millionth of a meter) all the way up to 50 microns are collectively called total suspended particulates (TSP). Anything larger tends to settle out of the air very quickly. Particles 10 microns in size and smaller can lodge deep in the lungs and cause respiratory problems. They are called PM_{10}. Recent health studies suggest that it is the particles 2.5 microns in size and smaller that pose the most serious health problems. This particulate matter is called $PM_{2.5}$, and in 1997 the EPA adopted new standards for $PM_{2.5}$.

By far, the majority of man-made particulates would be termed PM_{10}. Particles of PM_{10} larger than 2.5 microns are typically due to "fugitive dust" (sand and dirt blown by winds from roadways, fields, and construction sites) and contain large amounts of silica (sand like) materials.

By contrast, $PM_{2.5}$ is generally born of combustion and includes fly ash (from power plants), carbon black (from cars and trucks), and soot (from fireplaces and woodstoves). Much of Utah's $PM_{2.5}$ is called secondary aerosol. "Secondary" means that it was not emitted directly as a particle, but instead results when gasses such as sulfur dioxide (SO_2) or nitrogen oxides (NO_x) react with other gasses in the atmosphere such as ammonia (NH_3) to become tiny particles. SO_2 and NO_x are also products of combustion. These chemical reactions occur predominantly during cold weather, and Utah's wintertime temperature inversions act to trap air in our valleys long enough for concentrations of secondary aerosol to build up to levels that can be unhealthy. Particles smaller than $PM_{2.5}$ 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 each. The standards for PM_{10} are set at 50 micrograms per cubic meter (ug/m3) on an annual basis, and 150 ug/m^3 for a 24-hour average. The standards for $PM_{2.5}$ are15 ug/m3 on an annual basis, and 65 ug/m^3 for a 24-hour average. EPA has recently proposed to lower the $PM_{2.5}$ standard, and is expected to make a final decision in the fall of 2006.

Particulate Matter in 2005

In the early 1990's steps were taken to bring Utah's three PM_{10} nonattainment areas back into compliance with the health standards, and these efforts continue to pay dividends. By NAAQS definition, to remain in compliance, the state is allowed one exceedance of the standard per year averaged over a three year period. According to this criterion, Utah has remained in compliance with the PM_{10} standard for the past 12 years. A PM_{10} maintenance plan which demonstrates an additional ten years of attainment for each of these three areas was approved by the Air Quality Board (AQB) in July 2005. This plan along with a petition to rescind the "nonattainment" area designation for each area was submitted to EPA for approval in September 2005.

Figures 6 and 7 show recent trends in PM_{10} concentrations.

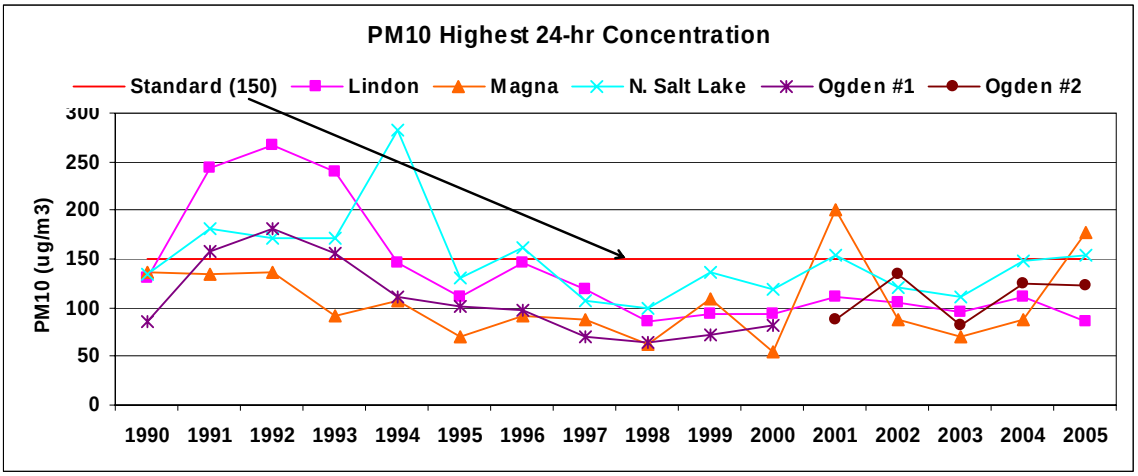


Figure 6.

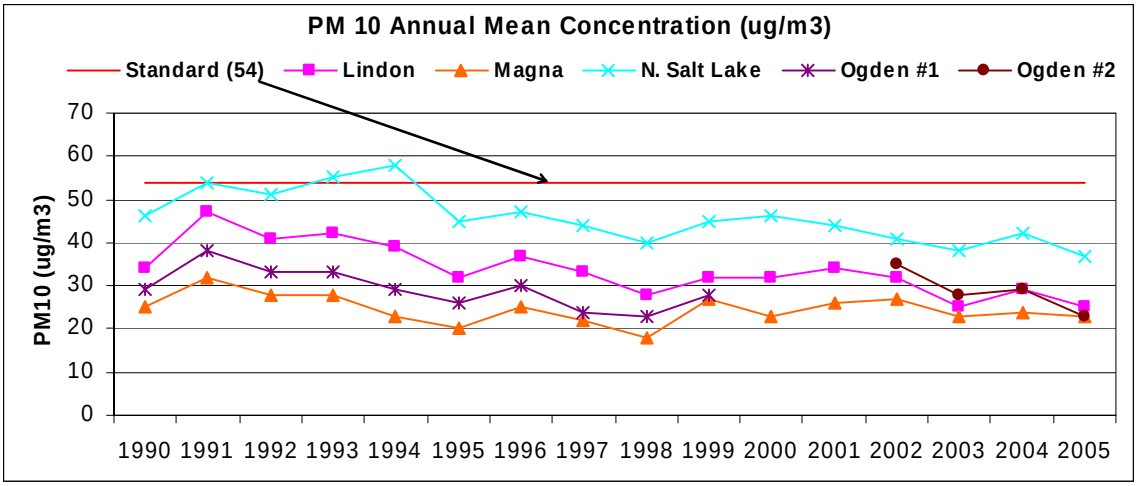


Figure 7.

2005 also marks the sixth year that DAQ has been collecting $PM_{2.5}$ data, and although we may be close to the standards at some locations, we are nevertheless attaining the NAAQS at every monitor. The 24-hr NAAQS for $PM_{2.5}$ is met if the 98th percentile 24-hour average concentration of particulate matter with aerodynamic diameter less than 2.5 micrometers, averaged over three consecutive years, is less than 65 ug/m^3. Continued cooperation by the public on "no-burn days" has been a large part of our success, as have the measures taken to mitigate PM_{10} concentrations in the early 1990s. Many of these measures were directed at precursors to secondary aerosols that count as both PM_{10} and $PM_{2.5}$.

Figures 8 through 10 show the recent trends in $PM_{2.5}$.

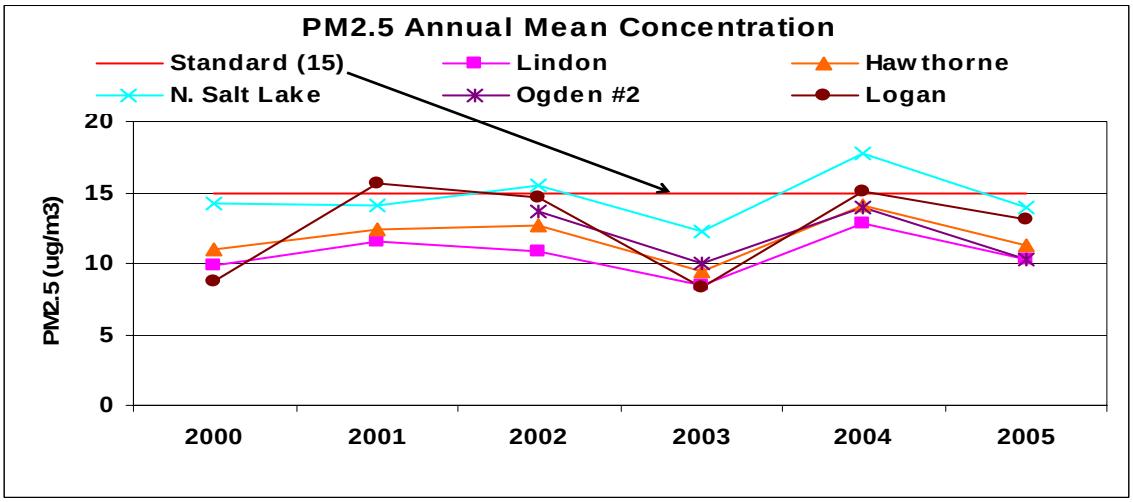


Figure 8.

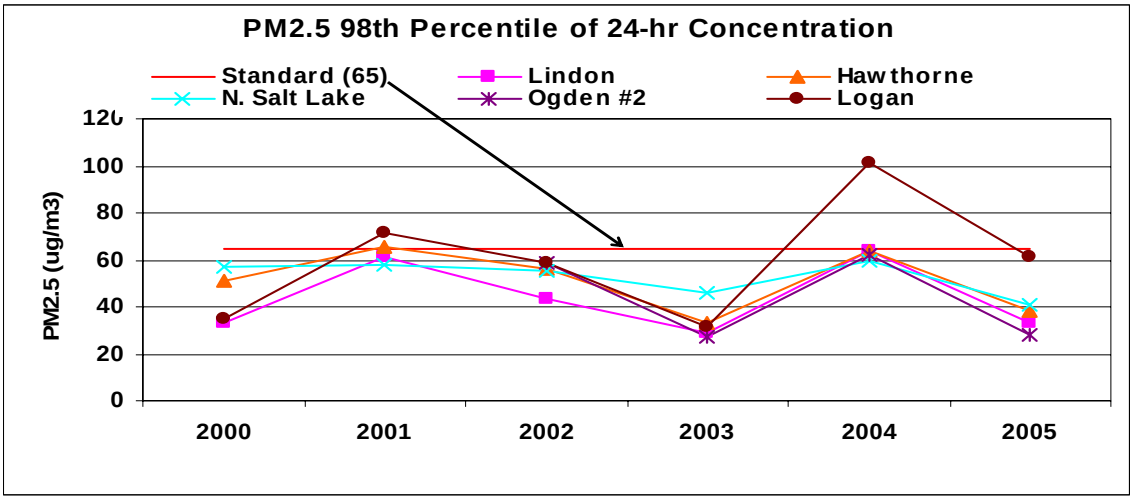


Figure 9.

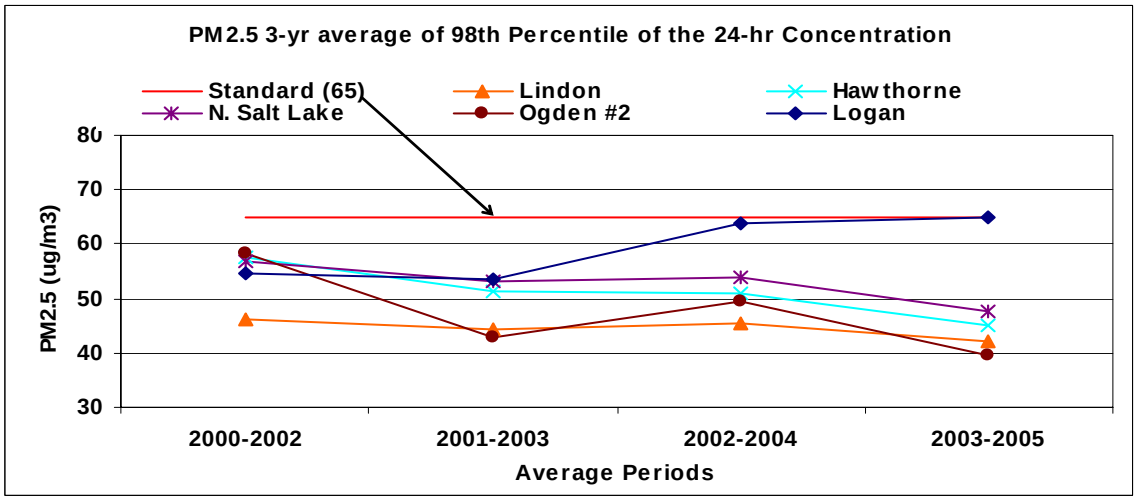


Figure 10.

Sulfur Dioxide (SO_2)

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

There are two primary health based NAAQS for SO_2: a 1-year average of 0.03 ppm, and a 24-hour average of 0.14 ppm. In addition there is a secondary welfare related standard of 0.5 ppm averaged over a 3-hour period.

The DAQ has situated its monitors near the largest sources of SO_2 (Kennecott Utah Copper and the five refineries along the Wasatch Front). Throughout the 1970s the

Magna monitor routinely measured violations of the 24-hour standard. Consequently, Salt Lake County and Tooele County above 5600 ft were designated as non-attainment for SO_2. Two significant technological upgrades at the Kennecott smelter have resulted in continued compliance with the SO_2 standard since 1981.

In the mid 1990s, Kennecott, Geneva Steel, the five refineries, and several other large sources of SO_2 made dramatic reductions in emissions as part of an effort to curb concentrations of secondary aerosol (sulfates) that were contributing to PM_{10} violations. Utah submitted a maintenance plan and redesignation request for Salt Lake and Tooele Counties to EPA in April of 2005. Recent measurements of SO2 indicate that Utah's ambient air is well within the federal health standards. Figure 11 shows the trend in SO_2 emissions over the past 30 years.

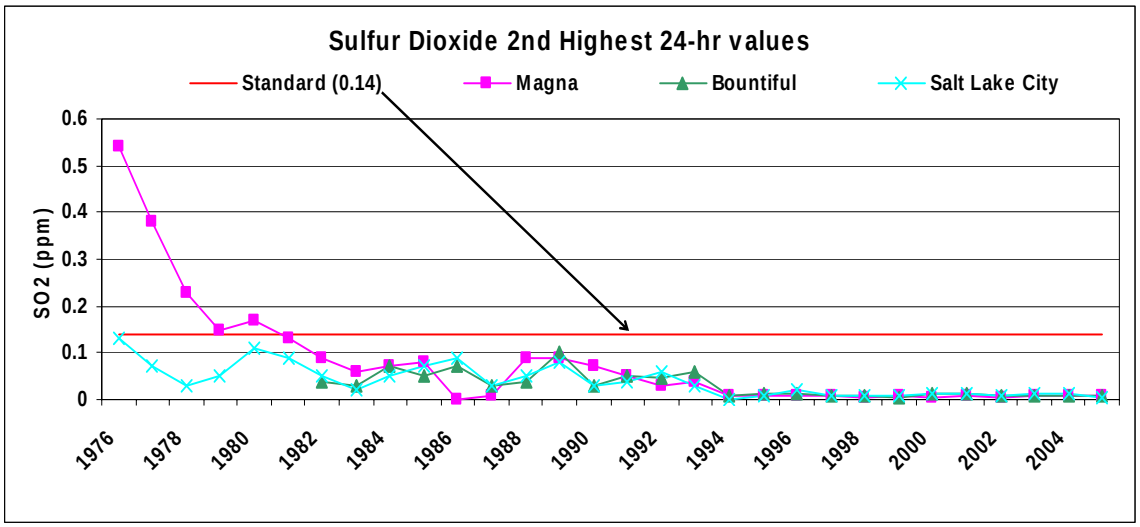


Figure 11.

Emissions Inventories

Every three years, DAQ collects information about the quantity and characteristics of the various air pollutants released by all emission sources in the state. In between the triennial inventory years, emissions information is also collected annually for the larger industrial sources. Finally, more detailed inventories are prepared, as needed, for special projects to quantify emissions during specific seasonal air pollution episodes. The 2002 triennial inventory is the most recent state-wide inventory available. The 2005 inventory is currently being collected and compiled.

Once collected, the inventory information is reviewed, quality assured, analyzed, and stored in the DAQ data system. This emissions information is then tallied according to source type to provide billing information for the Title V program, look at trends over time, and create inputs to air quality models. A copy of the emissions inventory data is also uploaded to the EPA's National Emissions Inventory data system. In recent years,

Utah has made significant strides toward automating the collection of emissions information from the major industrial sources resulting in more timely and higher quality inventories.

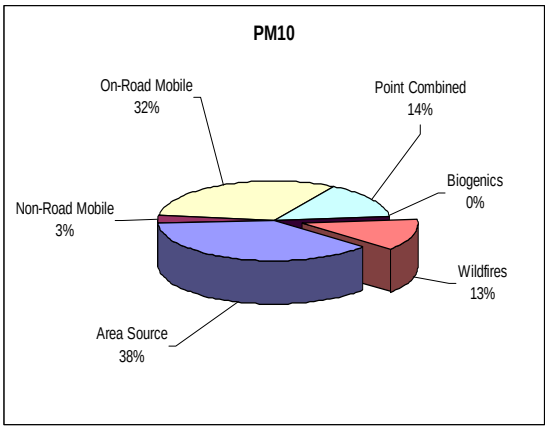
Sources of Air Contaminants

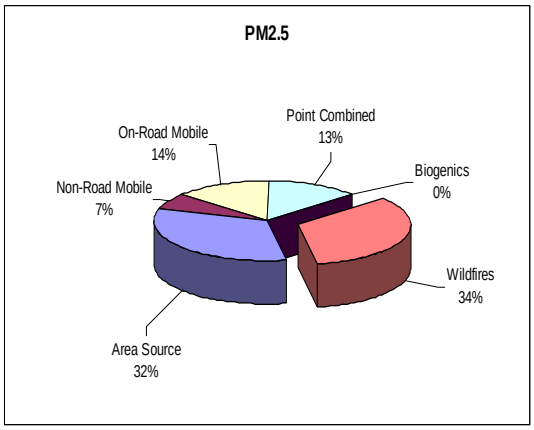
Emission inventories are typically broken out into three broad categories of sources: Point, Area and Mobile. Point sources are larger, stationary industrial or commercial facilities such as power plants, steel mills, and manufacturing facilities. Air pollutants released from these types of facilities are accounted for on a facility-by-facility basis.

Area sources are smaller stationary sources that, because of their greater number, are accounted for by classes of sources. Home heating, wildfires, and biogenics (emissions from vegetation) are examples of area sources. In the 2002 emissions pie charts (Figure 12) below, wildfire and biogenic emissions are pulled out of the total to denote they are non-anthropogenic, or not produced by human activity.

Mobile sources make up the third category and consist of emissions from non-stationary sources such cars, trains, and aircraft. Mobile emissions are often further broken down into On-Road Mobile and Off-Road Mobile categories (Figure 12). On-Road mobile sources primarily consist of cars and trucks, and contribute by far the largest part of the Mobile source emissions. Off-Road Mobile sources consist of a diverse group of heavy construction equipment, small engines (lawnmowers and snow blowers), trains, and aircraft. Estimating emissions from Mobile sources requires an understanding of the various emission characteristics of the many types of vehicles and model years that make up the fleet, as well as an understanding of how they are driven and the distance they travel.

Figure 12 shows how the source categories contributed to the various criteria pollutants tallied in the 2002 triennial emissions inventory. The triennial inventory covers 355 individual point sources, 37 area source categories, and 12 non- and on-road source categories. The pie sections that have been pulled out denote emissions from non-anthropogenic sources.





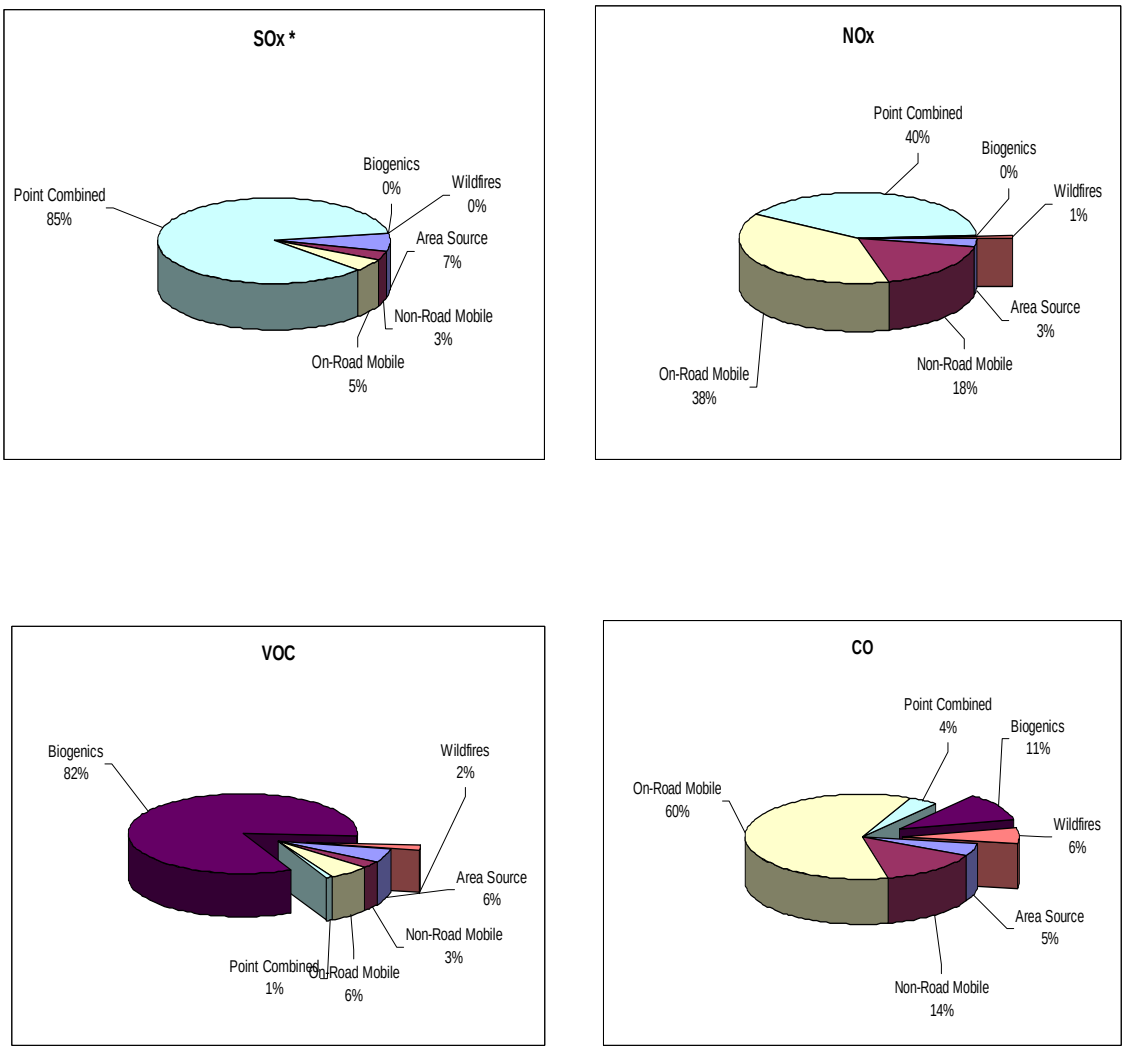


Figure 12.

Table 2 shows, by county, the most recent triennial statewide emissions inventory (2002) compiled by DAQ. The 2005 triennial inventory is currently being compiled and is not yet available for inclusion in this report.

2002 Criteria Pollutant Inventory (tons/year)

County Summary	PM_{10}	$PM_{2.5}$	SOx	NOx	VOC	CO
Beaver	981.11	190.18	215.72	1,926.92	30,086.31	17,263.51
Box Elder	4,299.73	1,150.14	315.22	6,818.65	38,491.01	55,758.99
Cache	2,747.78	734.68	190.91	4,071.71	18,678.23	42,131.03
Carbon	1,257.22	421.35	8,082.37	5,878.06	18,004.84	24,430.76

Daggett	1,022.17	781.22	5.82	1,144.93	15,333.94	10,680.71
Davis	3,378.55	709.07	2,441.04	11,086.59	18,878.71	78,777.83
Duchesne	1,492.56	387.41	104.65	1,653.57	24,443.66	17,302.43
Emery	3,608.46	1,166.36	21,021.82	32,536.97	33,161.97	28,557.85
Garfield	5,061.37	3,933.88	95.47	1,626.27	51,306.71	50,949.38
Grand	4,870.23	3,792.65	57.86	2,899.43	42,457.93	54,850.97
Iron	2,068.23	499.76	531.32	4,010.70	40,993.13	37,045.81
Juab	1,776.07	415.58	309.22	4,200.40	29,977.09	60,015.06
Kane	719.89	175.88	89.48	559.86	48,922.26	16,373.69
Millard	3,108.85	779.25	4,458.34	31,334.00	52,030.53	36,068.02
Morgan	705.52	135.41	172.32	3,291.37	10,373.43	8,564.85
Piute	315.11	123.93	38.46	183.27	13,046.81	7,281.61
Rich	770.81	198.57	34.68	274.62	10,071.12	6,312.57
Salt Lake	13,701.26	4,157.54	5,992.10	46,825.95	51,304.36	287,117.54
San Juan	1,386.85	410.63	1,568.33	2,064.07	65,831.50	28,022.62
Sanpete	1,199.18	261.34	395.16	1,247.33	19,309.58	18,446.14
Sevier	1,487.52	305.17	438.05	2,304.98	20,145.82	28,837.04
Summit	2,755.51	1,382.28	296.15	4,754.04	22,725.54	37,952.21
Tooele	3,895.24	806.71	464.50	6,112.33	44,033.67	46,526.65
Uintah	1,428.90	377.41	83.50	1,414.30	31,424.20	21,358.50
Utah	5,798.47	1,493.72	903.90	13,377.84	36,681.68	119,053.39
Wasatch	788.47	175.03	49.16	1,147.71	18,924.34	14,049.34
Washington	2,568.95	762.72	282.34	4,637.00	58,743.31	56,709.53
Wayne	478.46	83.64	155.10	254.60	24,602.66	8,005.77
Weber	2,768.36	731.20	296.89	6,933.27	16,184.75	62,246.82
Total	**76,440.83**	**26,542.71**	**49,089.88**	**204,570.74**	**906,169.09**	**1,280,690.62**

Table 2.

Planning for the Future

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

In addition, the Clean Air Act now requires transportation planning organizations to prepare information detailing the air quality impacts associated with improvements in the transportation infrastructure. These plans must conform to the plans (SIPs) prepared by the DAQ. Therefore, many of the recent SIP revisions were undertaken with the goal of helping transportation planners adapt to an ever-growing population base.

Status of Current Projects

PSD/NSR - On December 31, 2002 EPA published a major revision to the federal permitting program for modifications at major sources; the program is commonly referred to as the New Source Review (NSR) Reform Rule. All states were required to submit a SIP revision to EPA that incorporates the NSR Reform Provisions by January 2, 2006.

Utah was on track to meet this deadline, but the uncertainty caused by the June 24, 2005 *State of New York vs. EPA* DC Circuit Court decision delayed the rulemaking process pending direction from EPA. Based on guidance received from EPA in August of 2005 to proceed with the implementation of those sections of the rule that were upheld by the DC Court, DAQ submitted the NSR rule to the Air Quality Board on November 2, 2005. The Air Quality Board recommended a 45 day comment period and asked DAQ to develop a technical analysis of the impact of the NSR rule on sources in Utah. The DAQ presented a technical analysis at the fifth NSR Reform Rule stakeholder meeting on November 29, 2005. The comment period commenced on December 1, 2005 and closed on January 17, 2006. The DAQ plans to bring the recommended rule changes to the Air Quality Board during the early months of 2006. A summary of the proposed changes is available at http://www.airquality.utah.gov/Public-Interest/Public-Commen-Hearings/Pubrule.htm

$PM_{2.5}$ – One of the six "criteria" pollutants identified for regulation in the original Clean Air Act of 1970 was total suspended particulate (TSP). In 1987 EPA defined an "indicator" of the suspended particles that were of concern to public health. These were particles with an aerodynamic diameter of ten microns or less, and this newly regulated subset of TSP was called PM_{10}. It includes a complex mixture of extremely small particles and liquid droplets that can be emitted directly, as in smoke from a fire, or it can form in the atmosphere from reactions of "precursor" gases such as sulfur dioxide and ammonia.

Further study of PM_{10} revealed a bi-modal size distribution. In other words, there were typically two distinct groups of PM_{10} particles –those between 2.5 and 10 microns in

diameter, and those smaller than 2.5 microns. A growing body of health studies has led to the conclusion that it is the smaller of these particle groups that most severely impacts public health. In response, EPA in 1997 added a new indicator to the regulatory framework for particulate matter. "$PM_{2.5}$" is defined as particles with an aerodynamic diameter of 2.5 microns or less. As with PM_{10}, EPA established an annual standard as well as a 24-hr standard. The DAQ has monitored for $PM_{2.5}$ since 2000, and found that all areas within the state have remained in compliance with both standards.

Nevertheless, the Cache Valley has come very close to exceeding the 24-hr standard of 65 micrograms per cubic meter ($\mu g/m^3$) due to very high concentrations measured during wintertime temperature inversions. This has prompted the DAQ to work closely with local officials as well as Utah State University to proactively address the situation. Currently, DAQ is conducting computer modeling studies to identify the pollutants that control the formation of $PM_{2.5}$. A specialized air monitoring field project will be conducted during 2006 to help verify the model findings.

In December of 2005 the EPA proposed sweeping revisions to the regulations for particulate matter. This proposal, which is scheduled to be finalized by September 2006, would retain the annual $PM_{2.5}$ standard at its 1997 level of 15 $\mu g/m^3$, but the 24-hr standard would be lowered from 65 to 35 $\mu g/m^3$. At this new level it is likely that Salt Lake, Davis, Utah, Weber, Cache and Box Elder Counties would all be in non-compliance with the federal health standard for $PM_{2.5}$, (see figure 13) and the state would have to prepare comprehensive plans to meet the standards in these areas by the year 2015. Also included in EPA's 2005 proposal is the replacement of PM_{10} with $PM_{10-2.5}$, or "inhalable coarse" particles. As the name suggests, this describes the aggregate of

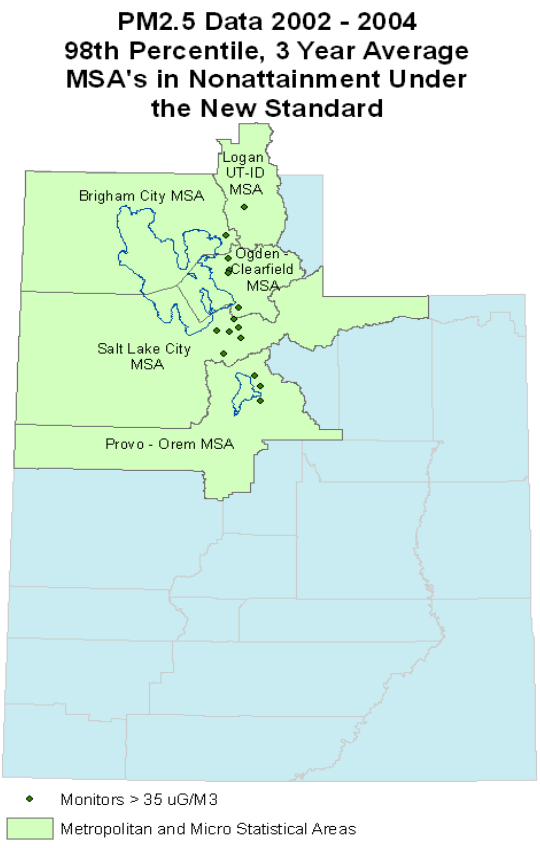


Figure 13.

particles between ten and 2.5 microns in size. The 24-hr standard for PM_{10} (150 µg/m^3) would be replaced by a 24-hr standard for $PM_{10-2.5}$ set at 70 µg/m^3. There would be no annual standard in either case. The DAQ will follow EPA's proposal and participate in the commenting phase of the process. In the meantime the agency will continue to look at what may be causing the problem and determine the most effective ways to reduce this pollution statewide. More information may be obtained at http://www.epa.gov/air/particlepollution/actions.html

Cache Valley PM – The DAQ actively participated in the Cache Valley $PM_{2.5}$ Air Quality Task Force to investigate particulate formation and deposition for Logan and the greater Cache Valley area. The DAQ conducted computer modeling that will help to determine what control measures can be implemented to reduce high wintertime particulate concentrations. Since the Cache Valley includes a portion of Idaho, the Idaho Department of Environmental Quality (DEQ) has installed particulate monitors in Preston and Franklin, Idaho. The DAQ currently monitors ammonia (NH_3) at the Logan site, as well as two additional Cache Valley particulate monitors, one in Hyrum, and one in Amalga. A cooperative air measurement campaign between DAQ and Utah State University is planned for January 2006. Volatile Organic Carbons (VOC) and nitric acid will be measured during several pollution episodes to further the development of the DAQ computer model. More information regarding the project may be found at http://www.airquality.utah.gov/Public-Interest/Current-Issues/cache-valley-PM/index.htm.
Current monitoring data is available at http://www.deq.utah.gov/Divisions/AMC.

Ozone Maintenance Plan - All areas of the state were officially designated as attainment areas for the new 8-hour ozone standard in 2004, and the 1-hour ozone standard was revoked on June 15, 2005. To complete the transition to the new 8-hour ozone standard, the State of Utah must demonstrate that the Salt Lake/Davis County ozone maintenance area will continue to maintain the new 8-hour ozone standard for the next 10 years. The DAQ is currently gathering background information and has begun preparation of the plan. It is scheduled to be presented to the Air Quality Board in late 2006 and will be submitted to the EPA by June 15, 2007.

Regional Haze SIP – When the Clean Air Act was reauthorized by Congress in 1990 it included provisions to improve visibility in large national parks and wilderness areas and established a commission to determine the causes of poor visibility at the Grand Canyon. The Commission determined that many kinds of sources contribute to visibility impairment and recommended strategies for improvement. These strategies were included in EPA's 1999 regulations as an option that western states could use in writing the visibility plans (SIPs) required of all states. Utah is one of five states that submitted plans in 2003 under this option. Key elements of the plan include using a regional cap on SO_2 emissions and a backstop market trading program to be triggered if emissions exceed the emissions cap. Other components identify reduced emissions from prescribed fires and require tracking emissions and visibility conditions every five years through 2018. The most current (2003) Milestone Report prepared by the five states shows that actual sulfur dioxide emissions in 2003 were 25 percent below the emissions cap for that year. Technical work is ongoing with other western states and tribes that are members of the Western Regional Air Partnership to prepare the plan updates that are due late in 2007. More information may be found at http://www.wrapair.org/forums/309/docs.html.

Provo CO – The redesignation request and associated maintenance plan for Provo city CO was approved by EPA in 2005 and became effective on January 3, 2006. The plan demonstrated that there is no longer a need for oxygenated fuels, and revised the transportation conformity budget. Revisions to both the Salt Lake City and Ogden City maintenance plans for CO were previously approved by the EPA. In each case, the transportation conformity budget was updated to reflect the use of mobile emissions model MOBILE6.

Ancillary Programs

Within the community there are some familiar programs and information hotlines which have their roots in some of the air quality plans developed at DAQ. These include:

Woodburning Program (red-burn / green-burn) – This has its origin in a problem with meeting the health standard for PM_{10}. Although originally met with some skepticism, the measurable success of this program has been outstanding, owing much to the voluntary cooperation of Wasatch Front residents. The program runs from November through early April of each year. In addition to the burning restrictions, residents are encouraged to drive less and industry is encouraged to optimize operating conditions. Notification is given through the general media, or can be found on the web at either http://www.airmonitoring.utah.gov/api.htm or http://www.cleanair.utah.gov/wood_burning.htm

Vehicle Inspection/Maintenance Programs – Although not run directly by DAQ, the emissions portions of these programs were instituted because of past problems in attaining the federal health standards (NAAQS) for several pollutants; most notably CO and ozone. Implementation of these programs was critical to obtaining these standards, and their continued operation is necessary for the Wasatch Front to remain in attainment of these standards. These programs are administered by the counties.

Air Quality Index (AQI) – The AQI is an index that relates current air quality data to potential health effects. The purpose of the index is to help DAQ understand how air quality can impact our health. The index ranges from 0 to 500 with higher values corresponding to more pollution and increased adverse health effects. Levels below 100 are considered satisfactory while levels above 100 are considered to be increasingly unhealthy. An AQI is calculated for 5 major pollutants including ground-level ozone, particulate pollution (particulate matter), carbon monoxide, sulfur dioxide and nitrogen dioxide. See http://www.airquality.utah.gov/ for the current AQI.

No Drive Days – These are announced whenever the probability of exceeding the ozone standard is forecast to be high. High temperature and stagnant air masses contribute to this probability. Residents are also encouraged to minimize driving when we approach the PM standards.

Choose Clean Air – An interactive source of information about ways individuals can help improve air quality by making smart choices in their personal lives may be found on the website at http://www.cleanair.utah.gov. The Utah Department of Environmental Quality is also sponsoring an electronic mail server, known as a List Server or Listserv. Those who join will be automatically notified by e-mail when unhealthy air pollution levels are forecast for the Wasatch Front. Information about how to subscribe to Listserv can be found @ http://www.deq.utah.gov/ListServe.

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

Cache County	435-792-6611
Davis County	801-546-8860
Salt Lake County	801-944-SMOG
Utah County	801-851-SMOG
Weber County	801-399-7140

Permitting

The DAQ Permitting Branch is responsible for issuing permits to any source that emits any contaminant into the air. These permits often establish actual emission limits that can be measured, but it's not unusual to find surrogate limits such as production rates or limited hours of operation or combinations of these surrogates. Also common are limits on opacity, which is the transparency or opaqueness of the smoke that is emitted from a source.

The branch issues two types of permits. New Source Review (NSR) permits are basically Construction Permits that are called "Approval Orders" (AO). These are issued by the New Source Review Section and have been required since 1969. The Operating Permits Section issues the Title V Operating Permits to the larger "major" sources in the state; there are approximately 100 of these sources. These Operating Permits basically consolidate all air quality related requirements into a single document, making it easier for the source to understand all of the many requirements with which they must comply. It is also easier to conduct inspections with a consolidated document, as well.

In addition, the branch also processes a number of smaller actions such as de minimus determinations for NSR, name changes, tax exemption certificates for pollution control equipment purchases, and soil aeration approvals. Information regarding permits and permit applications may be found at
http://www.airquality.utah.gov/Permits/index.htm

New Source Review

Any new or modified source of air pollution in Utah is required to obtain an Approval Order (AO) before it is allowed to construct. The application, called a notice of intent (NOI), is reviewed to make sure that the source is planning to use the best available

control technology (BACT). BACT is a case-by-case determination that takes into account both the cost and the benefits of the control equipment. An approval order is

written based on the NOI to ensure that the source will be operated in accordance with the Utah Administrative Code (UAC) and all applicable federal requirements.

The general public and EPA are given an opportunity to review the proposed approval order before it is issued. The criteria indicating which sources must obtain an approval order are specified in R307-401 of the UAC. Potential applicants are encouraged to contact DAQ prior to submitting the necessary paperwork. In fiscal year 2005 (7/1/04 to 6/30/05) the NSR section completed or was working on 313 different projects. This included the completion of 129 AO's and 109 other projects.

Operating Permits

Congress created Title V of the Clean Air Act in 1990. This Title requires states to issue an Operating Permit to the larger or "major" sources of air pollution within the state. Utah developed and submitted a program in 1994 and received approval from the EPA in 1995. As stated above, a primary purpose of the permit is to consolidate the applicable air requirements from the many and varied locations such as Approval Orders, federal New Source Performance Standards (NSPS), National Emissions Standards for Hazardous Air Pollutants (NESHAP) and Maximum Available Control Technology (MACT) requirements. Like the Approval Orders, the general public is given an opportunity to review the draft Operating Permits before they are issued; in addition, the EPA has up to 45 days to review the proposed Operating Permit as well. The criteria indicating which sources must obtain an Operating Permit are specified in R307-415 of the UAC. As with the NSR Permit or AO, potential applicants are encouraged to contact DAQ prior to submitting the necessary paperwork.

Another significant purpose or 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, not just the civil liabilities of other violations. In addition, sources must report the results of monitoring at least every six months. Permit provisions for monitoring, record keeping and reporting are added or enhanced to assure compliance with the permit conditions and limits.

During 2005, the Operating Permits section issued several permit modifications, coordinating extensively with the NSR Section. The Operating Permit has a life of only five years (as opposed to the AO that does not expire), and in 2005 the section issued several permit renewals. These renewal permits become a bit complex, and care must be taken to ensure that new federal requirements for the Compliance Assurance Monitoring Rule (CAM) and any other new requirements (such as new MACT Standards) are included as appropriate.

Compliance Activities

The Compliance and the Hazardous Air Pollutants Sections are responsible for ensuring that all regulatory requirements are met. This is done through inspections, emission testing, and review of periodic reports from industry, and enforcement.

Inspection and Enforcement

DAQ regulates more than 2,000 facilities within the state through approval orders, state rules and federal emission standards. Annual inspections encourage these facilities to maintain continuous compliance with the rules and permit conditions. Possible enforcement actions, which may lead to financial penalties or additional regulatory requirements, provide incentive for source operators to see that these conditions are taken seriously. Inspectors in the Compliance Section average roughly 1,500 inspections per year. They also respond to about 250 complaints each year, and frequently conduct drive-by observations of visible emissions.

Should enforcement actions become necessary, the DAQ may issue written warnings called Source Compliance Action Notices (SCANs), Compliance Action Notices (CANs), or Notices of Violation (NOVs) with compliance orders. SCAN warnings are usually reserved for first-time offenders with minor infractions. CANs are less formal than NOVs and offer the company an opportunity to settle the compliance action in a rapid manner and be offered a reduced penalty for their expedient cooperation. NOVs are used whenever there are significant violations of the rules or permit conditions, and the violator may be fined as much as $10,000 per day per violation. Most of the violations are resolved with a settlement agreement between the Executive Secretary and the operator, saving time and court costs. Early settlement compliance advisories provide incentive for source operators to address these issues in a timely manner. Settlements may also include supplemental environmental projects. These are environmentally beneficial projects that a violator agrees to undertake as a way to offset some or all of a civil penalty.

Stack Test Audits

Regulated sources are required to conduct periodic stack tests in order to verify that their facilities are operating properly. Some of the largest sources maintain continuous emissions monitors that record real-time emission rates and concentrations around the clock. In either case, DAQ personnel will audit the records and reports to ensure that the testing was done in accordance with EPA reference methods.

2005 Compliance Summary

The following is a summary of 2005 compliance activities:

Annual Inspections completed

Major A Sources	126
Synthetic Minor Sources	133
Minor B Sources	207
Stack Test Audits	55
Continuous Emission monitor Audits	33
Complaint Responses	254
Miscellaneous Inspections (Includes VOC degreasers, transport inspections, paint booths and surveillance)	668
Total Inspections Conducted	1476

Penalty Assessments for 2005 Air Quality violations:	
Number of violations	50
Penalties collected in cash	$254,619
Penalties credited for environmental enhancement	$155,441
Total penalties collected	$410,060

Hazardous Air Pollutants (HAPS)

The Hazardous Air Pollutants Section determines compliance with specific regulations involving the emission of hazardous air pollutants. For more information see http://www.qirquality.utah.gov/HAPs/index.htmThe following programs currently reside within HAPS:

National Emission Standards for Hazardous Air Pollutants (NESHAP), 40 CFR Part 61 (R307-214-1). HAPS presently oversees 12 sources operating under these regulations due to emissions of asbestos, beryllium, benzene waste, or radon from uranium mill tailings.

National Emission Standards for Source Categories - Maximum Achievable Control Technology (MACT), 40 CFR Part 63 (R307-214-2). These regulations cover the emission of 187 additional hazardous air pollutants, and sources of these pollutants are required to apply controls that are equivalent to what is in service for the "best controlled 12%" of all such operations in the nation. Utah presently oversees about 225 sources that must comply with these regulations.

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

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

Asbestos NESHAP and State asbestos work practices - 40 CFR Part 61, subpart M, R307-801. Under this program, HAPS deals with the certification of individuals and companies, review of asbestos project notifications, review of demolition notifications for structures, review of alternate work practices, inspection of asbestos abatement projects and demolition of structures, and asbestos outreach activities.

Small Business Assistance Program

The Small Business Assistance Program (SBAP) helps small businesses understand and comply with state air quality rules. The SBAP provides "plain language" educational information to help small sources learn about the many air quality requirements, and also provides on-site assistance with process evaluation, compliance assistance, and pollution prevention (P2) techniques.

Another function of the SBAP is to incorporate the advice of a Small Business Ombudsman and a Small Business Advisory Panel that is appointed by the Legislature. These additional services are designed to provide education to small businesses outside of the regulatory environment, and also to provide feedback to the SBAP regarding program effectiveness. All of these services are free of charge. A toll-free telephone hotline (1-800 270-4440) provides access to SBAP services 24 hours a day / seven days a week. For more information see either the Department of Environmental Quality web site at www.deq.utah.gov/offices/ppa/business/index.htm, or the Division of Air Quality web site at www.airquality.utah.gov/Permits/Small_Business_Assistance_Program.htm.

Outreach

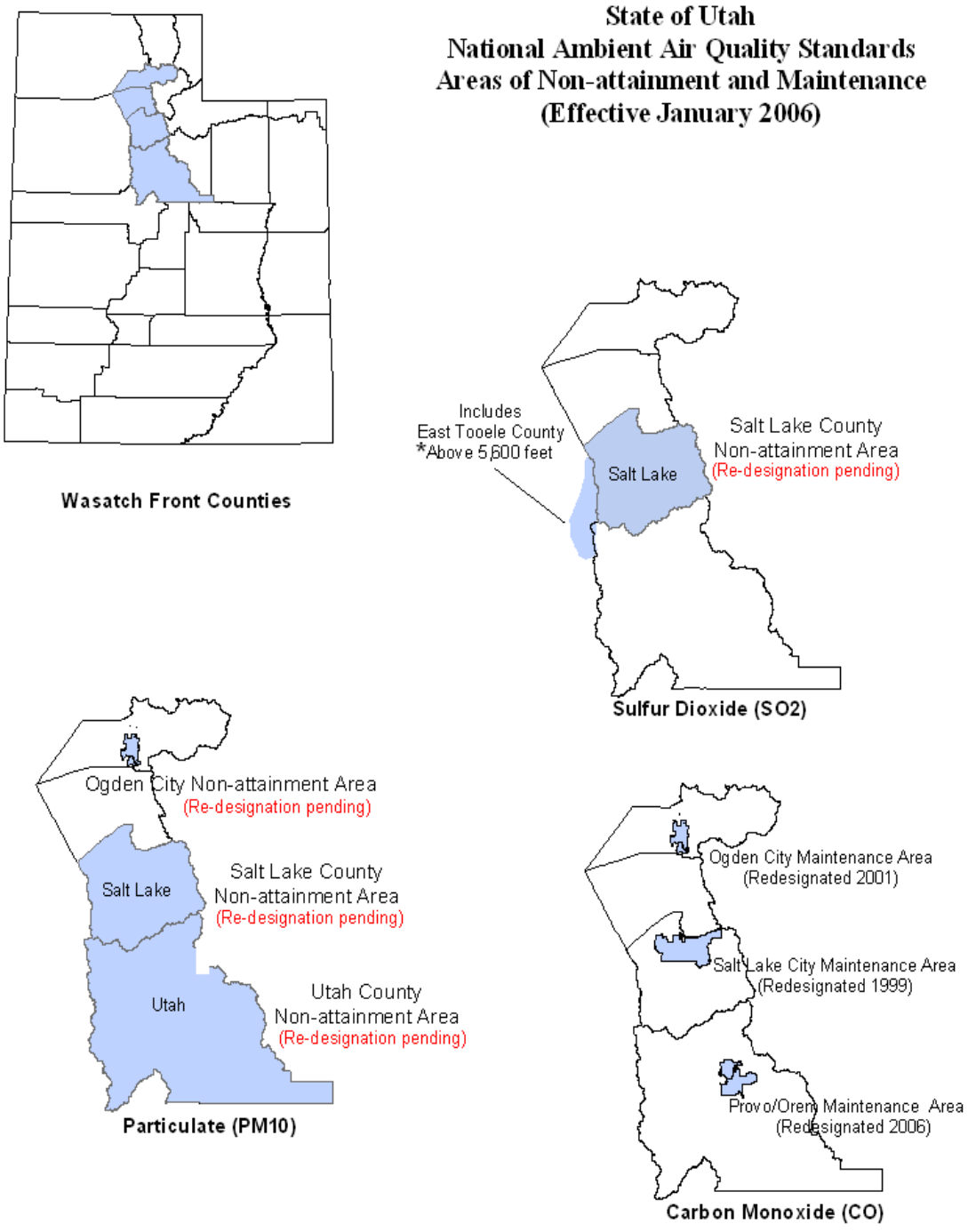
The DAQ provides access to all plans, rules, and permits currently open for public comment, lists training workshops available to assist industry understand permitting and compliance issues, provides Air Quality Board minutes and information, and also provides access to all Air Quality Permitting and Compliance forms. The DAQ Outreach website may be accessed through the *Public Interest* tab at www.airquality.utah.gov/.

Frequently Asked Questions

How do I get an air quality permit? The first step is to contact the DAQ at (801) 536-4000 and ask to speak with the New Source Review Section. Later, in order to ensure that the required application information is complete, request a copy of "The Methodology." Information on obtaining air quality permits may be found at http://www.airquality.utah.gov/Permits/index.htm.

What are Utah's nonattainment and maintenance areas? Figure 14 is a map of the current nonattainment and maintenance areas within the state. A maintenance area is an area that was once designated as nonattainment, and which subsequently demonstrated that it will attain and maintain the particular standard for a period of 10 years. EPA must

approve the demonstration. As indicated below, all nonattainment areas are currently pending redesignation to maintenance.



Note: The entire state is in attainment for $PM_{2.5}$ and 8-hour Ozone

Figure 14.