UTAH

AIR MONITORING

NETWORK REVIEW 2006

Prepared by the Division of Air Quality

Utah State Department of Environmental Quality

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MONITORING NETWORK REVIEW

1.0 INTRODUCTION

The monitoring network has been described in the network reviews from 1982 through 2006. A complete description of each station is located in the station file at the Air Monitoring Center and is available upon request. This network review will focus on the adequacy of the existing network and the changes that are needed.

The existing or proposed monitoring stations are reviewed to see if the objectives are being met. The most recent emissions inventories for each pollutant are reviewed along with ambient data gathered in the area and, when available, a review of current computer air pollution dispersion modeling is also reviewed. The practicality of installing or maintaining a monitoring station at the current or proposed location is then reviewed with respect to the initial monitoring objectives, the available budget for monitoring, and the Division's monitoring priorities. A Network Modification Form is submitted to Region VIII of the Environmental Protection Agency prior to or as part of installing a new station. The network review process follows the requirements of 40 CFR 58.20(d).

1.1 CURRENT UTAH AIR MONITORING NETWORK

Table 1 lists the stations in Utah's current air monitoring network. The indicated location is the actual location address.

Under the listed parameters, a station may be designated NAMS = National Air Monitoring Station, SLAMS = State and Local Air Monitoring Station, or SPM = Special Purpose Monitor. The monitoring objectives (population exposure, source impact, highest expected concentration or background station) and the spacial scale of representativeness (micro, middle, neighborhood, urban or regional scales) are also designated.

Spacial scale of representativeness is described in terms of the physical dimensions of the air parcel surrounding an air monitoring station, throughout which pollutant concentrations are reasonably homogeneous. The scales of representativeness used for Utah's network are in the following ranges:

Micro Scale:	Several meters to about 100 meters
Middle Scale:	About 100 meters to 0.5 kilometers
Neighborhood Scale:	About 0.5 to 4.0 kilometers
Urban Scale:	Overall citywide conditions, usually about 4.0 to 50 kilometers. Requires more than one station to define
Regional Scale:	Defines a rural area, usually of reasonably homogeneous geography, extending for tens to hundreds of kilometers

Table 1
UTAH AIR MONITORING NETWORK

STA., LOC., ARIS#, SAROAD#	SO_2	CO	O_3	NO_2	LEAD	PM_{10}	$PM_{2.5}$
Amalga 6970 N 2400 W Amalga UT 49-005-0005							SPMS Population Neigh.
Beach #4 12100 West. 1200 S. GSL Beach Marina, Magna, UT 49-035-2004 460900005FO2	SLAMS High Neigh.		SLAMS* High Neigh.				
Bountiful #2 171 West 1370 North Bountiful, UT 49-011-0004 460060001F01	SLAMS Impact Neigh.		NAMS* High Neigh.	SLAMS Population Neigh.			SLAMS Population Neigh.
Brigham City 140 West Fishburn Dr Brigham City, UT 49-003-0003			SLAMS Population Neigh.				SPMS Population Neighbor
Cottonwood, 5715 South 1400 East Behind School, Holladay, UT 49-035-0003 4600003F01		NAMS Population Neigh	NAMS* Population Neigh.	SLAMS High Neigh.		NAMS Population Neigh.	SLAMS Population Neigh.
Hawthorne 1675 South 600 East Salt Lake City, UT 49-035-3006		SLAMS* High Neigh.	SLAMS* High Neigh.	SLAMS High Neigh.		SLAMS High Neigh.	SLAMS Population Neigh.
Harrisville 405 West 2550 North Ogden, UT 49-057-1003			SLAMS Population Neigh.				SLAMS Background Regional
Herriman 5600 West 12885 South Herriman, UT 49-035-3008			SLAMS* High Neigh.				SPMS Background Regional

*Indicates Seasonal Monitoring
**Should be re-designated to NAMS

Table 1
UTAH AIR MONITORING NETWORK

STA.,LOC ARIS#, SAROAD#	SO_2	CO	O_3	NO_2	LEAD	PM_{10}	$PM_{2.5}$
Highland 10865 North 6000 West Highland, UT 49-049-5008			NAMS* High Neigh.				SPMS Population Neigh.
Hyrum 100 N 480 W Hyrum, UT 49-005-0006							SPMS Population Neigh
Lindon 30 North Main, Lindon, UT 49-049-4001 461220001F01						NAMS Impact Neigh.	SLAMS Population Neigh.
Logan 125 West Center Street Logan, UT 49-005-0004			SLAMS* Pop Neigh.			SLAMS High Neigh.	SPMS Population Neigh.
Magna 2935 South 8560 West, Magna, UT 49-035-1001 460520001F02	NAMS Impact Neigh.				SLAMS Impact Neigh.	NAMS High Neigh.	SPMS Population Neigh
North Provo 1355 North 200 West Provo, UT 49-049-0002 460800002F01		SLAMS* Population Neigh.	NAMS* Population Neigh.	SLAMS High Neigh.		NAMS Population Neigh.	SLAMS Population Neigh.
North Salt Lake #2 1795 North 1000 West Salt Lake City, UT 49-035-0012 460920012F02	SLAMS ** High Middle					NAMS High Middle Co-Loc	SPMS High Middle

*Indicates Seasonal Monitoring
** Should be re-designated to NAMS

TABLE 1
UTAH AIR MONITORING NETWORK

STA., LOC., ARIS#, SAROAD#	SO_2	CO	O_3	NO_2	LEAD	PM_{10}	$PM_{2.5}$
Ogden #2 228 E 32nd Street Ogden UT 49-057-0002				SLAMS High Neigh.		SLAMS High Neigh.	SLAMS High Neigh.
Spanish Fork 50 South Main 49-049-5010			SLAMS* Population Neigh.				SPMS Transport Regional
State Street #3 1400 South State Street Salt Lake City, UT 49-035-0014		NAMS High Micro					
Tooele #3 50 West 434 North Tooele, UT 49-045-0003			SPM Population Neigh				SPM Population Neigh
Washington Blvd. #2 2540 South Washington Blvd, In Office Bldg. Ogden, UT 49-057-0006		SLAMS High Micro					
Washington Terrace 4601 South 300 West Washington Terrace, UT 49-057-0007			NAMS* Population Neigh.				SPMS Population Neigh.
West Valley 3100 South 3275 West West Valley City, UT 49-035-3007		SLAMS* Population Neigh.	SLAMS* Population Neigh.				SLAMS Population Neigh.

*Indicates Seasonal Monitoring
**Should be re-designated

UTAH DIVISION OF AIR QUALITY

OFFICIAL AND SPECIAL STUDIES MONITORING NETWORK SUMMARY JUNE 2006

	SITE CODE	TELEMETRY	PM 2.5	#PM2.5	PM10	#PM10	CO	O3	SO2	NO2	SPAN SOURCE	WIND	TEMP/RH	SR/BP*	SG/DT/PRE*	LEAD	AQI
ANTELOPE ISLAND	AI	CAMPBELL										YES	TEMP&RH		SIGMA ONLY		
AMALGA	AG	N/A	3 DAY	1													
BADGER ISLAND	BI	CAMPBELL										YES	TEMP&RH		PRECIP. ONLY		
BEACH	B4	ESC						*SEASONAL/API	TECO		DYNACAL/API	YES	TEMP		SIGMA ONLY		
BOUNTIFUL	BT	ESC	3 DAY	2				*SEASONAL/DASIBI	TECO	TECO	DYNACAL/DASIBI/CYLINDER	YES	TEMP&RH		SIGMA ONLY		SO2/CO/O3
BRIGHAM CITY	BR	ESC	3 DAY	1				*SEASONAL/API			DASIBI	YES	TEMP		SIGMA ONLY		
COTTONWOOD	CW	ESC	3 DAY	1	3 DAY	1	TECO	*SEASONAL/DASIBI		TECO	DYNACAL/DASIBI/CYLINDER	YES	TEMP&RH		SIGMA ONLY		O3/CO
HARRISVILLE	HV	ESC	3 DAY	1				*SEASONAL/DASIBI			DASIBI	YES	TEMP		SIGMA ONLY		
HAWTHORNE	HW	ESC	TEOM & E D	3	TEOM & ED	2	*SEASONAL/ TECO	DASIBI		TECO	DYNACAL/API/CYLINDER	YES	TEMP&RH	SR & BP			TEOM (2.5&10) O3/CO
HERRIMAN	HE	ESC	3 DAY	1				*SEASONAL/DASIBI			DASIBI	YES	TEMP&RH	SOLAR	SIGMA & DT		
HIGHLAND	HG	ESC	3 DAY	1				*SEASONAL/DASIBI			DASIBI	YES	TEMP		SIGMA ONLY		
HYRUM	HY	ESC	3-DAY									YES	TEMP&RH				
LINDON	LN	ESC	TEOM/CL/E D & CL	3	TEOM & ED	2					N/A	YES	TEMP&RH		SIGMA ONLY		TEOM (PM10/2.5)
LOGAN	L4	ESC	TEOM/3 DAY & CL	3	3 DAY	1	*SEASONAL/TECO	DASIBI	TECO	TECO	DASIBI/CYLINDER	YES	TEMP&RH		SIGMA ONLY		TEOM (PM2.5)CO/O3
MAGNA	MG	ESC	3 Day	1	3 DAY	1			TECO		DYNACAL	YES	TEMP		SIGMA ONLY	*HV/CL	SO2
NORTH PROVO	NP	ESC	3 DAY	1	3 DAY & CL	2	*SEASONAL/TECO	*SEASONAL/DASIBI		TECO	DYNACAL/DASIBI/CYLINDER	YES	TEMP		SIGMA ONLY		O3/CO
N. SALT LAKE	N2	ESC	3 DAY	1	E/D &CL	2			TECO		DYNACAL	N/A					SO2
OGDEN #2	O2	ESC	TEOM/3 DAY	2	TEOM/ED	2				TECO	DYNACAL	Yes	TEMP&RH				TEOM (PM10/2.5)
SALTAIRE	SA	CAMPBELL										YES	TEMP&RH	SOLAR	SIGMA ONLY		
1400 S. STATE	S3	ESC					TECO				CYLINDER	N/A					CO
SPANISH FORK	SF	ESC	3 DAY	1				*SEASONAL/API			API	YES	TEMP		SIGMA ONLY		
SYRACUSE	SY	CAMPBELL										YES	TEMP&RH		SIGMA ONLY		
TOOELE	T3	ESC	TEOM/3DAY					*SEASONAL/API			API	YES	TEMP				TEOM/03
WASH. BLVD	W2	ESC					TECO				CYLINDER	N/A					CO
WASH. TERR.	WT	ESC	3 DAY & CL	2			*SEASONAL/TECO	*SEASONAL/DASIBI			DASIBI/CYLINDER	YES	TEMP&RH		SIGMA ONLY		O3/CO
WEST VALLEY	WV	ESC	3 DAY & CL	2			*SEASONAL/TECO	*SEASONAL/DASIBI			DASIBI/CYLINDER	YES	TEMP				
WEST JORDAN	WJ	ESC										YES	TEMP&RH				
SITES	27	26	20		8		7	14	5	6		23	24	3	19	1	13
REPORTING SMPLRS.				27		13										1	
CO-LOC SMPLRS.				3		2										1	
SEASONAL SMPLRS.							5	11									
TEOM (PM 2.5 & 10)				6		3											

!SPM – SPECIAL PURPOSE MONITOR
ESC - DATA LOGGER

*SEASONAL TECO - COLLECT CO DURING WINTER SEASON (NOV-MAR)
*SEASONAL DASIBI – COLLECT O3 DURING SUMMER SEASON(MAY-SEPT)
*EOD - EVERY OTHER DAY SAMPLING
*ED - EVERY DAY SAMPLING

SR/BP* - SOLAR RADIATION & BAROMETRIC PRESSURE
C/L - CO-LOCATED
H/V – HIGH VOLUME SAMPLER
'SG/DT/PRE*-SIGMA-THETA, DIFFERENTIAL TEMP. & PRECIPITATION

1.2 CURRENT NETWORK MODIFICATION ISSUES:

The following modifications to the monitoring network are anticipated during the next year.

The PM_{10} and $PM_{2.5}$ concentrations at the North Salt Lake monitoring station are impacted by local commercial and industrial operation including a large sand and gravel operation. Trucks that haul material from the pass near the station. At times the trucks idle near the station when trains pass on the tracks that are east of the station. There are times when a train is being assembled for departure. At those times the large diesel trucks and other vehicle are stopped by the tracks for extended periods of time waiting for the train. For these reasons, a monitoring site more representative of the residential urban nature of the surrounding neighborhood needs to be established. A site in the Rose Park community would best meet that need. The North Salt Lake monitoring station is discussed further in the section on $PM_{2.5}$.

The micro scale CO monitoring sites at State Street and University Avenue have not measured violations of the CO NAAQS for many years. EPA discussions say CO is a solved pollution problem across the nation. It appears that is also the case in Utah. With EPA's approval the State Street and University Avenue stations will be closed and the resources associated with those stations will be used to meet other objectives. The State Street and University Avenue CO monitoring sites are discussed further in the section on CO.

Response to change in EPA Focus

EPA has proposed a National Ambient Air Monitoring Strategy. It identifies an increased focus on monitoring non-criteria pollutants. In so doing, EPA is proposing re-allocating funding from measuring criteria pollutants to increased monitoring of Air Toxics. Rules to implement the new monitoring strategy will be promulgated this fall. As EPA changes the monitoring requirements in 40 CFR Part 58 and implements the National Monitoring Strategy, the DAQ monitoring efforts will change. The changes required to the monitoring network will be identified in the next monitoring network review.

Response to New or Proposed NAAQS

EPA has proposed a change to the $PM_{2.5}$ NAAQS. The final promulgation of that standard will contain a time line for implementation of the change and changes to the monitoring network. Those changes will be discussed in the next monitoring network review.

DAQ Identified Data Needs

With lead, CO and SO_2 being considered as "solved pollutants", the focus needs to turn to measuring non-criteria pollutants (called toxic air pollutants) and to measuring CO,

1.2 CURRENT NETWORK MODIFICATION ISSUES (Cont)

SO_2 and ozone at very low levels. We need to focus on toxic air pollutants in order to provide data in evaluating these pollutants involvement in the formation of secondary particulate matter and ozone. EPA's monitoring policy and rule changes require these needs to be discussed in next years review.

Additional Monitoring Needs Due to Growth

Utah has experienced significant population growth over the past 15 years. A table showing the growth rate is attached as Appendix B. Changes to the monitoring network the past couple of years have addressed some of the population growth. The area discussed below deserves consideration for future monitoring.

Park City-Snyderville Basin-Summit County: Summit County and Park City have a high population growth. Their Meteorology is significantly different than Salt Lake Valley; but they do have inversion periods. Although the inversions are easier to eliminate than the inversions in Salt Lake Valley, they can be persistent. With a population of 34,000, it is an air shed that needs to be evaluated.

Modifications to Meteorological Monitoring Because of Computer Modeling Needs

Computer modeling is a very important part of evaluating air pollution impacts and the results of control strategies and control measures. Meteorological data is necessary to the computer modeling.

Differential temperature measurements at 2 meters and 10 meters are needed in response to new computer modeling requirements. A delta T site is needed in each air basin that may require computer modeling. Those areas will be determined through discussions with those that run the computer models that need the data.

No change has been identified this year to the meteorological monitoring network.

1.3 REVIEW OF LAST YEAR NETWORK MODIFICATIONS

$PM_{2.5}$ concentrations in Cache County continue to be a concern. In response to that need, new $PM_{2.5}$ monitoring stations were installed in Amalga and Hyrum in Cache County. Amalga is 6 miles north northwest of Logan and the Hyrum site is 6 miles south of Logan in Cache Valley. $PM_{2.5}$ data were collected during the winter season 2005-06 at these two new sites.

Tooele City in Tooele County is now part of the Salt Lake City Metropolitan Statistical Area. Tooele City and the surrounding area is experiencing rapid growth. The population is 48,000 and increasing. In response to that growth and the existing population, a new monitoring site was established in Tooele City to measure $PM_{2.5}$ meteorological data and summer ozone.

2.0 UTAH AIR MONITORING NETWORK

The following sections discuss the air monitoring network in Utah for the criteria pollutants identified by EPA that have a National Ambient Air Quality Standard. The need for ambient air monitoring for each criteria pollutant is different, and the requirements for selecting an appropriate monitoring site are identified by EPA in 40 CFR Part 58. In many cases, monitoring for more than one criteria pollutant can be performed at the same monitoring location, which enhances the value of the data and reduces sampling costs to the state.

2.1 SULFUR DIOXIDE

The sulfur dioxide (SO_2) monitoring sites were installed at their present locations based on the emissions inventory and early computer modeling. Siting has also occurred in response to concerns expressed by the public. Computer modeling showed areas of expected high SO_2 concentrations at Magna, in Salt Lake County and the area of North Beck Street in Salt Lake County. The Magna and North Salt Lake SO_2 Monitoring sites were installed in response to that computer modeling. A review of the SO_2 data showed no violations of the SO_2 standard since 1978. EPA has said that SO_2 is a solved pollutant and resources used to measure SO_2 can be redirected to addressing other issues. SO_2 continues to be a concern in that it has an important part in the formation of particulate matter through the formation of secondary sulfate particles, therefore, more detailed SO_2 data may be needed to help understand the formation of particulate matter.

SO_2 NETWORK

Salt Lake County

There are three types of major SO_2 sources in Salt Lake County. They are process industries, refineries and electric power generation. The impact of each of these sources is measured by the existing monitoring stations. The monitoring stations located at Magna, North Salt Lake and at the Great Salt Lake Beach State Park are meeting our needs and objectives.

Davis County

The largest SO_2 sources in Davis County are oil refineries. In recent years, the crude oil being processed by the oil refineries has become increasingly more sour, so the refineries have installed sulfur scrubbing systems to reduce their SO_2 emissions. Their emissions are adequately monitored by the North Salt Lake Station near the Salt Lake County-Davis County border. The new Bountiful monitoring station in Davis County is population oriented as was the previous monitoring site. It is the only SO_2 monitoring station in Davis County and is meeting DAQ needs and objectives.

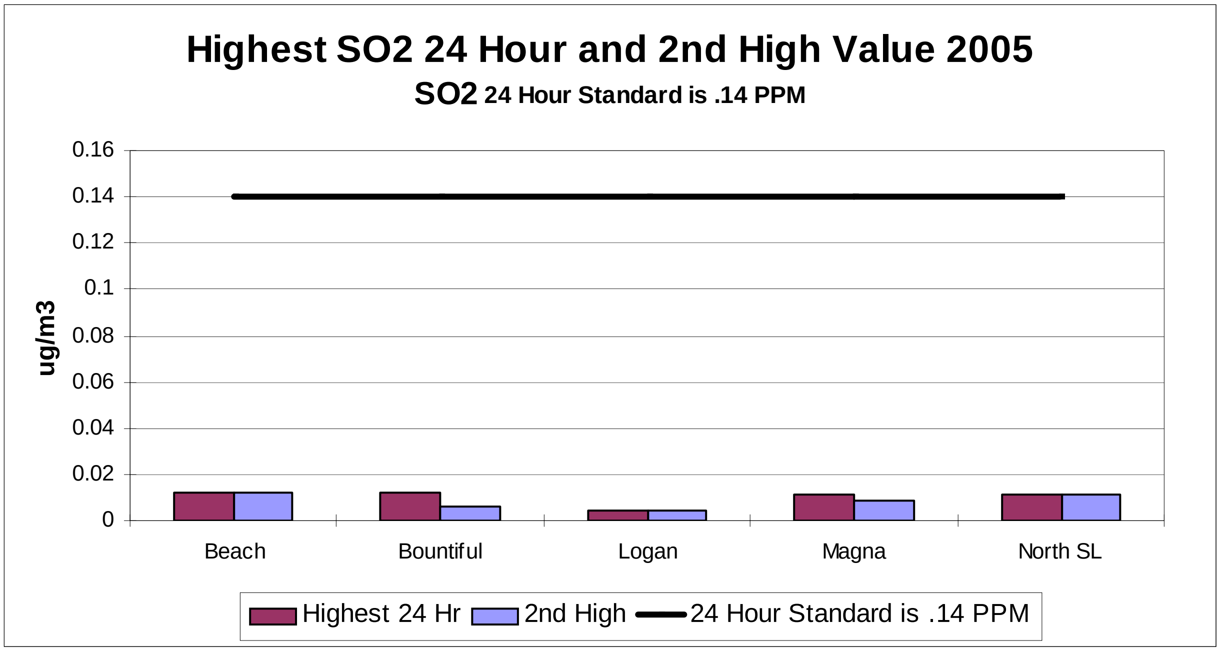
Cache County

SO_2 is being monitored in Logan to help identify SO_2 precursors for $PM_{2.5}$. The information is needed in characterizing $PM_{2.5}$ in the Logan area.

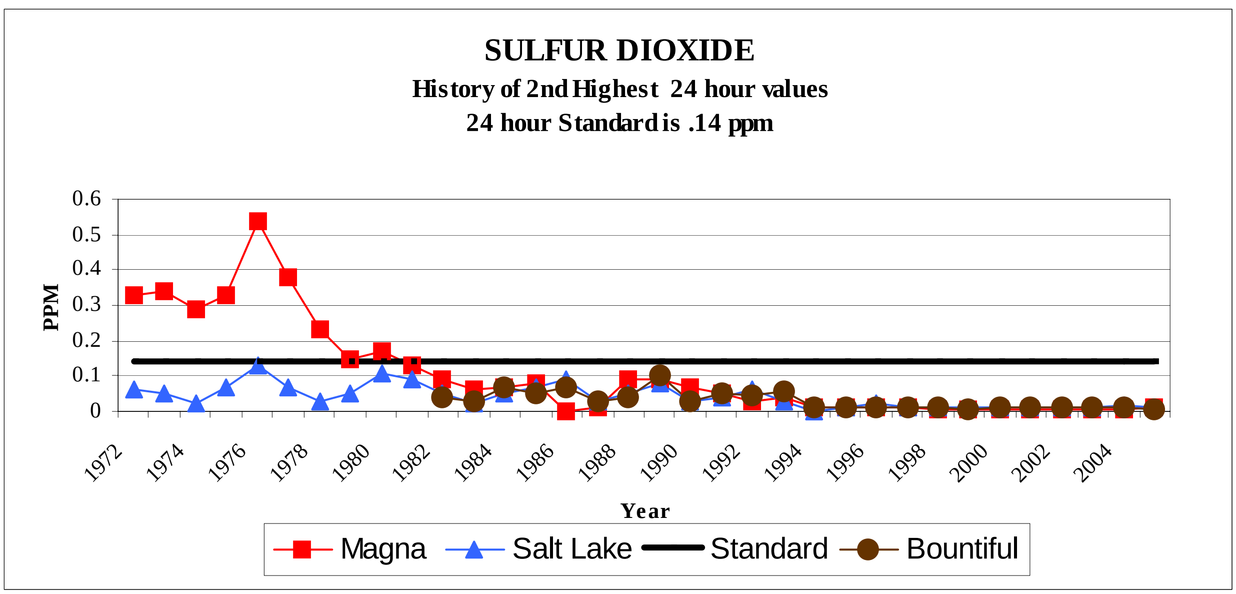
Existing Monitoring Network

The existing SO_2 monitoring network meets the federal requirements and State needs.

The following graph displays the highest and second highest 24 hour average for the monitoring stations. As can be seen the highest values are not even close to the standard.



The following graph shows the history of SO_2 concentrations measured in Utah. The graph shows the last time the standard was exceeded was 1981. Since that time SIP requirements and control measures implemented by industrial operations have resulted in low SO_2 levels.



2.1 SULPHUR DIOXIDE (Cont)

Additional Monitoring

The above graphs show that there is no longer an SO_2 concern in Utah. No additional SO_2 monitoring is planned.

Special Studies

No special studies are planned.

Changes To The SO_2 Monitoring Network

No changes are planned to the SO_2 monitoring network.

2.2 NITROGEN DIOXIDE

The existing Nitrogen Dioxide (NO_2) monitoring stations were installed at their current locations based on a combination of emissions inventory and population centers. The sites were installed in response to oxides of Nitrogen (NO_x) emissions from automobiles and the involvement of NO_x in the photochemical reaction that produces ozone. Based on that criteria, the sites were located in the center of the major urban areas. EPA's guidance that monitoring should be performed in areas with a population of 200,000 or greater was considered. Even though NO_x monitors are located in cities with populations of less than 200,000, the urban areas have populations over 200,000. The sites were also selected based on the ability to group several different analyzers into one station.

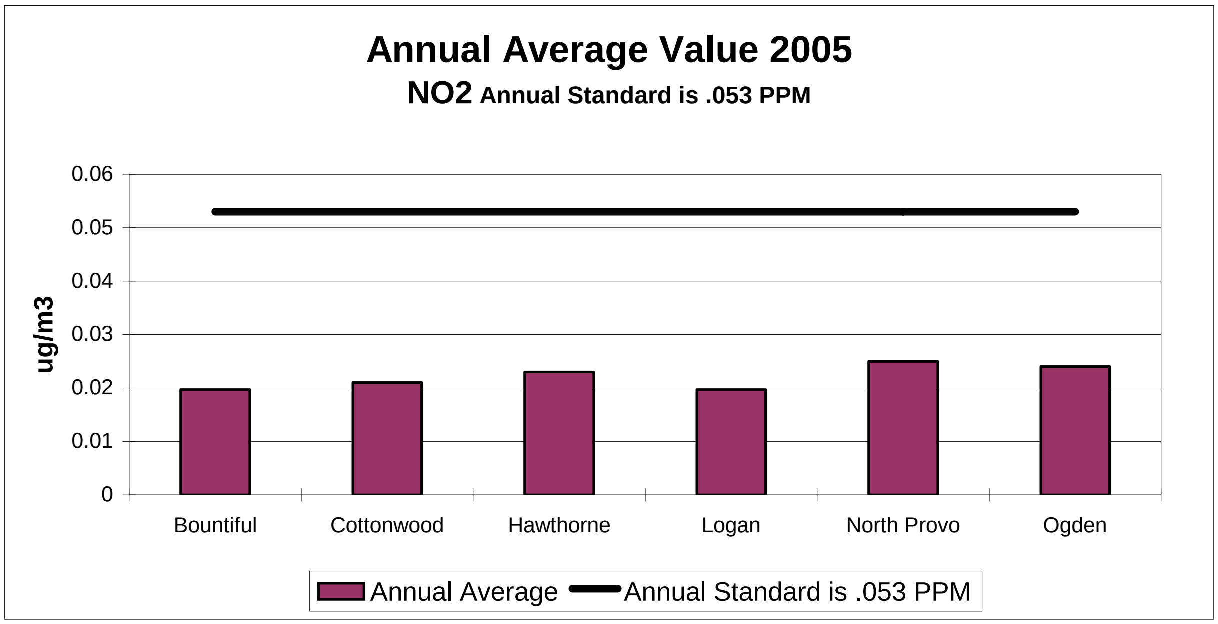
The oxidation of Nitric Oxide (NO) to NO_2 takes time, therefore, the highest NO_2 concentrations should be located some distance downwind from major NO sources. The ideal location for NO_2 monitors is at the edge of an urban area. NO_2 is also a concern because of its involvement in the formation of ozone and secondary particulate matter. More detailed NO_2 data may be needed to help better understand the formation of ozone and particulate matter.

NO_2 NETWORK

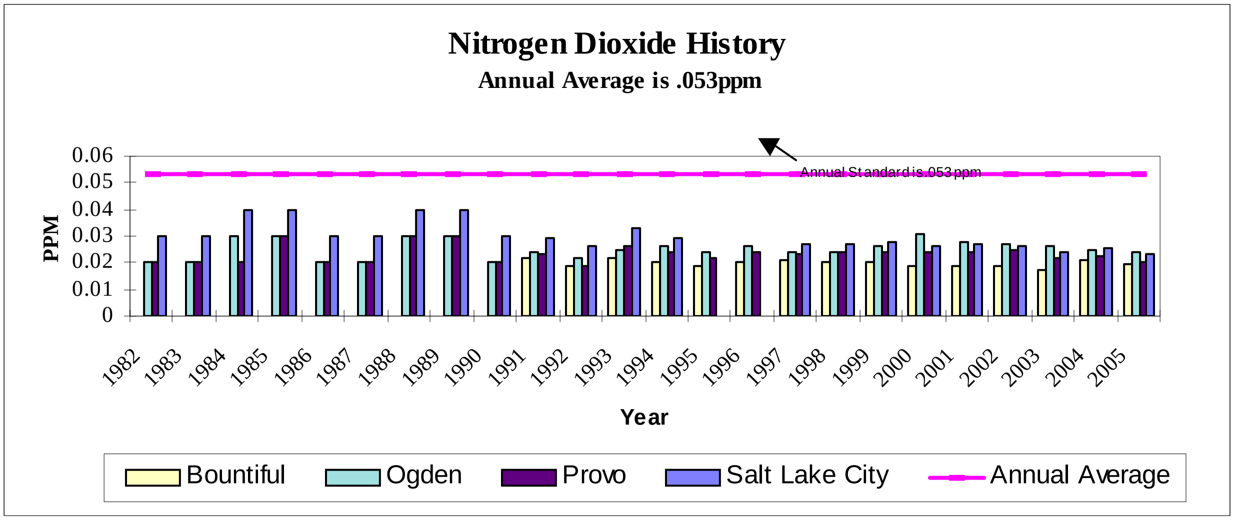
Existing Monitoring Network

The existing NO_2 monitoring stations are Ogden, North Provo, Bountiful, Hawthorne, Logan, and Cottonwood. The network is meeting the needs and objectives of DAQ.

The following graph shows the annual average NO_2 concentrations for 2005. As can be seen, the measured values are less than half of the standard.



Over the years NO_2 has not been close to exceeding the standard as the following graphs display. The concern from NO_2 is its involvement in the creation of ozone and fine particulate matter. Because of that concern, NO_2 controls have been required on vehicles and industry. As a result of those controls, a close review of the graph shows a slight decreasing trend.



Additional Monitoring

No new monitoring for NO_2 has been planned.

Special Studies

No additional studies are necessary.

Changes To The NO_2 Monitoring Network

No changes will be made to the NO_2 monitoring network.

2.3 CARBON MONOXIDE

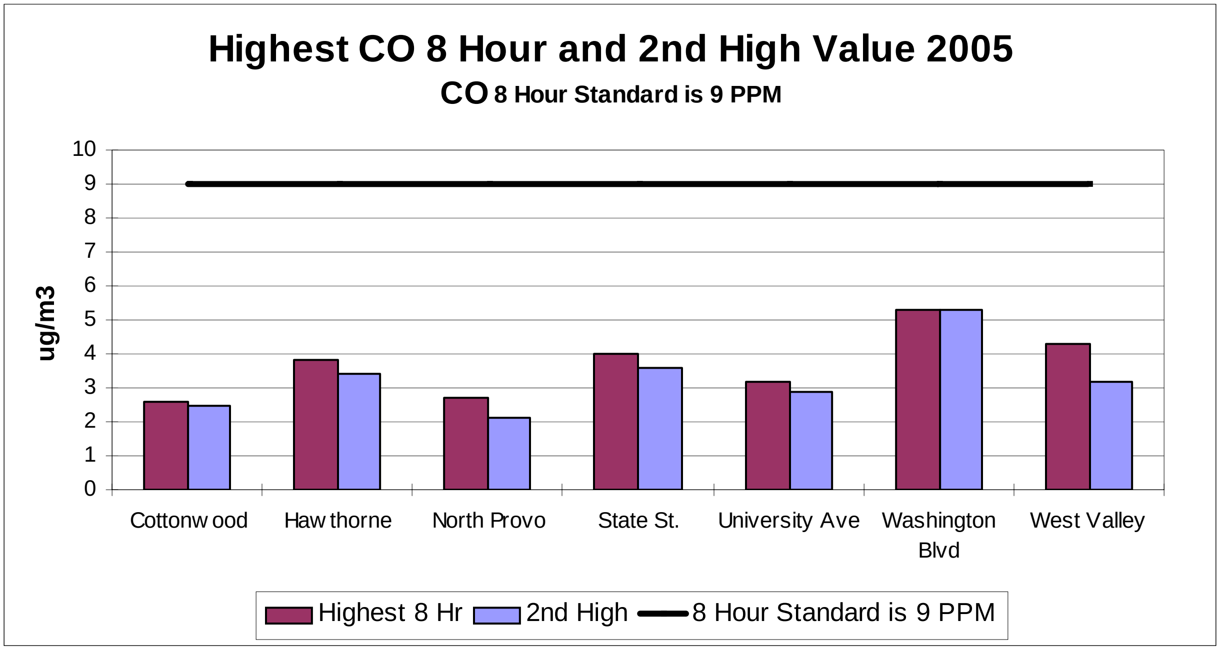
The present CO monitoring sites were installed based on emissions from automobiles. Based on that criteria, the sites were located according to traffic patterns and traffic densities. The traffic information used was obtained from the Utah Department of Transportation.

When Utah's CO network was designed, no modeling data was available to assist in site location, so sites were chosen based on traffic volumes and patterns. Since that time, SIP modeling has been done for the Salt Lake-Davis County area and for the Provo-Orem area in Utah County. Models used under predicted the CO concentrations measured at all of the monitoring sites. The models give a rough estimate of the relative concentrations of CO, which indicates areas of expected maximum CO concentrations.

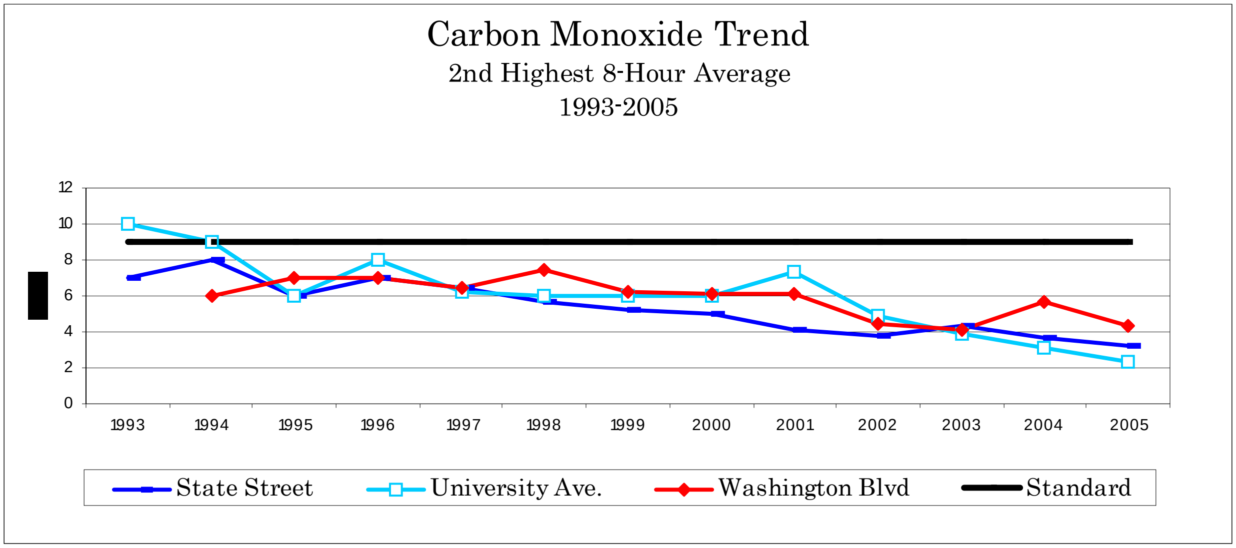
CO NETWORK

The existing Network CO monitoring stations that operate all year are: Cottonwood, State Street, and Washington Blvd. In June 2006 CO monitoring ended at the University Avenue site because even though it was a micro scale site, the measured concentrations were almost always lower than the values measured at the Hawthorne site. The CO Monitoring stations that operate seasonally are: Hawthorne, North Provo and West Valley. This network presently meets the needs and objectives of DAQ.

The following graph show the highest and second highest measured CO 8 hour average values for 2005. As can be seen, the measurements are well below the 8 hour standard.



The following graph shows the trend in the second highest CO concentrations from 1993 through 2005. The decrease in CO levels is a result of the controls that are required on new vehicles, the impact of the county vehicle inspection and maintenance programs, and controls on industry. For an area that used to routinely violate the CO standard, the current situation is pleasant to see. CO concentrations remain a concern as CO may be involved in chemical reactions that form other pollutants such as particulate matter. More detailed CO data may be needed to study its involvement in those chemical reactions.



Additional Monitoring

As we have discussed, there has been a dramatic decrease in measured CO concentrations since the early 1990's to the point that CO is no longer an environmental concern. The last time the CO standard was violated was 1993. Carbon monoxide can be considered as a problem solved, as a result, no additional CO monitoring is planned.

2.3 CARBON MONOXIDE (Cont)

Changes To The CO Monitoring Network

Due to many years of measuring low CO concentrations, we plan on ending CO monitoring at the Cottonwood monitoring site. The NAMS designation needs to be moved to the Hawthorne CO monitor. We will also end monitoring CO at the State Street site. We plan to stop monitoring CO at Washington Blvd in a year or year and a half.

Special Studies

No special studies are planned.

Saturation Study

No additional saturation studies are being considered at this time.

2.4 OZONE

Unlike the other pollutants, ozone is not emitted directly into the atmosphere. It is produced in the atmosphere as precursors, nitrogen oxides and hydrocarbons react in the presence of sunlight to form a number of photochemical compounds. The photochemical reaction takes time to occur; therefore, ozone monitoring should be conducted down wind from the sources of precursors.

The valley setting of the major urban areas along the Wasatch front complicates ozone monitoring. Typical ozone monitoring indicates that the peak ozone stations should be located 5 to 7 hours down wind from the urban area, however, summer wind patterns in Utah result in a typical diurnal up valley down valley wind flow. This situation suggests that after 5 to 7 hours the polluted air mass may be right back over the urban area.

Ozone concentrations at all Division of Air Quality monitoring sites fluctuate seasonally, with higher values measured only during the warmer months. Monitoring at all ozone stations in attainment areas is therefore done seasonally, from May through September, unless year round data is requested for modeling.

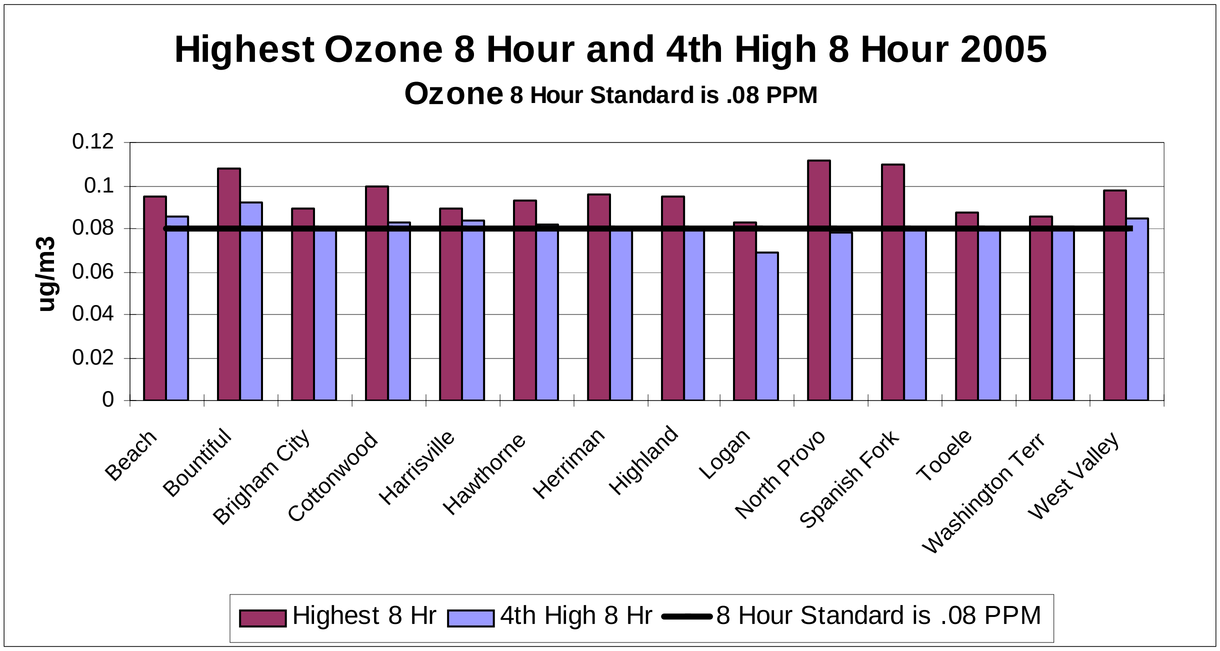
One and Eight Hour NAAQS

On June 16, 2005, EPA rescinded the one-hour ozone standard. This results in the only time period identified by EPA for evaluating ozone is an eight hour average. The existing monitoring sites are located where the highest hourly ozone concentrations occur, and we anticipate the highest 8 hour averages will occur at the same locations. The 8 hour NAAQS for ozone does not specifically require any new monitoring sites. The impact of the 8 hour standard has been the occurrence of exceedances at stations in more rural locations that did not exceed the 1 hour standard. There are also many more exceedances of the 8 hour ozone standard in the urban areas than the 1 hour standard.

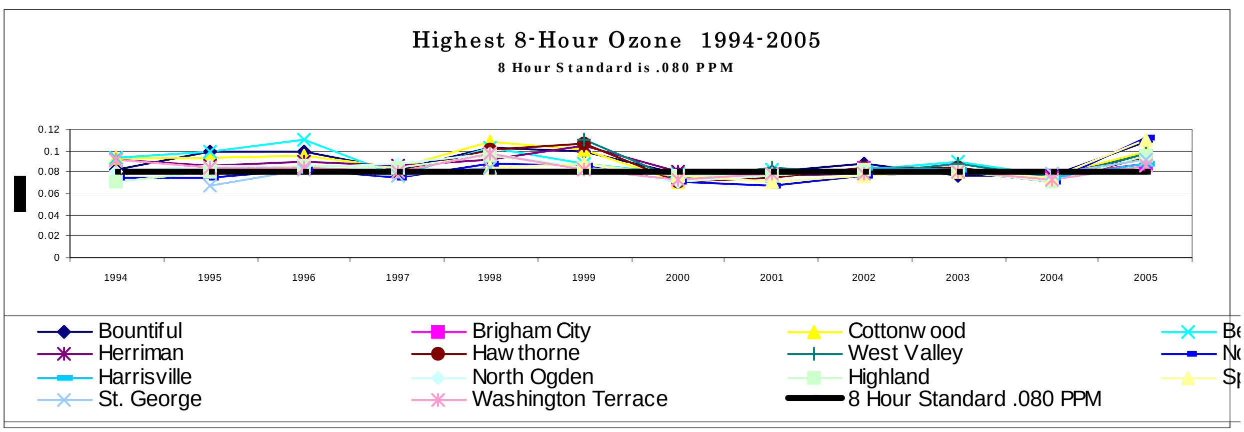
Existing Network

The existing monitoring network for ozone consists of fourteen monitoring sites located primarily in the populated counties along the Wasatch Front. As noted below, this network is meeting most but not all of the data needs for ozone.

The following graph shows the highest and 4^{th} highest 8 hour average concentrations of ozone for 2005. As can be seen, exceedances of the 8 hour standard occur throughout our urban areas. Some of the sites have 4^{th} high averages that also exceed the standard. To violate the standard the 4^{th} high average for three years must be averaged. If that three-year average is above the standard then that station has measured a violation. The previous two years have had ozone concentrations low enough that the three-year average does not violate the standard at any of the monitoring locations in the network.



The following graph shows the trend for the 8-hour average ozone concentration for 1994 through 2005. The overall trend is that of improvement. That improvement is the result of the emission control devices on new vehicles, the county operated vehicle emission inspection and maintenance programs, and control required for industry. In addition to comparing the measured ozone concentrations to the NAAQS, ozone is of interest because of its involvement in the formation of secondary particulate matter. More detailed ozone data may be needed to evaluate ozone involvement in the chemical reaction that forms secondary particulate matter.



Special Studies

No special studies have been conducted since the summer of 1996. None are planned for this next year.

2.4 OZONE (Continued)

Additional Monitoring

We wish to find a site for measuring ozone in the east side of the Sandy/Draper area. Previous modeling suggests that ozone concentrations may be higher in the southeast part of Salt Lake Valley when the afternoon lake breeze pushes the polluted air mass from Salt Lake City into this part of the valley. The mountains partially trap the air mass, allowing the ozone concentrations to build up.

Additional Saturation Studies.

No additional studies are planned.

Changes To The O_3 Monitoring Network

No changes have occurred with the ozone monitoring network since ozone monitoring began in Tooele, beginning July 2005.

2.5 LEAD

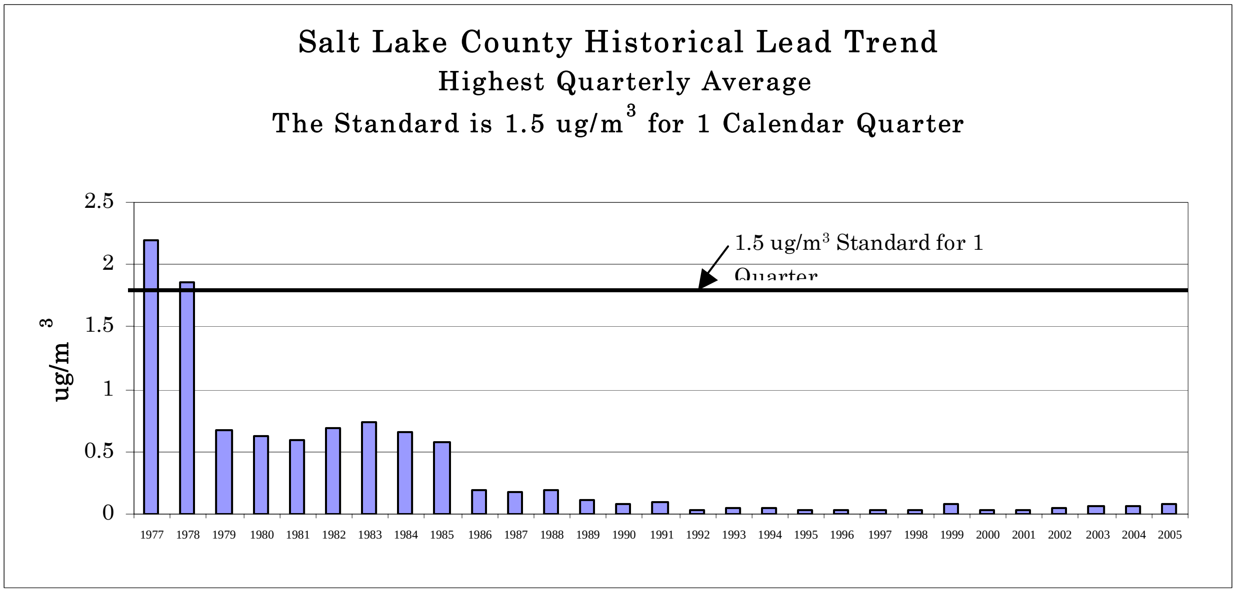
Utah has established a SLAMS lead sampler using the regulatory guidelines in 40 CFR Part 58 Appendix D. The station is on a six-day sampling schedule.

LEAD NETWORK

Existing Monitoring Network

In 1976, lead monitoring began in the urban center of Salt Lake City. At that time, the lead standard was violated in Salt Lake County. More recently, lead monitoring has been performed at the Magna air monitoring station. That data began in 1983. Lead monitoring is now only required near industrial lead sources which emit 5 tons or more of lead a year to the atmosphere. Historically, there is only one industrial source in Utah that emits more than 5 tons or more of lead a year. That is the Kennecott Copper Smelter. Recent changes in the smelting process at the smelter have reduced the lead emissions from the smelter to less than 5 tons of lead a year. Documentation of that reduction has been submitted to EPA along with a network modification form to discontinue lead monitoring at the Magna air monitoring station. Approval has been received to stop lead monitoring at our Magna station.

The following graphs show the highest quarterly average of lead from 1977 through 2005. As can be seen, lead is no longer an issue in Salt Lake County. The primary cause of such a dramatic improvement is the removal of lead as an antiknock agent in gasoline. Industry has implemented controls, which has also contributed to the decrease.



Changes to the Monitoring Network:

Lead monitoring at the Magna monitoring station will be discontinued.

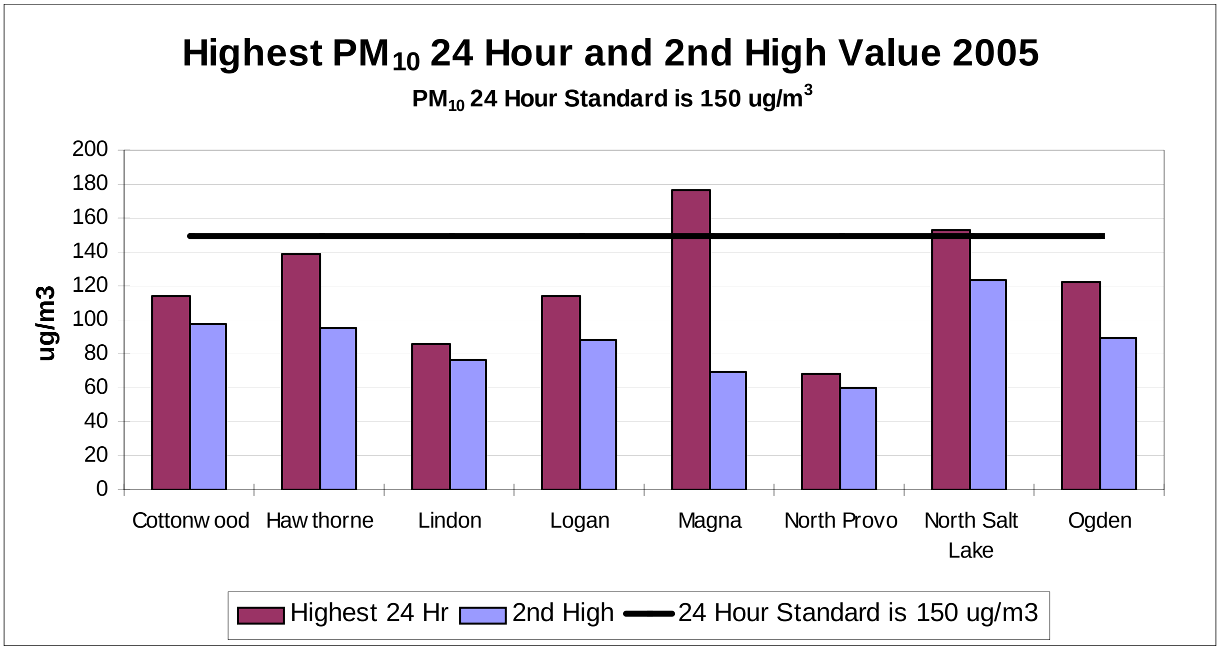
2.6 PM10

The PM_{10} samplers were initially installed at the same sites as the Total Suspended Particulate (TSP) samplers. TSP monitoring had been performed for many years at those locations and has shown many violations of the TSP standard. Computer modeling was not available to assist in locating the PM_{10} samplers, but has now been completed for the PM_{10} SIP. The modeling primarily dealt with source impact identification. There are two types of PM_{10} particles, which complicates PM_{10} monitoring. Primary PM_{10} particles are released from the source as particles and their concentration decreases from the point of release dependent on dispersion characteristics. Secondary particles are released as gases and become PM_{10} particles through chemical reactions in the atmosphere. Secondary particle concentrations are greater some distance from the source or after some time has elapsed from the time of release. Measured PM_{10} concentrations are a combination of both primary and secondary particles. Establishing monitoring sites to measure both types of particles can be a concern. Historically, TSP and PM_{10} sites have been located based on primary particulates.

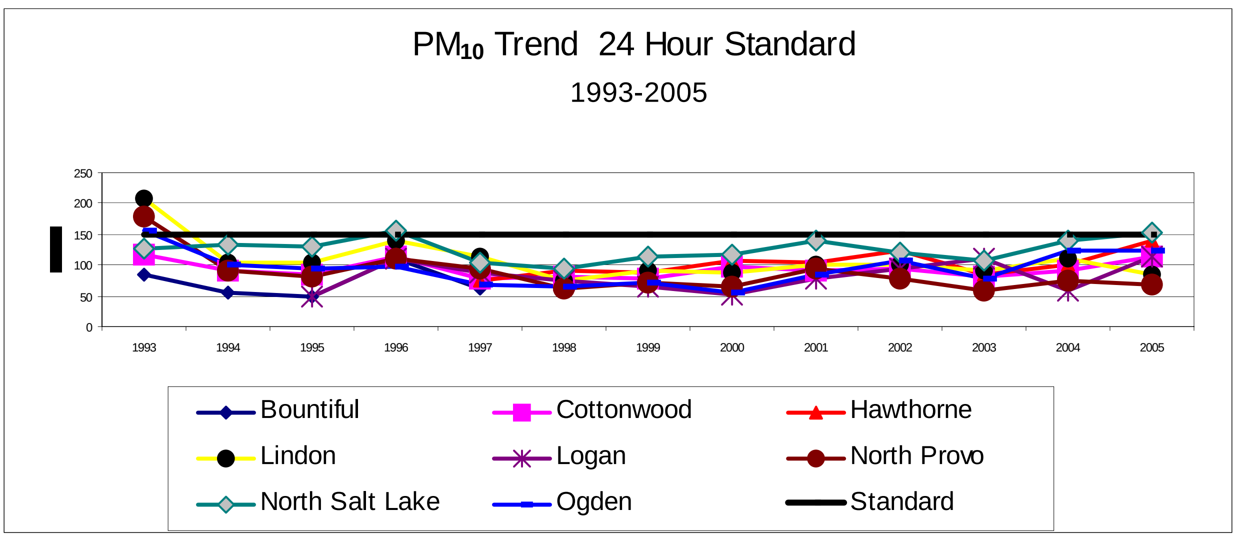
Existing Monitoring Network (See Table 1)

The existing PM_{10} monitoring network meets the minimum requirements for PM_{10} data for state and federal government needs. The existing network is not keeping pace with population growth.

The following graphs show the highest 24 hour average PM_{10} and second highest 24 hour average PM_{10} values for 2005. As can be seen, only one station measured an exceedance of the standard. That high value was the result of very high winds with the result of blowing soil dust all along the Wasatch Front. By showing the second high value, you can see this was a single event that exceeded the standard.



This graph shows the PM_{10} trend from 1993 through 2005. It shows attainment of the PM_{10} standard since 1993.



2.6 PM_{10} (Cont)

Additional Monitoring

No additional PM_{10} monitoring is necessary at this time.

Saturation Studies

No saturation studies are planned for the next year.

Special Studies

No special studies are planned for the next year.

Changes To The PM_{10} Monitoring Network

No changes are planned in the PM_{10} monitoring network.

2.7 $PM_{2.5}$

On September 20, 2006, the Environmental Protection Agency promulgated a new NAAQS for particulate matter measured as $PM_{2.5}$. The promulgation changes the 24 hour standard from 65 ug/m^3 to 35 ug/m^3 effective December 18, 2006. The effect of that change in the NAAQS will be discussed in next years monitoring review.

Particulate sampling was first conducted for TSP, then PM_{10} and then $PM_{2.5}$ at several locations in each county. In addition, computer modeling for TSP and PM_{10} and some limited PM_{10} saturation sampling have shown the existing particulate sampling sites are located in the areas of high concentrations for particulates so $PM_{2.5}$ sampling has been performed at those sites. Previous particulate monitoring has also shown the existing locations to have elevated particulate concentrations. There are two types of particles that form $PM_{2.5}$ particles. Primary $PM_{2.5}$ particles are released from the source as particles and their concentration decreases from the point of release dependent on dispersion characteristics. Secondary particles are released as gases and become $PM_{2.5}$ particles through chemical reactions in the atmosphere. Secondary particle concentrations are greater some distance from the source or after some time has elapsed from the time of release. Measured $PM_{2.5}$ concentrations are a combination of both primary and secondary particles. Historically, TSP, PM_{10} sites have been located based on primary particulates. The $PM_{2.5}$ monitoring sites have been located based on concentrations of PM_{10}. The appropriateness of that decision will be reviewed as modeling for $PM_{2.5}$ is performed. To complete the modeling emission inventory information must be collected and the reactive models need to be verified.

IMPROVE samplers are operated by the National Park Service and are included as part of the $PM_{2.5}$ monitoring network. The IMPROVE samplers are located in the Utah National Parks.

EXISTING $PM_{2.5}$ MONITORING NETWORK

With the inclusion of the Amalga, Hyrum and Tooele $PM_{2.5}$ monitoring sites, the existing $PM_{2.5}$ monitoring network is adequate and meets our data needs in Cache County.

North Salt Lake site in Salt Lake County. Discussion on siting. One must consider whether the data collected at the North Salt Lake monitoring site is representative of the area at large when determining whether to use that data for non-attainment designations. Evaluation of the data for such purpose does not, however, align with the intended purpose of the NSL monitor.

2.7 $PM_{2.5}$ (Cont)

The air monitoring network requirements are contained in 40 CFR Part 58. Based on these requirements, the Utah Division of Air Quality (UDAQ) established a monitoring network and described such in the 2004 annual network review that was submitted to your office. In that review UDAQ designated both National and State and Local Air Monitoring Stations (NAMS and SLAMS), as well as what are called special purpose monitors (SPMs), to specifically address the monitoring objectives described in Appendix D to Part 58 (Network Design for SLAMS, NAMS, and PAMS.) Such objectives include making measurements to define impact on population, to ascertain what is likely the area of highest concentration, and to characterize localized areas of impact from specific sources of emissions.

The North Salt Lake monitor was sited to measure expected local high levels of $PM_{2.5}$, and it is listed as a special purpose, middle scale monitoring station.

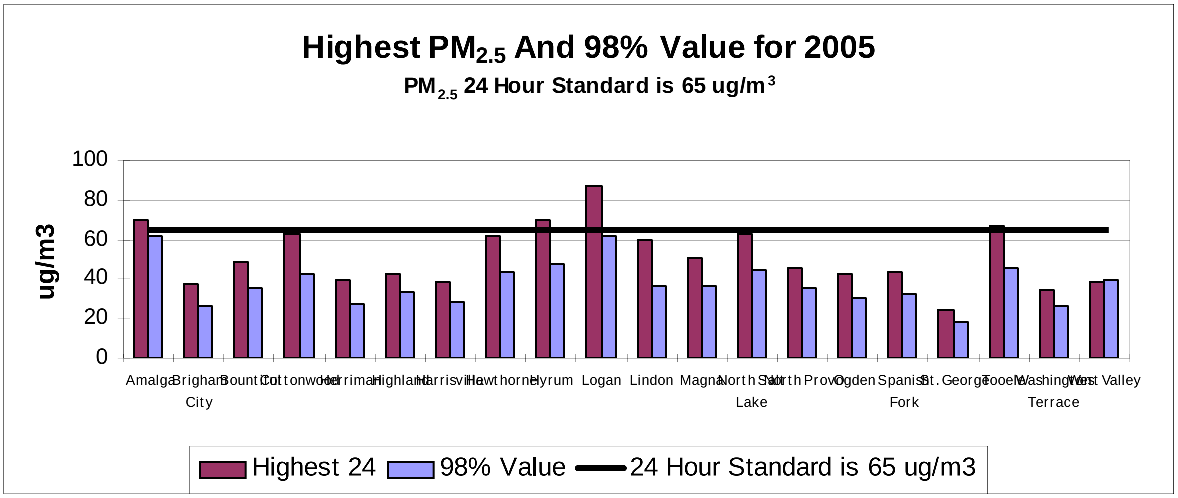
As described in Appendix D, it is very important to correctly match the spatial scale most appropriate for the monitoring objective of the station. This will prevent mismatches between what the collected data will actually represent and what the data are interpreted to represent. The NSL monitor is consistent in this regard. As a middle scale monitor, it is considered appropriate for measurements involving areas of high concentration as well as localized impacts from emission sources. Middle scale monitoring defines areas with dimensions of up to about 0.5 kilometers (several city blocks in size.)

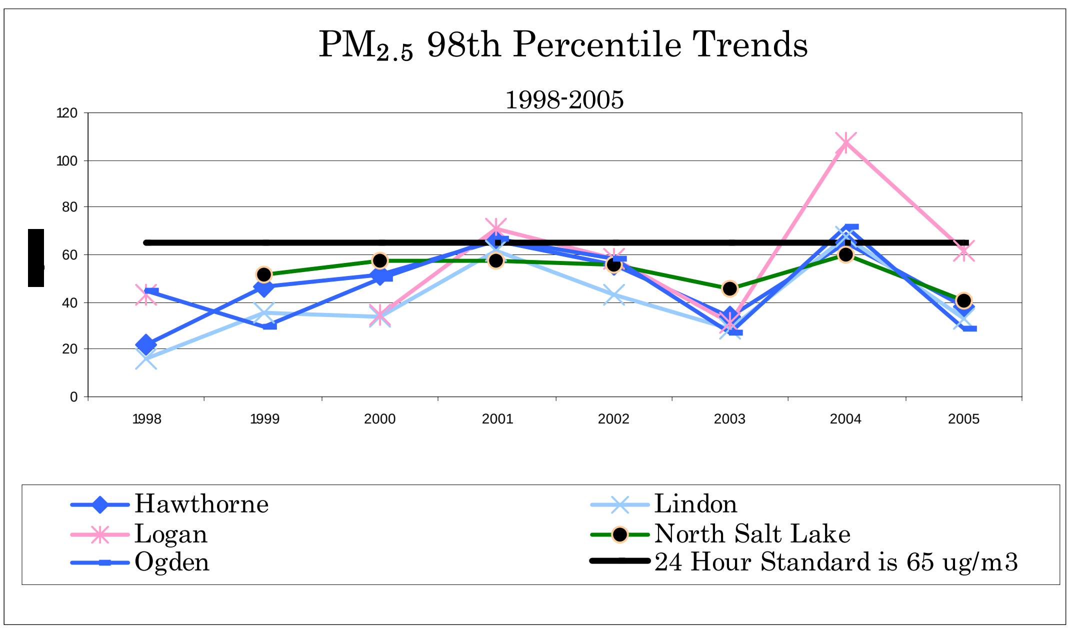
In general, most $PM_{2.5}$ monitoring in urban areas should have a Neighborhood Scale. This scale characterizes areas with dimensions ranging from about 0.5 km to about 4.0 km. It is an appropriate scale for measurements concerning high concentrations, impact from sources, background concentrations, and most importantly, impact on populations.

$PM_{2.5}$ data used for comparison with the annual National Ambient Air Quality Standards (NAAQS) should be collected at Neighborhood-Scale community-oriented locations (Section 2.8.1.2). These would represent conditions throughout some urban region with reasonably homogeneous conditions of land use and air quality, and would also represent other neighborhoods of similar character in other parts of the urban region. These are areas where people commonly live and work for periods of time comparable to those specified in the NAAQS. Because of the concerns associated with the North Salt Lake monitoring site, a new monitoring location should be found. It should be a neighborhood setting based on population exposure and without the difficulties associated with the present North Salt Lake site. Data should be collected concurrently to allow comparison of the sites.

The following graph shows the highest 24 hour average $PM_{2.5}$ and 98% value of $PM_{2.5}$ for 2005. As you can see, there are exceedances of the value of the 24 hour standard; but the actual 98% value that the standard is based on is not violated.

2.7 PM$_{2.5}$ (Cont)


Highest PM2.5 And 98% Value for 2005
PM 2.5 24 Hour Standard is 65 ug/m3
ug/m3
100
80
60
40
20
0
Logan
Lindon
Lake
Fork
Terrace
West Valley
Highest 24
98% Value
24 Hour Standard is 65 ug/m3


PM2.5 98th Percentile Trends
1998-2005
120
100
80
60
40
20
0
1998
1999
2000
2001
2002
2003
2004
2005
Hawthorne
Logan
Ogden
Lindon
North Salt Lake
24 Hour Standard is 65 ug/m3

2.7 $PM_{2.5}$ (Cont)

ADDITIONAL STUDIES

A special study is planned for the winter of 2006-07 in Cache County to help characterize $PM_{2.5}$ formation. The study will look at ammonia and VOC in the winter inversions. The data will help determine the most important precursors to the secondary $PM_{2.5}$.

Changes to the $PM_{2.5}$ Monitoring Network

A new monitoring site will be found to compare with the North Salt Lake site. It should be a neighborhood scale site and allow for determining public exposure to $PM_{2.5}$.

2.8 METEOROLOGICAL DATA

By measuring surface wind speed and direction, one can attempt to determine where a pollutant-laden air mass has come from and where it is going. This information is essential any time an attempt is made to determine the cause of high pollution periods.

The wind patterns in the mountainous terrain of Utah can be very difficult to analyze. Winds affected by geographical features can, and often do, control air mass movement in the mountain valleys where most industrial and urban activities are concentrated.

Because of these complex wind patterns, it has been the policy of the Division of Air Quality that many major air monitoring stations of middle scale or larger should record meteorological data. Each station must be evaluated separately because of the complex micrometeorology in Utah. Because the terrain produces the complex wind patterns, there are not enough monitoring sites that measure meteorological parameters.

There is a need to collect delta T temperatures for use in computer modeling. Delta T is the differential temperature at 2 and 10 meters and shows the stability of the air mass that is being modeled.

Existing Monitoring (See Network Summary Table 1)

The importance of measuring meteorological parameters has increased as a result of more complex computer modeling. Modifications to the meteorological monitoring network have occurred as a result of a report prepared by the Technical Analysis Section. A computer model called Urban Airshed Model requires an extensive amount of meteorological information. The current meteorological monitoring network does not collect delta T temperature so the network be modified to begin collecting delta T temperature.

Additional Monitoring

Additional meteorological monitoring is planned to collect delta T temperature as funding is identified to purchase the new pairs of matched temperature sensors.

Changes To The Meteorological Monitoring Network

No changes have been made to the meteorological monitoring network.

2.9 AIR TOXICS

The category of toxic air pollutants encompasses literally thousands of different compounds, including organic and inorganic particulate compounds and volatile and semi-volatile organic compounds. It would be an impossible task to monitor for every known toxic compound. The list of known toxic compounds is growing, with dozens of compounds being added yearly.

The Clean Air Act of 1990 identified 189 toxic air pollutants, which are now the immediate focus of the toxic monitoring program. That list has since been modified to 188 Toxic Air Pollutants. EPA has chosen 33 toxic air pollutants to focus on in its Integrated Urban Air Toxics Strategy. The focus to increase monitoring for toxic air pollutants has been increased by the National Monitoring Policy. In response to the national policy EPA is reducing the number of criteria pollutant monitors required by rule so states can refocus the cost savings toward additional toxics monitoring. In Utah closing a few criteria monitoring sites will not come close to covering the cost associated with increasing the toxics monitoring network to extent needed to answer the questions being raised about toxic air pollutants. Any increase in the toxic monitoring network will depend on additional funding by EPA.

Sampling Locations

Specific sources of toxic pollutants have been identified using SARA 313 information and a toxic air pollution survey conducted by Radian for the Division. Toxic monitoring at these sources was not isolated for the initial sampling phase of the program; rather a general survey of the air contaminants was initiated. Monitoring near specific sources is being performed based on identified need. Historic sampling has been performed at Salt Lake City, Lindon, and North Provo stations. DAQ has been part of the EPA funded Urban Air Toxics Monitoring Program since a site was installed at West Valley in October 1999. In West Valley, voc's, aldehydes and particulate metals were sampled.

In January 2003, the air toxics monitoring was moved to the Bountiful monitoring station so Urban Air Toxics equipment would be co-located with the $PM_{2.5}$ speciation equipment. This will give a more complete evaluation of the air mass being monitored. An Aethalometer has been added to measure ambient carbon particles was purchased with EPA funds and located at the Bountiful monitoring site. In addition sampling for chrome 6 was started in 2005.

Existing monitoring

The one Urban Air Toxics monitoring site provides a baseline for air toxics data in the urban areas along the Wasatch Front. It is a minimal effort that currently meets the needs of the division.

2.9 AIR TOXICS (Continued)

Additional Monitoring

EPA has indicated a desire to increase monitoring for non-criteria pollutants. EPA is re-allocating $6.3 million from existing funds for measuring criteria pollutants to increased monitoring of Air Toxics. As more guidance comes from EPA, that information will be used to assess needed changes in air toxics monitoring.

Additional Studies

No additional studies are planned for next year.

Changes to the Air Toxics Monitoring Network

EPA's National Monitoring Policy recommends increasing the number of sites and number of parameters being measured as part of identifying toxic air pollutants in the urban areas. As regulations are promulgated that implement the National Monitoring Policy, we will identify needed changes to our toxics monitoring network.

3.0 EMERGENCY EPISODE MONITORING

One of the responsibilities of the Division is to assure that the public is protected from air pollution concentrations that will cause immediate damage or impact to their health. Section 5.1 of the Utah Air Conservation Regulations establishes emergency response criteria in accordance with Subpart H and Appendix L of 40 CFR 51. Whenever air pollution concentrations meet or exceed the Alert, Warning, or Emergency levels, an Emergency Episode is determined to exist and actions are taken to reduce the emissions of air pollutants. It is the responsibility of the monitoring section to collect the air pollution data used to determine when an Emergency Episode exists. The data collection telemetry system is alarmed and the monitoring staff is alerted whenever the Alert, Warning, or Emergency levels are approached. The monitoring staff has the primary responsibility to notify the director of the Division that an emergency episode exists. This is a critical function that is required by State and federal law. The telemetered stations along the Wasatch Front are included in the Emergency Episode network. The Emergency Episode Plan has been reviewed to allow it to remain current.

No changes have been identified in the emergency episode monitoring effort.

4.0 NETWORK MODIFICATION FORMS

Network modification forms have been prepared for submittal to EPA Region VIII to remove University Avenue and State Street.

5.0 SUMMARY AND CONCLUSIONS

The minimum monitoring requirements identified by federal regulation are being met with the existing monitoring network in Utah. The procedures that are being used and the instruments that are being operated meet the standards that have been established by EPA.

The monitoring network provides, with the exceptions noted, the data necessary to meet the needs of the Utah Division of Air Quality.

APPENDIX A
EMISSIONS INVENTORY

The completed Emissions Inventory for 2002 is included in this Appendix. It is the most recent revision of the Emissions Inventory available.

2002 State Summary of Emissions by Source (tons/yr)							
County		CO	NOX	PM10	PM2.5	SOx*	VOC
Beaver	Area Source	1,591.79	102.39	807.31	311.97	138.33	9421.40
	Non-Road Mobile	565.19	737.51	13.63	12.49	49.22	103.69
	On-Road Mobile	10,911.97	1091.99	323.66	61.76	26.21	683.58
	Point Source	5.99	20.94	45.81	4.89	1.96	1.71
	Biogenics	5354.67					29041.00
	Total	**18,429.61**	1952.83	1190.41	391.11	215.72	39251.38
Box Elder	Area Source	5,831.90	223.85	2,961.27	1,308.24	23.93	10,406.87
	Non-Road Mobile	3,253.25	2,061.05	79.30	72.87	112.72	689.51
	On-Road Mobile	41,911.79	4,209.88	1,280.41	244.44	104.93	2,539.70
	Point Source	1,142.37	400.26	595.81	116.96	73.64	354.66
	Biogenics	6,990.18					33,584.84
	Total	**59,129.39**	**6,895.04**	**4916.79**	**1742.51**	**315.22**	**47,575.58**
Cache	Area Source	4,766.78	338.12	2,176.83	1,027.83	68.04	14,904.00
	Non-Road Mobile	4,235.04	842.97	61.89	56.99	21.77	555.24
	On-Road Mobile	34,164.24	2,884.07	1,071.96	204.25	89.26	2,568.43
	Point Source	64.18	79.51	26.26	11.30	11.84	173.47
	Biogenics	2,183.81					13,264.42
	Total	**45,414.05**	**4,144.67**	**3,337.04**	**1,300.37**	**190.91**	**31,465.56**
Carbon	Area Source	4,849.52	191.63	516.83	240.33	225.69	11,729.35
	Non-Road Mobile	1,139.62	409.37	10.88	9.99	25.59	201.66
	On-Road Mobile	15,485.51	1,247.00	463.11	88.20	37.81	1,185.33
	Point Source	349.92	4,035.54	313.50	128.04	7,793.28	135.18
	Biogenics	2,868.56					15,708.79
	Total	**24,693.13**	**5,883.89**	**1,304.32**	**466.56**	**8,082.37**	**28,960.31**
Daggett	Area Source	7,075.35	200.85	1,019.48	807.52	2.06	5,730.02
	Non-Road Mobile	262.29	14.24	1.70	1.56	0.77	104.98
	On-Road Mobile	1,257.58	100.01	35.95	6.87	2.99	88.61
	Point Source	82.92	834.61	3.63	2.32	0.00	72.18
	Biogenics	2,217.60					13,858.56
	Total	**10,895.74**	**1,149.71**	**1,060.76**	**818.27**	**5.82**	**19,854.35**
Davis	Area Source	2,074.67	440.99	1,163.20	494.83	14.13	7,335.91
	Non-Road Mobile	13,351.29	1,642.65	114.89	105.70	71.33	2,122.49
	On-Road Mobile	61,165.65	6,727.29	1,734.88	5.74	223.28	4,049.14
	Point Source	1,799.86	2,288.17	466.64	199.82	2,132.30	1657.69
	Biogenics	949.40					6,447.29
	Total	**79,340.87**	**11,099.10**	**3,479.61**	**806.09**	**2,441.04**	**21,612.52**
Duchesne	Area Source	4,279.46	134.56	1,572.18	670.93	75.46	30,311.77
	Non-Road Mobile	2,174.01	246.15	25.96	23.89	7.23	494.48
	On-Road Mobile	8,498.05	716.44	267.05	50.78	21.96	604.48
	Point Source	775.48	603.35	6.42	5.70	0.00	295.30
	Biogenics	3,687.28					22,398.99
	Total	**19,414.28**	**1,700.50**	**1,871.61**	**751.30**	**104.65**	**54,096.02**
Emery	Area Source	4,464.96	150.14	926.41	294.23	226.79	9,985.92
	Non-Road Mobile	655.18	288.58	13.19	12.12	14.93	172.11
	On-Road Mobile	16,342.62	1,507.01	498.83	94.88	40.29	1,077.51
	Point Source	1,774.21	30,609.13	2,314.54	903.85	20,739.81	214.07
	Biogenics	6,125.97					31,185.73
	Total	**29,362.94**	**32,554.86**	**3,752.97**	**1,305.08**	**21,021.82**	**42,635.34**

County		CO	NOX	PM10	PM2.5	SOx*	VOC
Garfield	Area Source	35,514.96	1,033.25	4,947.15	3967.94	70.97	33,791.18
	Non-Road Mobile	1,923.78	94.87	20.13	18.52	4.70	797.54
	On-Road Mobile	5,907.26	488.22	181.16	34.44	14.87	409.50
	Point Source	9.22	21.51	6.48	2.80	4.93	1.82
	Biogenics	8115.39					44,055.39
	Total	**51,470.61**	**1,637.85**	**5,154.92**	**4023.70**	**95.47**	**79,005.43**
Grand	Area Source	33,481.48	970.96	4,485.29	3,727.26	6.34	16949.09
	Non-Road Mobile	1,533.39	268.85	7.21	6.62	18.89	527.94
	On-Road Mobile	13,211.38	1,293.99	391.06	75.05	31.84	953.59
	Point Source	228.09	370.06	22.47	18.08	0.79	66.44
	Biogenics	6,596.06					34,972.81
	Total	**55,050.40**	**2,903.86**	**4,906.03**	**3,827.01**	**57.88**	**53,469.87**
Iron	Area Source	4,020.36	290.25	1,566.81	693.57	387.07	18,630.62
	Non-Road Mobile	1,786.74	1,038.30	22.79	20.90	67.29	431.05
	On-Road Mobile	26,806.60	2,686.75	831.93	158.25	67.45	1,677.58
	Point Source	21.04	44.50	43.25	7.73	9.51	66.85
	Biogenics	6,620.42					37759.57
	Total	**39,255.16**	**4,059.80**	**2,464.78**	**880.45**	**531.32**	**58,565.67**
Juab	Area Source	2,188.87	103.32	1,223.06	338.83	170.25	7,660.59
	Non-Road Mobile	914.75	950.78	12.43	11.36	64.40	288.84
	On-Road Mobile	17,993.05	1,813.57	521.63	100.11	42.83	1,089.18
	Point Source	34,096.31	1,352.67	179.95	119.84	31.74	77.07
	Biogenics	5,719.08					28,154.87
	Total	**60,912.06**	**4,220.34**	**1,937.07**	**570.14**	**309.22**	**37,270.55**
Kane	Area Source	990.36	52.94	572.21	167.80	72.56	11,410.52
	Non-Road Mobile	1,003.23	46.23	4.67	4.30	2.68	311.69
	On-Road Mobile	5,417.14	464.47	173.57	33.12	14.24	419.84
	Point Source	0.00	0.00	0.00	0.00	0.00	0.00
	Biogenics	9,133.20					47,897.91
	Total	**16,543.64**	**563.64**	**750.45**	**205.22**	**89.48**	**60,039.96**
Millard	Area Source	5,503.08	193.09	2,186.20	822.56	221.58	14,304.58
	Non-Road Mobile	2,065.74	1,507.62	48.72	44.72	98.57	902.63
	On-Road Mobile	19,520.02	1,943.89	589.59	112.40	47.63	1,215.83
	Point Source	1,874.37	27,753.24	799.99	294.59	4,090.56	143.47
	Biogenics	9,977.71					49,180.53
	Total	**38,940.92**	**31,397.84**	**3,624.50**	**1,274.27**	**4,458.32**	**65,747.04**
Morgan	Area Source	540.24	34.08	354.20	134.43	0.22	7,394.97
	Non-Road Mobile	1,208.23	1,370.58	17.22	15.73	97.69	413.32
	On-Road Mobile	5,251.61	550.24	166.72	31.67	13.65	297.27
	Point Source	913.63	1,347.32	255.04	37.74	60.76	44.60
	Biogenics	1,139.58					9,442.85
	Total	**9,053.29**	**3,032.22**	**793.18**	**219.57**	**172.32**	**17,593.01**
Piute	Area Source	1,131.52	39.07	305.50	149.28	30.32	5,590.72
	Non-Road Mobile	3,048.66	32.45	31.82	29.28	4.57	1,356.35
	On-Road Mobile	1,520.44	119.87	43.34	8.30	3.57	116.54
	Point Source	0.00	0.00	0.00	0.00	0.00	0.00
	Biogenics	1,946.23					11,419.77
	Total	**7,646.85**	**191.39**	**380.66**	**186.86**	**38.46**	**18,438.38**

County		CO	NOX	PM10	PM2.5	SOx*	VOC
Rich	Area Source	1,975.13	54.55	959.53	424.57	24.88	5,154.19
	Non-Road Mobile	2,599.70	96.02	32.48	29.89	5.09	1,053.35
	On-Road Mobile	1,973.60	158.44	56.58	10.78	4.71	127.63
	Point Source	0.00	0.00	0.00	0.00	0.00	0.00
	Biogenics	1,311.78					8,737.02
	Total	**7,860.21**	**309.01**	**1,048.59**	**465.24**	**34.68**	**15,072.18**
Salt Lake	Area Source	7,161.10	1,890.32	2,622.24	1327.03	138.62	26,608.23
	Non-Road Mobile	80,152.03	15,917.96	1,209.95	890.58	439.63	7,351.30
	On-Road Mobile	195,325.39	20,815.50	6,360.62	873.57	768.05	13,726.47
	Point Source	3,403.20	8,217.24	3,630.18	1,183.22	4,645.80	1,962.15
	Biogenics	1,754.02					11,341.58
	Total	**287,795.74**	**46,841.02**	**13,822.99**	**4,274.40**	**5992.10**	**60,989.73**
San Juan	Area Source	3,395.40	106.65	1,119.63	456.38	74.50	23,922.05
	Non-Road Mobile	1,709.11	207.55	28.18	25.93	7.65	681.90
	On-Road Mobile	10,782.73	973.71	387.05	73.04	31.60	752.02
	Point Source	593.80	795.80	8.88	5.90	1,454.58	795.58
	Biogenics	12,415.70					63,537.74
	Total	28,896.74	2,083.49	1,543.74	561.25	1,568.33	89,689.29
Sanpete	Area Source	5,627.91	259.34	1,215.36	520.27	361.15	25,801.02
	Non-Road Mobile	1,249.62	166.20	19.29	17.75	4.94	309.11
	On-Road Mobile	10,657.21	843.88	301.68	57.86	24.97	796.90
	Point Source	15.66	22.89	26.15	14.23	4.10	2.54
	Biogenics	2,919.84					17,507.44
	Total	**20,470.24**	**1,292.31**	**1,562.48**	**610.11**	**395.16**	**44,417.01**
Sevier	Area Source	6,000.61	269.45	1,094.42	488.62	380.77	20,006.16
	Non-Road Mobile	1,591.40	156.76	17.47	16.08	5.47	459.76
	On-Road Mobile	19,534.46	1,825.86	547.72	23.59	44.67	1,272.07
	Point Source	37.42	82.38	65.92	5.38	7.14	5.74
	Biogenics	2,999.23					17,595.08
	Total	**30,163.12**	**2,334.45**	**1,725.53**	**533.67**	**438.05**	**40,338.81**
Summit	Area Source	10,479.93	420.29	1,911.37	1,293.88	13.43	36,494.80
	Non-Road Mobile	3,046.84	1,350.81	30.22	27.72	87.35	425.49
	On-Road Mobile	22,472.57	2,520.45	882.45	164.86	71.92	1,234.72
	Point Source	325.41	478.88	63.86	22.92	123.45	26.32
	Biogenics	2,365.08					18,681.94
	Total	**38,689.83**	**4,770.43**	**2,887.90**	**1,509.38**	**296.15**	**56,863.27**
Tooele	Area Source	2,573.67	240.63	1,857.50	497.49	154.05	7,605.25
	Non-Road Mobile	3,114.40	1,555.46	60.43	55.50	97.04	1,251.71
	On-Road Mobile	32,968.57	3,215.77	1,068.21	203.44	87.56	2,355.06
	Point Source	421.05	1,117.37	1,045.60	181.32	125.85	70.29
	Biogenics	8,209.46					39,129.87
	Total	47,287.15	6,129.23	4,031.74	937.75	464.50	50,413.08
Uintah	Area Source	3231.86	113.36	1255.52	556.41	36.42	14,712.72
	Non-Road Mobile	2528.38	240.23	21.96	20.21	7.91	490.63
	On-Road Mobile	11764.88	1005.01	388.24	73.42	31.46	867.32
	Point Source	45.15	93.25	66.50	18.54	7.71	76.48
	Biogenics	5478.10					29,153.35
	Total	**23,048.37**	**1451.85**	**1732.22**	**668.58**	**83.50**	**45,300.50**

County		CO	NOX	PM10	PM2.5	SOx*	VOC
Utah	Area Source	6,763.99	704.55	3,023.07	1,265.74	157.94	40,313.80
	Non-Road Mobile	18,783.59	2,396.59	154.89	142.49	103.15	2,488.21
	On-Road Mobile	90,833.83	9,396.84	2,639.86	359.14	321.89	6,643.17
	Point Source	1,795.54	927.32	365.16	95.49	320.92	770.53
	Biogenics	3,018.72					19,540.86
	Total	**121,195.67**	**13,425.44**	**6,182.98**	**1,862.86**	**903.90**	**69,756.57**
Wasatch	Area Source	571.57	54.98	476.94	145.76	9.37	27,518.67
	Non-Road Mobile	1,865.05	215.22	21.57	19.84	10.37	602.17
	On-Road Mobile	9,762.69	871.54	343.17	64.60	28.30	665.07
	Point Source	3.30	13.50	7.54	3.15	1.12	1.44
	Biogenics	2,185.21					17,256.32
	Total	**14,387.82**	**1,155.24**	**849.22**	**233.35**	**49.16**	**46,043.67**
Washington	Area Source	3,922.97	210.32	1,155.18	500.55	138.15	14,814.76
	Non-Road Mobile	13,151.20	642.48	67.09	61.73	23.17	1,627.12
	On-Road Mobile	31,281.77	3,504.56	1,301.70	244.98	103.94	2,437.71
	Point Source	65.22	287.30	106.79	14.79	17.08	36.37
	Biogenics	8,632.70					52,151.55
	Total	**57,053.86**	**4,644.66**	**2,630.76**	**822.05**	**282.34**	**71,067.51**
Wayne	Area Source	1,875.63	81.85	510.97	158.73	148.98	7,173.56
	Non-Road Mobile	322.41	40.19	4.12	3.79	1.52	107.15
	On-Road Mobile	1,644.95	144.12	56.75	10.77	4.60	133.59
	Point Source	0.00	0.00	0.00	0.00	0.00	0.00
	Biogenics	4,683.04					24,203.35
	Total	**8,526.03**	**266.16**	**571.84**	**173.29**	**155.10**	**31,617.65**
Weber	Area Source	2,433.07	461.34	1,099.11	493.66	44.06	12,431.87
	Non-Road Mobile	10,843.39	1,719.30	88.97	81.84	79.89	1,262.84
	On-Road Mobile	46,626.89	4,316.24	1,337.16	188.00	151.53	3,593.12
	Point Source	2,223.70	455.63	398.51	116.88	21.41	196.53
	Biogenics	985.53					7,245.94
	Total	**63,112.58**	**6,952.51**	**2,923.75**	**880.38**	**296.89**	**24,730.30**
Statewide Totals	Area Source	174,318.14	9,367.12	45,084.87	23,286.64	3,416.06	479,144.59
	Non-Road Mobile	180,077.41	36,257.11	2,243.05	1,840.39	1,535.53	27,584.25
	Area Total	354,395.55	45,624.23	47,327.92	25,127.03	4,951.59	506,698.84
	On-Road Mobile	770,994.45	77,436.96	24,246.04	3,658.31	2,458.01	53,581.86
	Point:Industry Sources	52,067.04	82,252.15	10,864.88	3,515.48	41,680.28	7,248.48
	Point: Portable Equipment	59.99	169.05	215.48	71.51	23.52	19.90
	Point Combined	52,127.03	82,421.20	11,080.36	3,586.99	41,703.80	7,268.38
	Biogenics	136,583.55	0.00	0.00	0.00	0.00	754,396.36
	Totals	1,314,100.58	205,482.39	82,654.32	32,372.33	49,113.40	1,321,945.44

APPENDIX B

POPULATION GROWTH IN UTAH

Table of population growth in Utah shown by county:

County	Population 2000 Census	% Change Since 1990	# of Monitoring Stations in County
Salt Lake County	898,387	+24%	8 (5)*
Utah County	368,536	+40%	6 (9)
Davis County	238,994	+27%	1
Weber County	196,533	+24%	5
Cache County	91,391	+30%	1
Washington County	90,354	+86%	1 (1)
Box Elder County	42,745	+17%	1 (1)
Tooele County	40,735	+53%	1 (2)
Iron County	33,779	+63%	(3)
Uintah County	25,224	+14%	(1)
Carbon County	20,422	+1%	(1)
Duchesne County	14,371	+14%	(1)
Emery County	10,860	+5.1%	(5)
Grand County	8,485	+28%	(2)

*( ) Indicates monitoring done in the past.

Source: U.S. Bureau of the Census

CENSUS 2000 CITY PERCENT POPULATION CHANGE 1990 TO 2000

CITIES > 9,000	1990 CENSUS	2000 CENSUS	PERCENT CHANGE 1990-2000	RANK
Draper city	7,275	25,220	247.50	1
South Jordan city	12,220	29,437	140.9	2
Lehi city	8,475	19,028	124.5	3
Riverton city	11,261	25,011	122.1	4
Syracuse city	4,658	9,398	101.8	5
Spanish Fork city	11,272	20,246	76.6	6
St. George city	28,502	49,663	74.2	7
Pleasant Grove city	13,476	23,468	74.1	8
Tooele city	13,887	22,502	62.0	9
West Jordan city	42,892	68,336	59.3	10
Clinton city	7,945	12,585	58.4	11
Cedar City city	13,443	20,527	52.7	12
Springville city	13,950	20,424	46.4	13
Kaysville city	13,961	20,351	45.8	14
Layton city	41,784	58,474	39.9	15
American Fork city	15,696	21,941	39.8	16
Farmington city	9,028	12,081	33.8	17
Payson city	9,510	12,716	33.7	18
Roy city	24,603	32,885	30.7	19
Logan city	32,762	42,670	30.2	20
North Ogden city	11,668	15,026	28.8	21
Centerville city	11,500	14,585	26.8	22
West Valley City city	86,976	108,896	25.2	23
Orem city	67,561	84,324	24.8	24
Clearfield city	21,435	25,974	21.2	25
Provo city	86,835	105,166	21.1	26
Ogden city	63,909	77,226	18.9	27
South Ogden city	12,105	14,377	18.8	28
Sandy city	75,058	88,418	17.8	29
Salt Lake City city	159,936	181,743	13.6	30
Bountiful city	36,659	41,301	12.7	31
Brigham City city	15,644	17,411	11.3	32
Murray city	31,282	34,024	8.8	33