UTAH

AIR MONITORING NETWORK PLAN

2007

Prepared by the Division of Air Quality

Utah State Department of Environmental Quality

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MONITORING NETWORK PLAN

1.0 INTRODUCTION

This Air Monitoring Network Plan meets the requirements of 40 CFR 58.10(a)(1). The purpose of this plan is to provide for the establishment and maintenance of an air quality monitoring system in Utah that consists of a network of National Air Monitoring Stations (NAMS), State and Local Air Monitoring Stations (SLAMS) and Special Purpose Monitoring (SPM) sites that include federal reference method (FRM) monitors.

The Utah air monitoring network has been described in network reviews from 1982 through 2007. A complete description of each station is on file at the Air Monitoring Center and is available upon request.

This Monitoring Network Plan was made available for public review for 30 days beginning May 25, 2007, and revised as a result of comments received.

1.1 CURRENT UTAH AIR MONITORING NETWORK

Table 1 lists the NAMS, SLAMS, and SPM sites in Utah's current air monitoring network and identifies the location (address), the objective, and the spatial scale represented by each site. In Table 1, the location identified is the actual address where each monitoring site is situated. The Aerometric Information Retrieval System (AIRS) # is a unique number that identifies the site by state, county, and location. Under the listed parameters:

- A station may be designated as a National Air Monitoring Station (NAMS), State and Local Air Monitoring Station (SLAMS), or a Special Purpose Monitor (SPM).

- The spatial scale represented 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 used for Utah's network as listed in Table 1 are:

Micro:	Several meters to about 100 meters
Middle:	About 100 to 500 meters
Neighborhood:	About 500 meters to 4 kilometers
Urban:	Overall citywide conditions, usually about 4 to 50 kilometers. Requires more than one station to define
Regional:	Defines a rural area, usually of reasonably homogeneous geography, extending for tens to hundreds of kilometers

- The monitoring objectives include population exposure (Population), source impact (Source), highest expected concentration (High) or background station (Background).

Table 2 provides a technical summary of the current monitoring network, including the type of telemetry used to retrieve the data, the type of analyzer used and frequency of data collection, the source of gases used to calibrate the gaseous monitors, other parameters monitored at each site, and the latitude and longitude of each site.

In addition, Utah conducts some "survey" monitoring using state funding to get an initial assessment of some areas of interest. This monitoring is less formal than the SPM monitoring discussed above and focuses on a local project or issue. Based on the results of the survey monitoring, the State may determine that more formal monitoring would be appropriate. The State is currently operating two sites that are considered survey sites: one in St. George in Washington County, and the other in Vernal in Duchesne County.

Table 1

UTAH AIR MONITORING NETWORK

STA., LOC., AIRS#	Monitoring Station Parameters						
	SO_2	CO	O_3	NO_2	LEAD	PM_{10}	$PM_{2.5}$
Beach GSL Beach Marina 12100 West. 1200 S. Magna, UT 49-035-2004	SLAMS High Neigh.		SLAMS* High Neigh.				
Bountiful Viewmont 171 West 1370 North Bountiful, UT 49-011-0004	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 Holladay, UT 49-035-0003		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

Table 1 (cont'd)

UTAH AIR MONITORING NETWORK

STA., LOC., AIRS#, SAROAD#	Monitoring Station Parameters						
	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.
Lindon 30 North Main, Lindon, UT 49-049-4001						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	NAMS Impact Neigh.				SLAMS Impact Neigh.	NAMS High Neigh.	SPMS Population Neigh
North Provo 1355 North 200 West Provo, UT 49-049-0002		SLAMS* Population Neigh.	NAMS* Population Neigh.	SLAMS High Neigh.		NAMS Population Neigh.	SLAMS Population Neigh.
North Salt Lake 1795 North 1000 West Salt Lake City, UT 49-035-0012	SLAMS High Middle					NAMS High Middle	

*Indicates Seasonal Monitoring

Table 1 (cont'd)

UTAH AIR MONITORING NETWORK

STA., LOC., AIRS#, SAROAD#	Monitoring Station Parameters						
	SO_2	**CO**	**O_3**	**NO_2**	**LEAD**	**PM_{10}**	**$PM_{2.5}$**
Ogden 228 E 32nd Street Ogden UT 49-057-0002				SLAMS High Neigh.		SLAMS High Neigh.	SLAMS High Neigh.
Rose Park 1230 North 1375 West Salt Lake City, UT 49-035-3010							SLAMS Population Neigh
Spanish Fork 50 South Main Spanish Fork, UT 49-049-5010			SLAMS* Population Neigh.				SPMS Transport Regional
Tooele #3 50 West 434 North Tooele, UT 49-045-0003			SPM Population Neigh				SPM Population Neigh
Washington Blvd. 2540 South Washington Blvd, 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

TABLE 2

MONITORING NETWORK TECHNICAL SUMMARY

June 2007

UTAH DIVISION OF AIR QUALITY

	SITE CODE	LONGITUDE (Degrees N)	LATITUDE (Degrees W)	TELEMETRY	PM 2.5	# PM2.5	PM10	# PM10	CO	O_3	SO_2	NO_2	SPAN SOURCE	WIND	TEMP/RH	SR/BP*	SG/DT/PRE*
ANTELOPE ISLAND	AI	41° 2.49'	112° 13.91'	CAMPBELL										YES	BOTH		SG
BADGER ISLAND	BI	40° 56.03'	112° 36.4'	CAMPBELL										YES	BOTH		PRE
BEACH	B4	40° 44.1'	112° 12.66'	ESC						API ‡	TECO		DYNACAL/API	YES	TEMP		SG
BOUNTIFUL VIEWMONT	BV	40° 53.88'	111° 53.13'	ESC	3 DAY	2				API ‡	TECO	TECO	DYNACAL/DASIBI/CYLINDER	YES	BOTH		SG
BRIGHAM CITY	BR	41° 29.57'	112° 1.12'	ESC	3 DAY	1				API ‡			DASIBI	YES	TEMP		SG
COTTONWOOD	CW	40° 38.7'	111° 51.0'	ESC	3 DAY	1	3 DAY	1	TECO	API ‡		TECO	DYNACAL/DASIBI/CYLINDER	YES	BOTH		SG
HARRISVILLE	HV	41° 18.17'	111° 59.30'	ESC	3 DAY	1				API ‡			DASIBI	YES	TEMP		SG
HAWTHORNE	HW	40° 44.01'	111° 52.30'	ESC	FDMS & E D	3	TEOM & ED	2	TECO *	API		TECO	DYNACAL/API/CYLINDER	YES	BOTH	SR & BP	
HERRIMAN	HE	40° 30.06'	112° 1.32'	ESC	3 DAY	1				API ‡			DASIBI	YES	BOTH	SR	SG, DT
HIGHLAND	HG	40° 25.69'	111° 48.2'	ESC	3 DAY	1				API ‡			DASIBI	YES	TEMP		SG
LINDON	LN	40° 20.33'	111° 42.8'	ESC	FDMS & ED & CL	3	TEOM & ED	2					N/A	YES	BOTH		SG
LOGAN	L4	41° 43.87'	111° 50.25'	ESC	FDMS & ED & CL	3	3 DAY	1	TECO *	API	TECO	TECO	DASIBI/CYLINDER	YES	BOTH		SG
MAGNA	MG	40° 42.41'	112° 5.63'	ESC	3 DAY	1	3 DAY	1			TECO		DYNACAL	YES	TEMP		SG
NORTH PROVO	NP	40° 15.21'	111° 39.79'	ESC	3 DAY	1	3 DAY & CL	2	TECO *	API ‡		TECO	DYNACAL/DASIBI/CYLINDER	YES	TEMP		SG
N. SALT LAKE	N2	40° 48.34'	112° 5.63'	ESC			E/D &CL	2			TECO		DYNACAL				
OGDEN #2	O2	41° 12.42'	111° 58.5'	ESC	FDMS & 3 DAY	2	TEOM/ED	2				TECO	DYNACAL	YES	BOTH		
ROSE PARK	RP	40° 47.44'	111° 55.51'	ESC	3 DAY	1											
SALTAIRE	SA	40° 48.27'	112° 2.96'	CAMPBELL										YES	BOTH	SR	SG
SPANISH FORK	SF	40° 8.18'	111° 39.61'	ESC	3 DAY	1				API ‡			API	YES	TEMP		SG
SYRACUSE	SY	41° 5.3'	112° 7.3'	CAMPBELL										YES	BOTH		SG
TOOELE	T3	40° 32.25'	112° 17.57'	ESC	TEOM & 3DAY					API ‡			API	YES	TEMP		
WASH. BLVD	W2	41° 13.18'	111° 58.22'	ESC					TECO				CYLINDER				
WASH. TERR.	WT	40° 10.77'	111° 58.99'	ESC	3 DAY & CL	2			TECO *	API ‡			DASIBI/CYLINDER	YES	BOTH		SG
WEST VALLEY	WV	40° 42.15'	111° 58.13'	ESC	3 DAY & CL	2			TECO *	API ‡			DASIBI/CYLINDER	YES	TEMP		
WEST JORDAN	WJ	40° 39.61'	112° 0.0'	ESC										YES	BOTH		
SITES	25			25		17		8	7	14	5	6		23	24	3	19
REPORTING SAMPLERS						26		13									
CO-LOC SAMPLERS						3		2									
SEASONAL SAMPLERS									5	11							
TEOM ($PM_{2.5}$ & PM_{10})						6		3									

ESC - DATA LOGGER

ED: EVERY DAY SAMPLING

CL: CO-LOCATED

*** -- COLLECT CO ONLY DURING WINTER SEASON (NOV-MAR)**

‡ -- COLLECT O_3 ONLY DURING SUMMER SEASON(MAY-SEPT)

SR/BP -- SOLAR RADIATION & BAROMETRIC PRESSURE

SG/DT/PRE -- SIGMA-THETA, DIFFERENTIAL TEMP. & PRECIPITATION

1.2 NETWORK MODIFICATION PROCESS

Utah's monitoring network is reviewed annually to verify that the objectives of the network are being met. The most recent emissions inventories for each pollutant are reviewed along with population data and ambient data gathered in the area. When it is available, current computer air pollution dispersion modeling is also reviewed. Based on that information, the State may identify the need for an additional monitoring station or the need to relocate a station to better meet the initial objectives of the site. The State may also identify sites that are no longer needed to meet the monitoring needs of the State. If a change is needed in the monitoring network, a Network Modification Form is submitted to EPA Region VIII prior to or as part of installing, modifying or removing a monitor.

1.3 REVIEW OF NETWORK MODIFICATIONS IN 2006/2007

Elevated concentrations of $PM_{2.5}$ in Cache County have been a concern to the Division of Air Quality; therefore, special purpose monitoring sites were established in Amalga and Hyrum as part of a coordinated study to determine how the concentrations of $PM_{2.5}$ varied throughout the air shed. The studies have been completed and demonstrated that the Logan $PM_{2.5}$ monitor is a good indicator of the $PM_{2.5}$ concentrations throughout the air shed during winter-time temperature inversions. Therefore, the monitoring stations in Amalga and Hyrum have been discontinued.

The objective of establishing a special purpose $PM_{2.5}$ monitoring site in the northern part of Salt Lake was to evaluate the $PM_{2.5}$ exposure of the population living in the area and the need for a more permanent representative neighborhood site. After reviewing data from that special purpose monitor, the State determined that, while the North Salt Lake monitoring site does not meet the requirements for a neighborhood scale site, it was critical to establish a neighborhood scale site in the area of North Salt Lake where the population is concentrated. Therefore, a new $PM_{2.5}$ monitoring site was established at Rose Park in Salt Lake County to get a better evaluation of the public exposure to $PM_{2.5}$. The Rose Park station meets the requirements for a neighborhood site which the North Salt Lake site does not. The North Salt Lake special purpose $PM_{2.5}$ monitor was replaced by the Rose Park monitor and was shut down.

1.4 PROPOSED NETWORK MODIFICATIONS

In December of 2006, EPA revised the National Ambient Air Quality Standard (NAAQS) for $PM_{2.5}$. Based on data already collected by the DAQ, there are several areas within the state that will not meet this new standard. Then, in early 2007, EPA proposed changes to the NAAQS for ozone which may have a significant impact on Utah, depending on the level chosen for a revised standard. EPA also recently modified the air monitoring requirements contained in 40 CFR Part 58 as part of a national effort to realign monitoring requirements to focus on pollutants that are of the greatest concern.

A significant portion of the funding for the monitoring program comes from federal grants to the state. That federal funding has decreased over the past several years with a significant decrease in FY2007. At the same time, the costs associated with equipment replacement, personnel and overhead have steadily increased, and EPA continues to add new monitoring requirements the states must meet with this reduced funding.

With these increased monitoring needs and new constraints on spending, the State determined that it is critical to verify that the monitoring network is operating as efficiently as possible – that each station addresses a critical need without duplicating existing information. To that end, in March of 2007 a process was initiated by DAQ to redesign the Utah air monitoring network to:

1. Ensure that the air monitoring network meets the requirements of 40 CFR 58;

2. Identify the monitoring sites that are required to evaluate compliance with the NAAQS, provide public notification of air quality conditions and to meet the needs for technical analysis of current and future air modeling work; and

3. Meet the available budget allocations by consolidating monitoring equipment to select sites and removing monitoring stations that are collecting redundant or immaterial data.

As a result of this network redesign, many modifications to the monitoring network are envisioned for next year. The first priority for the monitoring network is that it meet the requirements or 40 CFR 58 and the goals of the State of Utah. For that portion of the monitoring budget that is funded by state resources beyond federal monitoring grants, Utah priorities will take precedence over national priorities.

The following proposed changes to the monitoring plan are grouped into those resulting from a change in EPA's focus or a change to federal monitoring requirements, data needs identified by the DAQ, additional monitoring necessitated by growth in an area, or changes to meteorological monitoring due to the computer modeling needs of the Division.

Change in EPA Focus and Changes to Federal Requirements

On December 18, 2006, revisions to 40 CFR 58 which implement the National Ambient Air Monitoring Strategy became effective. That strategy increases EPA's monitoring of non-criteria pollutants and reduces monitoring of criteria pollutants that are no longer a national concern because emission reduction strategies have been successful. To do this, EPA proposes the reallocation of funding currently used to monitor criteria pollutants to fund increased air toxics monitoring. The changes to the monitoring requirements in 40 CFR 58 will result in changes to the DAQ monitoring effort, and are identified in this monitoring network review.

The revised 40 CFR 58 changes the name of the Annual Network Review to an "Annual Network Plan" and requires that the plan discuss the DAQ monitoring needs, goals and

objectives. It also requires a somewhat more global 5 year monitoring "assessment" that will be prepared and submitted to EPA by July 1, 2010.

The December 2006 revisions to 40 CFR 58 also include a new federal requirement to establish multi-pollutant National Core (NCore) multi-pollutant monitoring sites and to reduce the number of single pollutant monitoring sites nationally. Before July 1, 2009, the Annual Network Plan will be revised to discuss how NCore requirements will be implemented in the Utah network. The NCore monitoring stations are to be operational by January 1, 2011.

DAQ Identified Data Needs

During the spring of 2007, DAQ staff met to consider how to collect the air monitoring data needed to meet the goals and objectives of DAQ and implement the new EPA monitoring regulations, while, at the same time, EPA was significantly reducing federal funding for the monitoring program. A number of primary objectives were identified and served as the basis for a major realignment of Utah's monitoring network. Those objectives are:

- Provide timely air quality data to the public to support and enhance DAQ's public notification process whenever unhealthy air quality conditions are forecast or already exist. This notification allows the public to take the appropriate precautions to protect their health while providing them and local industry the opportunity to reduce their emissions and their impact on air pollution.

- Collect air pollution data to evaluate areas against the NAAQS.

- Focus on monitoring air pollutants of current concern. Carbon monoxide and SO_2 are currently considered "solved problems" because it has been many years since either pollutant violated their respective NAAQS. At the same time, EPA continues to revise the NAAQS for $PM_{2.5}$ and ozone to lower levels. Therefore, the focus for monitoring CO and SO_2 needs to be the assessment of the role these pollutants play in the formation of $PM_{2.5}$ and ozone, which requires measuring them at very low concentrations.

- Collect detailed, continuous and short-term multi-pollutant data at common sites in each urban area to be used in scientific research, including the support of reactive computer modeling. $PM_{2.5}$ and ozone are generally formed from the reaction of other pollutants over time under the right meteorological conditions; therefore, multiple hotspot-type monitors are not necessary. The current network has shown that $PM_{2.5}$ and ozone concentrations are generally homogeneous in each of the air sheds with only slight variability; therefore, DAQ is proposing concentrating the monitoring efforts into fewer sites. Selection of those sites was based on how well the site represented the air shed, how long of a historic perspective was available for the site, and how well the site met the monitoring siting criteria for all of the pollutants to be monitored as well as meteorological data collection. This objective parallels EPA's emphasis on NCore monitoring sites.

- Increase the capability of the monitoring network to measure non-criteria or toxic air pollutants.

- Monitor air quality in the fast-growing areas of Southern Utah to ensure compliance with the NAAQS and to identify air pollution trends in the area.

- Monitor air quality in areas with significant oil and gas development to determine whether this development is adversely affecting air quality.

- Gather baseline monitoring data in rural Utah to determine if and where air pollution problems may exist.

- Define future nonattainment areas for pollutants based on air quality data rather than geo-political boundaries.

Based on the above changes in DAQ data needs and changes in EPA's focus and funding, the following changes to the Utah air monitoring network are necessary to meet future needs of the DAQ. Details of these changes will be discussed in the sections discussing individual pollutants.

- **Changes to the SO_2 network:** The State will discontinue SO_2 monitoring at Beach, Magna and North Salt Lake; install an SO_2 monitor at Hawthorne, and continue SO_2 monitoring year around at Bountiful.

- **Changes to the CO network:** The State will discontinue CO monitoring at Cottonwood, Washington Blvd., and West Valley; continue monitoring CO at Hawthorne and North Provo; and move the CO monitoring currently at Washington Blvd. to the Ogden site.

- **Changes to the NO_2 network:** The State will add two additional NO_2 monitors, one at a new site in West Jordan or South Jordan, and the other at a new site in Draper.

- **Changes to the ozone network:** The State will discontinue ozone monitoring at Beach, Harrisville, Herriman, Highland and West Valley; move the Washington Terrace ozone monitor to the Ogden site; and continue ozone monitoring at Brigham City, Bountiful, Cottonwood, Hawthorne, Logan, North Provo, and Tooele. The State will establish two new ozone monitoring sites in the Salt Lake Valley, one in West Jordan or South Jordan, and the other in Draper. Additionally, the State will establish an ozone SLAMS site in Washington County.

- **Changes to the PM_{10} network:** The State will discontinue PM_{10} monitoring at Lindon and Cottonwood; and continue to monitor PM_{10} at Hawthorne, Logan, Magna, North Provo, North Salt Lake, and Ogden.

- **Changes to the $PM_{2.5}$ network:** The State will discontinue $PM_{2.5}$ monitoring at Cottonwood, Harrisville, Herriman, Highland, Lindon, Magna, Washington Terrace, and West Valley; and continue to monitor $PM_{2.5}$ at Bountiful, Brigham City, Hawthorne, Logan, North Provo, Ogden, Rose Park, Spanish Fork and Tooele. The State will add two additional monitors for $PM_{2.5}$, one in West Jordan or South Jordan, and the other in Draper.

- **Changes to the meteorological monitoring network:** The State will discontinue meteorological monitoring at Beach, Harrisville, Herriman, Highland, Lindon, Washington Terrace, and West Valley; and continue meteorological monitoring at Antelope Island, Badger Island, Bountiful, Brigham City, Cottonwood, Hawthorne, Logan, Magna, North Provo, Ogden, Rose Park, Salt Air, Spanish Fork, Syracuse, and Tooele. The meteorological monitoring currently occurring at the West Jordan site will be moved to a new location in South or West Jordan where monitoring for criteria pollutants will also occur, and a new meteorological monitoring site will be added in Draper where criteria pollutants will be monitored, as well.

- **Summary:** The changes to the individual monitors listed above will result in the creation of four consolidated monitoring stations where multiple pollutants are monitored year round: North Provo, Hawthorne, Ogden, and Logan. Hourly $PM_{2.5}$ data will be collected at these sites to support future modeling. Eight monitoring stations will be closed: Beach, Harrisville, Herriman, Highland, Lindon, North Salt Lake, Washington Blvd, and Washington Terrace. The West Valley City monitor will be moved to somewhere in South or West Jordan, and a new monitoring site will be established in Draper which may eventually replace the Cottonwood monitoring site. This major realignment of DAQ's monitoring network will take several years to complete and will continue to support near-real-time notifications of air quality conditions for Utah's population centers.

  Additional Monitoring Needs Due to Growth

  The significant population growth that Utah has experienced over the past 15 years is projected to continue, as shown on the governor's demographics web site (see: http://governor.utah.gov/dea/Projections/05Baseline/Jan05Populationbyarea.pdf). Changes to the monitoring network the past couple of years have addressed some of the population growth.

  The Park City – Snyderville Basin portion of Summit County is one of the areas experiencing significant population growth. The meteorology in the basin is significantly different from that in the Salt Lake Valley; but they do have inversion periods similar to those that result in elevated pollution levels in Salt Lake. Those inversions may not be as persistent as they are in the Salt Lake valley, but they may be persistent enough to result in elevated pollutant levels, and, therefore, the Snyderville basin should be considered for future monitoring.

The population growth in Washington County has reached an estimated population over 100,000. According to the new monitoring regulations, an ozone monitor is required to be in operation by the beginning of the ozone season in 2008.

Other areas of the state will require monitoring resources and flexibility to address new development including monitoring for the impacts from expanded oil and gas development, particularly in northeastern Utah.

Modifications to Meteorological Monitoring Because of Computer Modeling Needs

There is a need to collect Solar Radiation/Delta T (SRDT) data 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. Sources outside the Wasatch Front will be required to collect SRDT data as part of any PSD permitting actions. However, in nonattainment areas such as along the Wasatch Front where PSD permitting is not required, it may be necessary for DAQ to begin to collect SRDT data, based on available funding.

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 58.

2.1 SULFUR DIOXIDE

The sulfur dioxide (SO_2) monitoring sites were installed at their present locations based on proximity to large SO_2 emission sources, the results of early computer modeling, or in response to concerns expressed by the public.

Monitoring sites were established at Beach and Magna in response to emissions from a nearby copper smelter operation. Changes made in the operations and emissions control by the smelter have reduced the SO_2 emissions by over 99% from those years when violations of the SO_2 NAAQS were monitored. Concentrations at the Beech and Magna monitors are much less than 10% of the NAAQS. On-going compliance activities assure the current level of control will be maintained into the future. Since the last violation of the SO_2 standard occurred in 1978, there is no longer a need to measure SO_2 around the smelter operation; therefore, the Beach and Magna SO_2 monitors will be discontinued.

A violation of the SO_2 NAAQS has never been reported since the start of monitoring SO_2 at the North Salt Lake site in November 1981. As with the copper smelter, compliance activities will assure continued control of the oil refineries. DAQ plans to continue SO_2 monitoring year around at Bountiful and will be able to continue a trend analysis of SO_2

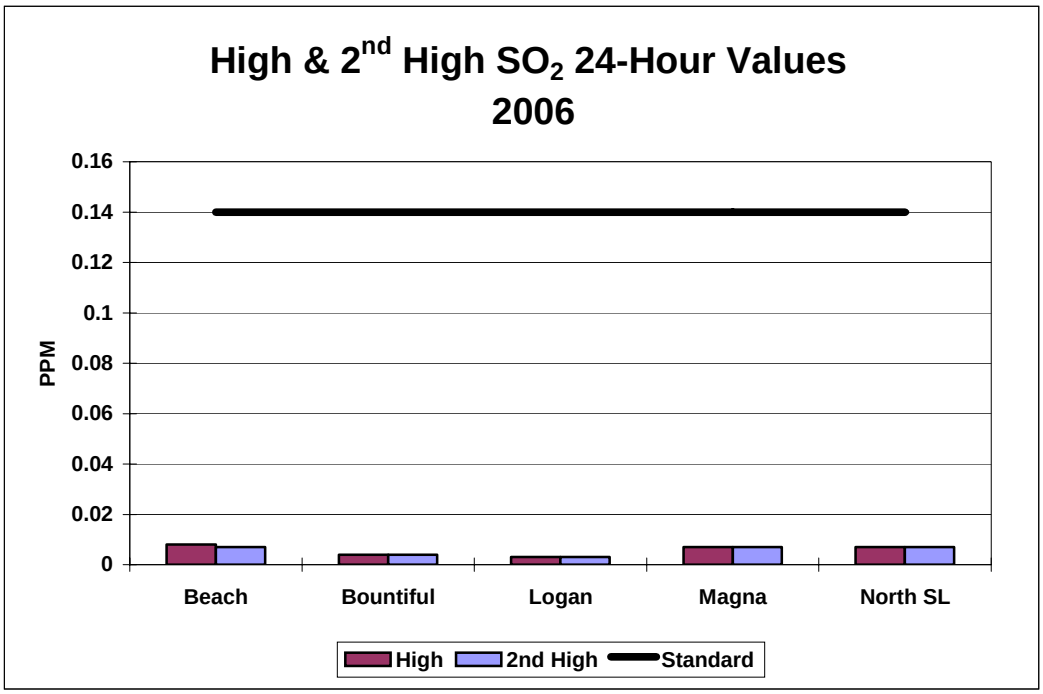
concentrations in North Salt Lake with data from the Bountiful site, and the North Salt Lake SO_2 monitor will be discontinued.

Salt Lake County and a portion of Tooele County are still officially designated nonattainment, pending EPA approval of Utah's SO_2 maintenance plan which is based on more than 25 years of continued monitoring showing attainment of the NAAQS. Once the area is redesignated to attainment, at least one monitor will need to be operated in the maintenance area to ensure that the area continues to maintain the standard.

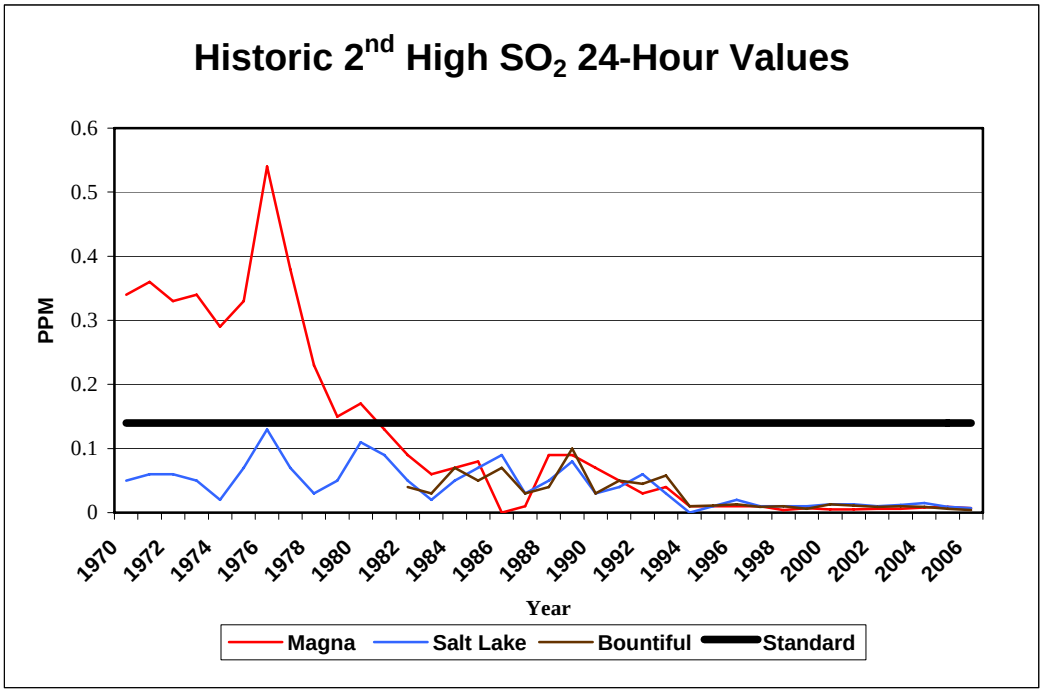
An SO_2 monitor from one of the discontinued sites will be installed at the Hawthorne consolidated site to ensure that the area continues to maintain the SO_2 standard.

Data Review from the Existing Monitoring Network

The following graph displays the highest and second highest 24-hour average for the monitoring stations. As can be seen, the highest values are much less than 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.



Changes To The SO_2 Monitoring Network

The State will discontinue SO_2 monitoring at Beach, Magna and North Salt Lake; install an SO_2 monitor at Hawthorne; and continue SO_2 monitoring year around at Bountiful.

Special Studies

No special studies are planned.

2.2 NITROGEN DIOXIDE

The existing Nitrogen Dioxide (NO_2) monitoring stations were installed at their current locations based on a combination of emissions inventories and population centers. EPA's guidance that monitoring should be performed in areas with a population of 200,000 or greater was considered, but monitoring for the NO_2 NAAQS has been a secondary consideration in Utah. The oxides of nitrogen (NO_x) are important precursors in the secondary formation of particulate matter and ozone. These pollutants tend to be more regional in nature, rather than occurring directly downwind of major sources of NO_x. For this reason, NO_2 monitoring stations have been co-located with $PM_{2.5}$ and ozone monitors to better understand and model the formation of these pollutants.

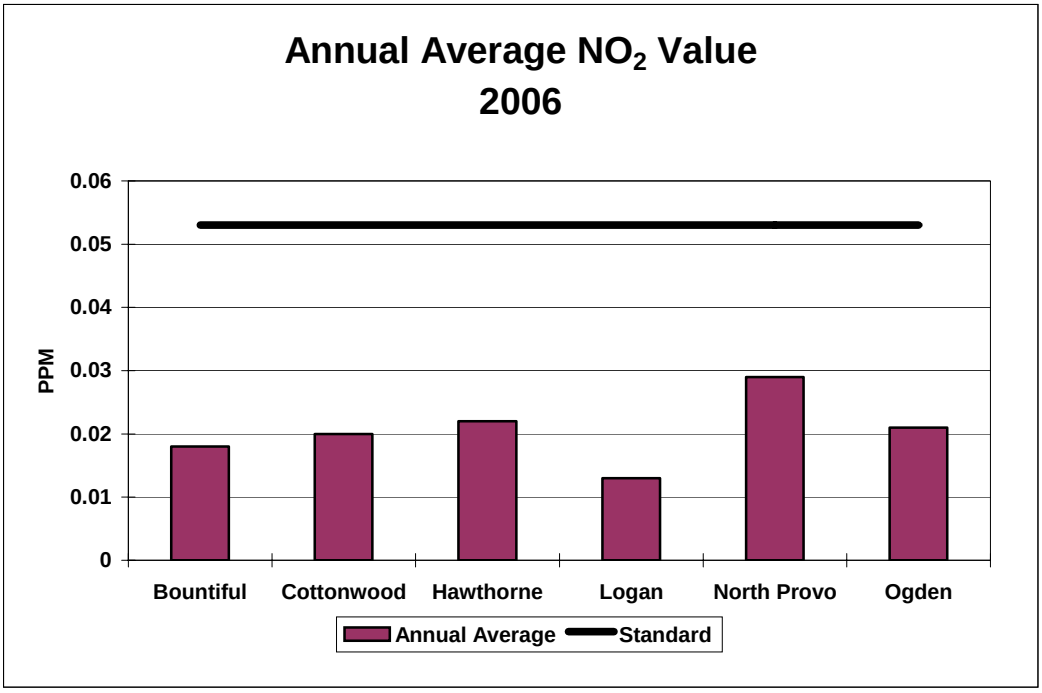
All NO_2 monitoring sites have consistently measured concentrations well below the NAAQS. However, DAQ plans to increase the NO_2 monitoring network with the addition of two monitoring sites, one in West Jordan or South Jordan and the other in Draper, both at new sites that would also monitor ozone and $PM_{2.5}$. These new sites will be down wind of

the urban center and transport will allow the chemical reactions to occur. The information will be necessary for studies in $PM_{2.5}$ and ozone formation.

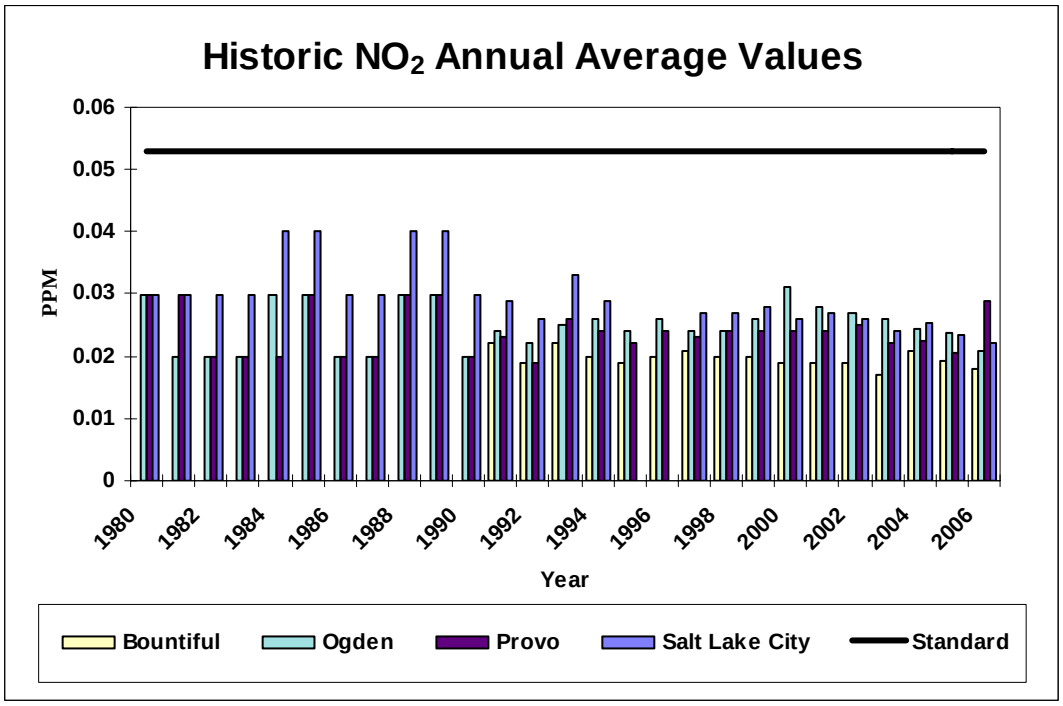
Data Review from the Existing Monitoring Network

The existing NO_2 monitoring stations are Ogden, North Provo, Bountiful, Hawthorne, Logan, and Cottonwood.

The following graph shows the annual average NO_2 concentrations for 2006. 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 graph displays. 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.



Changes To The NO_2 Monitoring Network

DEQ will establish a new NO_2 monitoring site in West Jordan or South Jordan and a new site in Draper. Additional NO_2 monitoring sites may be established to respond to growth-associated state monitoring needs.

Special Studies

No additional studies are necessary.

2.3 CARBON MONOXIDE

Historically, elevated CO concentrations occurred near high traffic areas. Therefore, traffic information was obtained from the Utah Department of Transportation and the two local Municipal Planning Organizations (Wasatch Front Regional Council for Salt Lake, Davis and Weber Counties and Mountainlands Association of Governments for Utah County) to establish CO monitoring sites based on traffic patterns and densities.

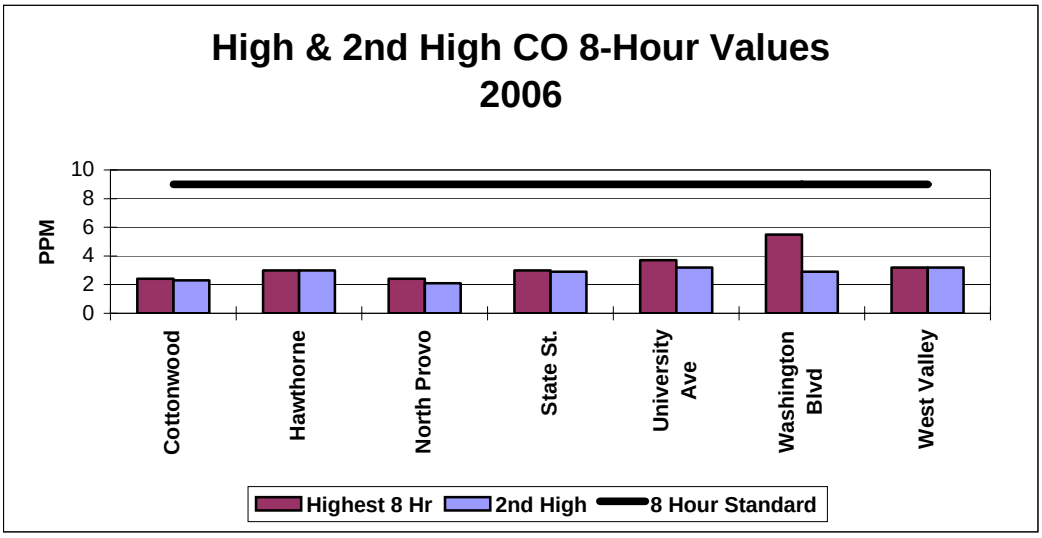
At the time the monitors were first installed, violations of the CO NAAQS were routinely recorded in Ogden, Provo, and Salt Lake City. The State developed and implemented State Implementation Plans and Maintenance Plans for those three areas that were subsequently approved by EPA. The implementation of those plans has resulted in all three areas attaining the CO NAAQS and being redesignated as attainment areas. In addition to the control measures identified in the plans, increasing federal controls on automobiles are

resulting in significantly lower emissions, resulting in monitored ambient concentrations of CO that are significantly below the NAAQS.

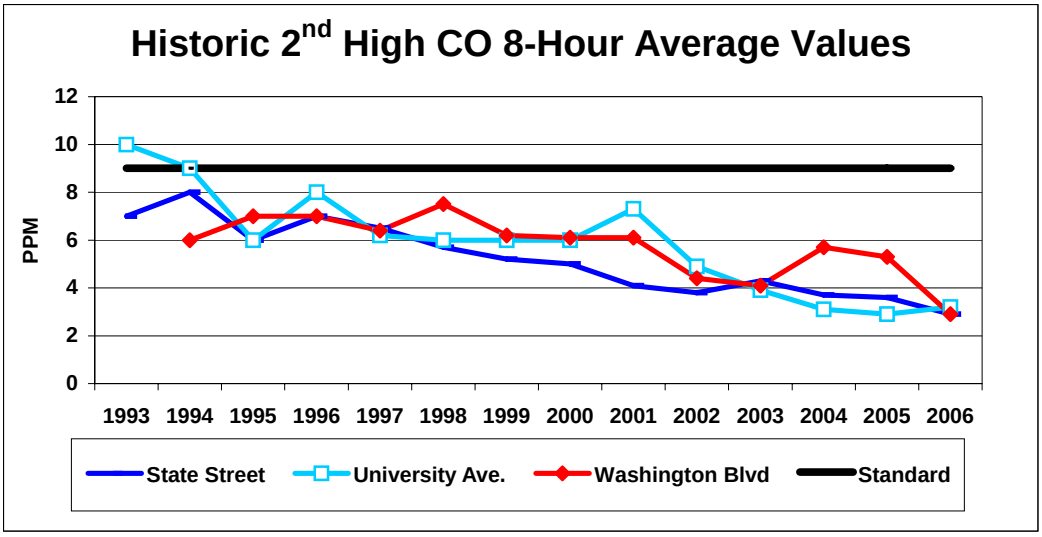
The existing CO monitoring stations that operate all year are: Cottonwood, Hawthorne, and Washington Blvd. In June 2006, CO monitoring ended at the University Avenue site in Provo, and the North Provo site will be used to assess ambient CO concentrations in Provo. In November 2006, the State Street CO site was closed because, even though it was a micro-scale site, the measured concentrations were almost always lower than the values measured at the Hawthorne site; therefore, the Hawthorne site will be used to track ambient CO concentrations in the Salt Lake Valley. The North Provo and West Valley CO monitoring stations currently operate seasonally.

Data Review from the Existing Monitoring Network

The following graph shows the highest and second highest measured CO 8-hour average concentrations for 2006. As can be seen, the values are all well below the 8-hour standard.



The following graph shows the trend in the second highest CO concentrations from 1993 through 2006. 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.



Additional Monitoring

Carbon monoxide can be considered as a problem solved; therefore, no additional CO monitoring is planned.

Changes To The CO Monitoring Network

Due to many years of measuring low CO concentrations, CO monitoring at the Cottonwood, Washington Blvd, and West Valley monitoring sites will be discontinued. The NAMS designation needs to be moved from the Cottonwood monitor to the Hawthorne monitor.

CO monitoring will continue at the consolidated Hawthorne and North Provo sites, and the CO monitor at Washington Blvd will be moved to the consolidated Ogden site. This will provide on-going monitoring to insure that all CO maintenance areas continue to meet the NAAQS.

Special Studies

No special studies are planned.

2.4 OZONE

Unlike carbon monoxide, SO_2 and NO_2, ozone is generally not emitted directly into the atmosphere in quantities high enough to result in a violation of the NAAQS. It is produced in the atmosphere as precursors – nitrogen oxides, hydrocarbons, and CO – 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.

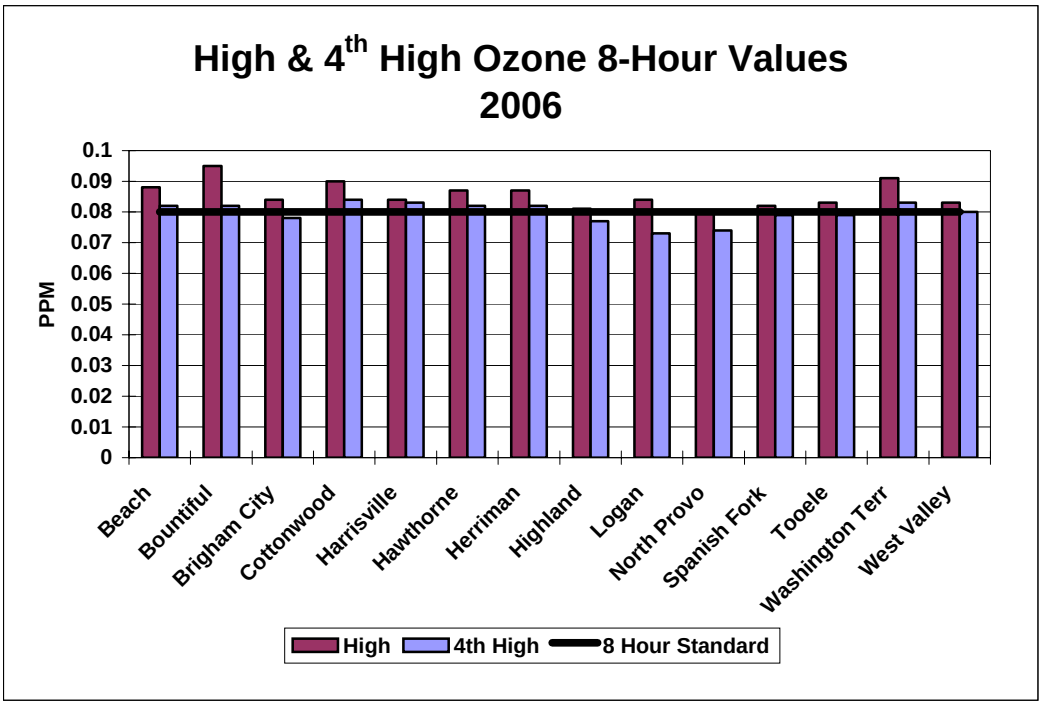
The valley setting of the major urban areas along the Wasatch Front complicates ozone monitoring. Typically, peak ozone stations should be located five to seven hours downwind from an urban area. However, summer wind patterns along the Wasatch Front result in a diurnal up-valley/down-valley wind flow pattern, such that after five to seven hours, the polluted air mass may be right back over the urban area.

Ozone concentrations at all DAQ monitoring sites fluctuate seasonally, with higher values measured only during the warmer months. Ozone is also created during winter temperature inversions as part of the complex photochemical reaction that is also creating $PM_{2.5}$. Therefore, some of the DAQ ozone monitors are operated seasonally, while others will be operated year-round.

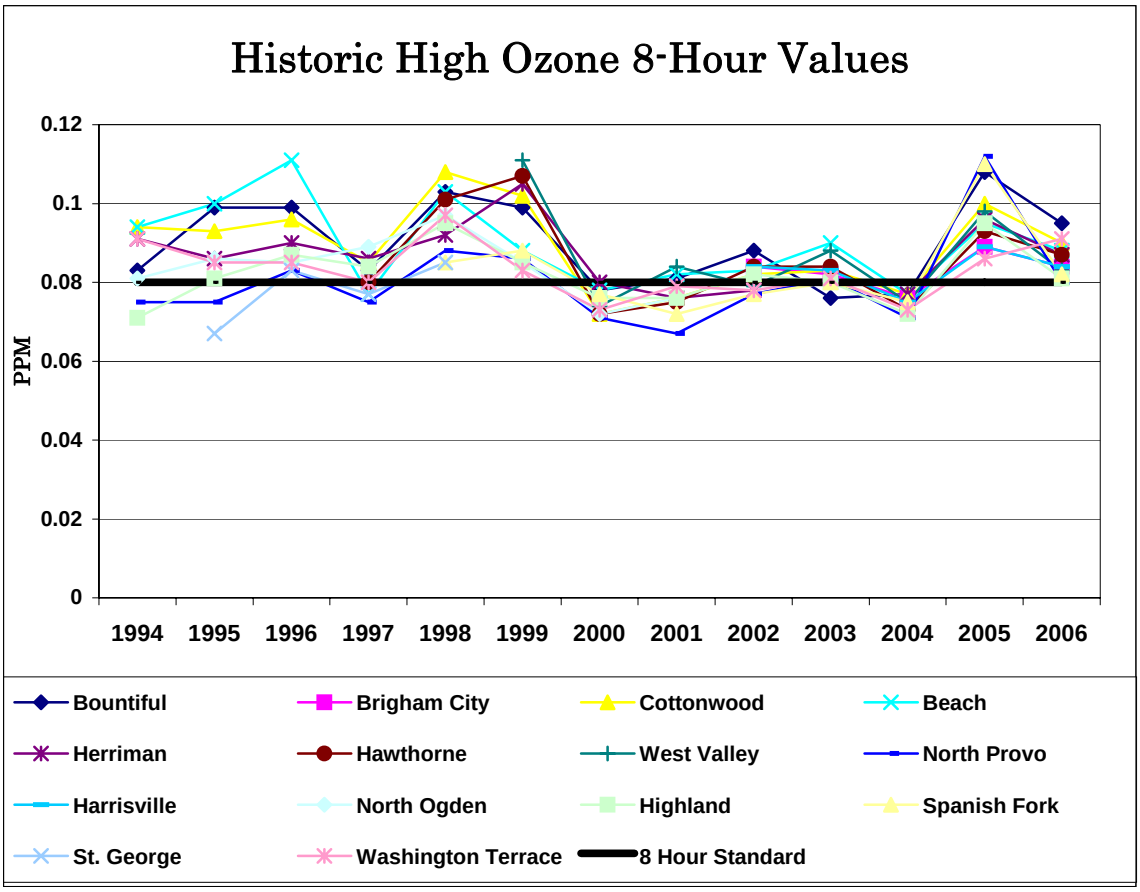
The fourteen existing ozone monitoring sites are located where the highest hourly and 8-hour ozone concentrations occur, located primarily in the populated counties along the Wasatch Front. Many of the sites routinely observe exceedances of the 8-hour ozone NAAQS, but none of the areas violated the standard. However, analysis of data from rural areas throughout Utah and the bordering states indicates that ozone is potentially much more of a regional problem in the West than was originally thought. Utah is actively participating with other states in the region to further analyze this, and this analysis may result in the need for an expanded ozone monitoring network.

Data Review from the Existing Network

The following graph shows the highest and 4th highest 8-hour average concentrations of ozone for 2006. As can be seen, exceedances of the 8-hour standard occur throughout our urban areas. Some of the sites have 4th high averages that also exceed the standard. To violate the standard the 4th high average for three years must be averaged, and if that average of the three yearly averages 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 2006. Ozone concentrations have remained level despite significant population growth due to emission control devices on new vehicles, the county-operated vehicle emission inspection and maintenance programs, a requirement for Stage I vapor controls at gasoline dispensing facilities, and significant control measures installed by industrial sources. 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.



Additional Monitoring

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. Therefore, DAQ will establish two new monitoring sites for ozone, one in the Draper area, and the other in the West Jordan/South Jordan area.

Changes To The Ozone Monitoring Network

Analysis of years of monitoring data has shown that the polluted air mass moves around the valley, analogous to water sloshing around in a bathtub. At any given time, the ozone concentrations at some sites may be higher than others in the network. DAQ currently operates six ozone monitors in the Salt Lake / Davis County Maintenance Area, and DAQ believes this is not the best use of resources. It has been our experience that the Cottonwood and Bountiful monitors usually record the highest ozone concentrations in the air shed. The Hawthorne site will be the Salt Lake County consolidated monitoring site. The Beach monitor, located at the edge of the Great Salt Lake where no people live, is not sited to represent the ozone concentrations to which the populated areas may be exposed. Therefore, the Beach Monitor will be shut down, and new monitors will be established in the southern portion of the Salt Lake Valley where the population is growing.

DAQ plans to discontinue ozone monitoring at Beach, Harrisville, Herriman, Highland and Washington Terrace sites. Ozone monitoring will continue at Brigham City, Bountiful, Cottonwood, Hawthorne, Logan, North Provo and Tooele. The West Valley ozone monitor will be moved to a new location in West Jordan or South Jordan, and a new ozone monitoring site will be established in Draper. Additional ozone monitoring sites may be established to respond to growth or to supplement the information regarding regional ozone concentrations.

The population growth in Washington County has reached an estimated population over 100,000. According to the new monitoring regulations, an ozone monitor is required to be in operation by the beginning of the ozone season in 2008.

Special Studies

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

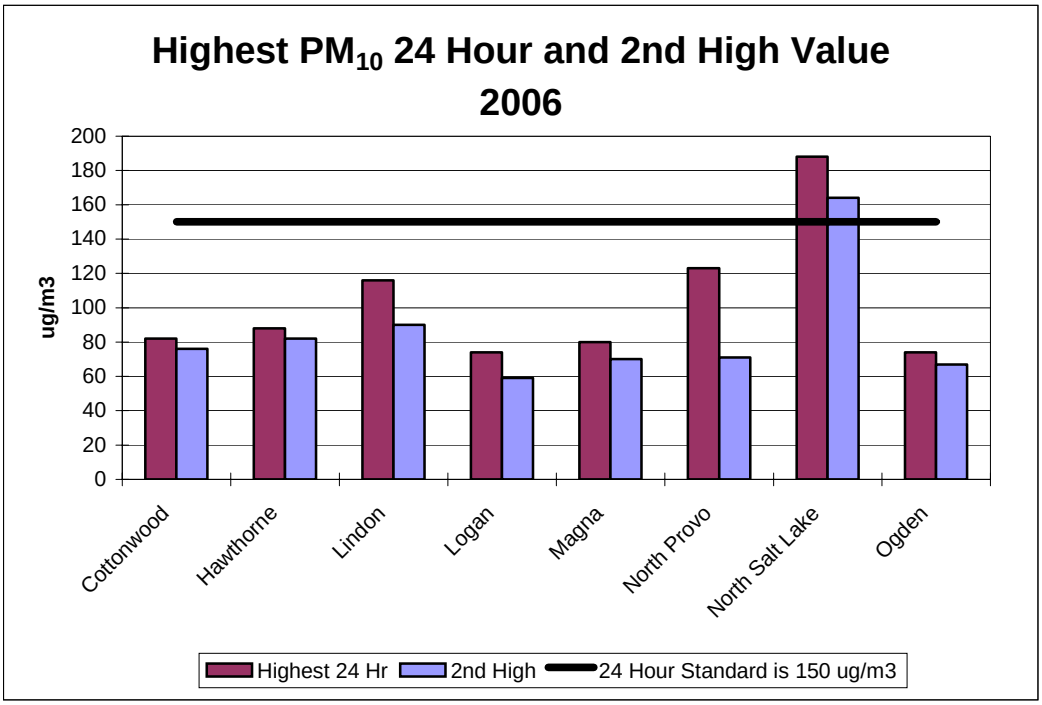
2.5 PM_{10}

The PM_{10} samplers were initially installed at the same sites as the Total Suspended Particulate (TSP) samplers because computer modeling was not available to assist in locating the sites. TSP monitoring had been performed for many years at those locations and showed many violations of the TSP standard.

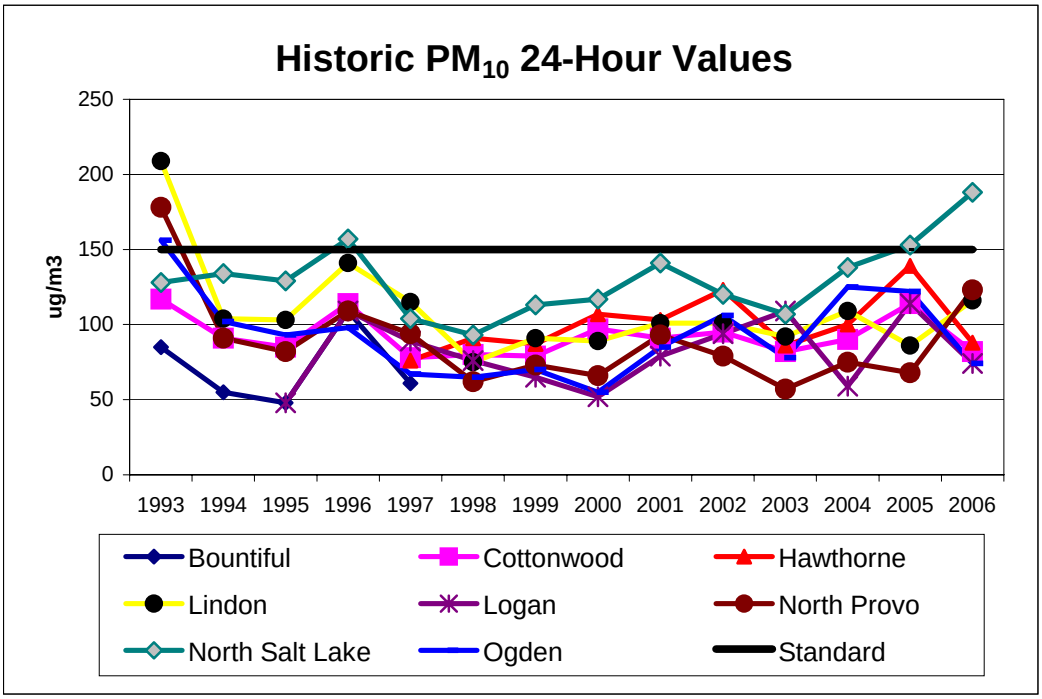
PM_{10} monitoring is complicated by the fact that there are two types of PM_{10} particles. Primary particles are released from the source as particles and their concentration decreases from the point of release dependent on dispersion characteristics. Secondary particles are released as gases and become PM_{10} particles through chemical reactions in the atmosphere. Concentrations of secondary particles are greater some distance from the source or after some time has elapsed from the time of release to allow the reactions to occur. Monitored 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.

Data Review from the Existing Monitoring Network

The following graph shows the highest and second highest 24-hour average PM_{10} values for 2006. As can be seen, only one station measured exceedances of the standard. The high values were the result of a natural event consisting of very high winds which blew dust all along the Wasatch Front.



The graph below shows the PM_{10} trend from 1993 through 2006, including the attainment of the PM_{10} standard in all areas of the state since 1993.



<u>Additional Monitoring</u>

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

Special Studies

No special studies are planned for the next year.

Changes To The PM_{10} Monitoring Network

In the 2006 revisions to 40 CFR 58, the minimum population based monitoring requirements were changed. Upon evaluation of the monitoring network and considering the trends in PM_{10} levels observed during winter time inversion periods, several sites are being discontinued. The discontinued sites were located in areas that were adequately represented by remaining monitors for the purpose of determining continued compliance with the NAAQS during winter inversion periods. By discontinuing redundant or single pollutant monitors, resources will be made available to address future monitoring priorities. Wintertime PM_{10} is primarily composed of $PM_{2.5}$, and is addressed by DAQ's $PM_{2.5}$ monitors. DAQ plans to discontinue PM_{10} monitoring at Cottonwood and Lindon, and continue to monitor PM_{10} at Hawthorne, Logan, Magna, North Provo and Ogden.

The location of the North Salt Lake monitor will be evaluated to determine if the current location is appropriate and representative. The Division has concerns that the local impacts of construction activities and emissions from idling diesels and neighboring yard activities are biasing the results of the ambient sampling.

Additional PM_{10} monitoring sites may be established to respond to growth and associated state monitoring needs.

2.6 $PM_{2.5}$

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/m3 to 35 ug/m3, effective December 18, 2006. The more stringent standard increases the importance of $PM_{2.5}$ sampling.

$PM_{2.5}$ is comprised of two different types of 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.

In Utah, elevated $PM_{2.5}$ concentrations principally occur during the winter time when the ground is covered in snow and strong, cold inversions set up along the Wasatch Front, resulting in stagnant air and foggy conditions. During these times, nearly all of the monitored $PM_{2.5}$ is secondary particulate. DAQ has operated many monitors along the Wasatch Front and participated in studies in the Cache Valley, and has found that $PM_{2.5}$

concentrations are generally fairly homogeneous throughout the valleys during the winter stagnant conditions.

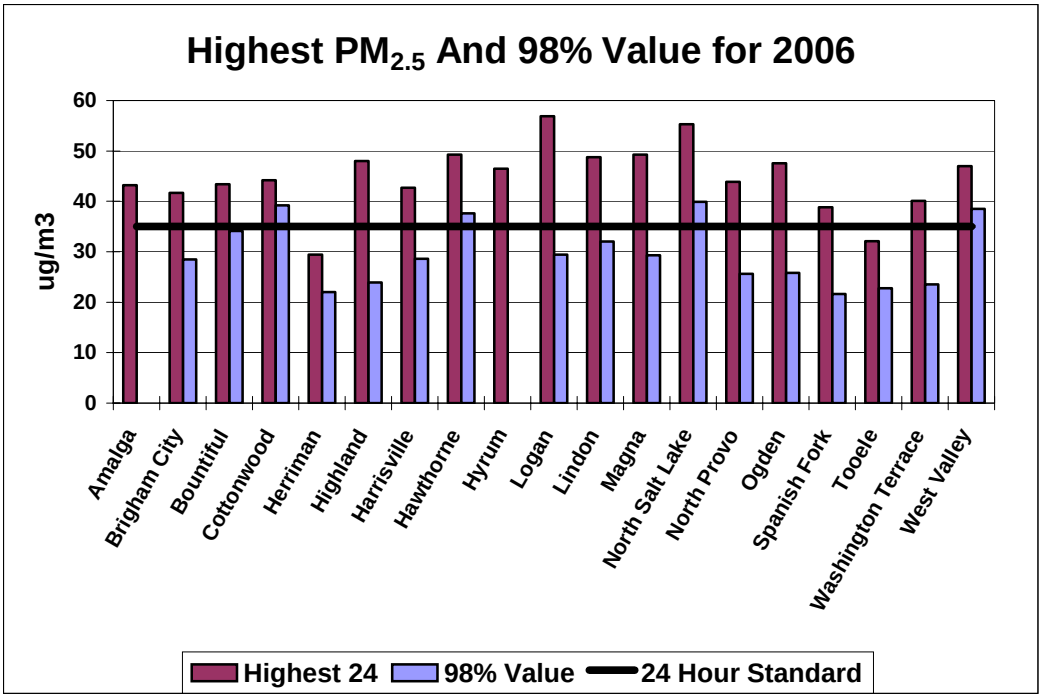
In the summer, strong wind events may cause elevated concentrations of $PM_{2.5}$, most of which is primary particulate (wind-blown dust).

Particulate sampling was first conducted for TSP, then PM_{10} at several locations in each county. Previous particulate monitoring has showed that the existing locations have elevated particulate concentrations. In addition, computer modeling for TSP and PM_{10} and some limited PM_{10} saturation sampling also showed existing particulate sampling sites are located in the areas of high concentrations for particulates. Therefore, when the initial $PM_{2.5}$ monitors were set up, it was done at those historic sites.

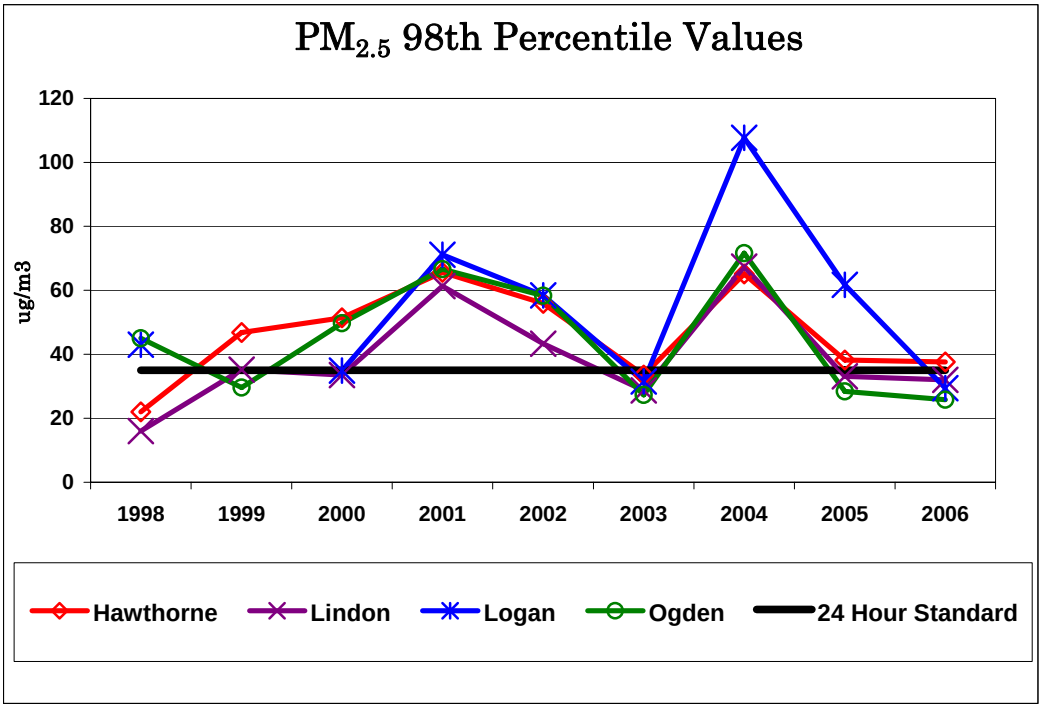
Historically, TSP and PM_{10} sites were located based on primary particulates, and the $PM_{2.5}$ monitoring sites were located based on concentrations of PM_{10}. The appropriateness of that decision will be reviewed as modeling for $PM_{2.5}$ is performed. To complete the modeling, emission inventory information must be collected and the reactive models need to be verified; however, our finding thus far of the homogeneity of $PM_{2.5}$ concentrations throughout the air shed indicates that one or two $PM_{2.5}$ monitors in each air shed are adequate to demonstrate compliance with the NAAQS. $PM_{2.5}$ monitors that sample every three days are of limited value because continuous hourly data are needed for public notification and modeling. Therefore, DAQ is proposing to shut down a number of $PM_{2.5}$ monitors.

Data Review from the Existing Monitoring Network

The following graph shows the highest 24-hour average $PM_{2.5}$ and 98% value of $PM_{2.5}$ for 2006. The values are significantly over the new $PM_{2.5}$ standard that became effective in December 2006. UDAQ is in the process of evaluating the monitoring data to make nonattainment/attainment recommendations by December of 2007.



The following graph shows the history of $PM_{2.5}$ 98th percentile concentrations measured in Utah.



Additional Studies

No special $PM_{2.5}$ studies are planned for this next year

Changes to the $PM_{2.5}$ Monitoring Network

DAQ will discontinue $PM_{2.5}$ monitoring at Cottonwood, Harrisville, Herriman, Highland, Lindon, Magna, Washington Terrace and West Valley; continue to monitor $PM_{2.5}$ at Bountiful, Brigham City, Hawthorne, Logan, North Provo, Ogden, Rose Park, Spanish Fork and Tooele; and begin monitoring $PM_{2.5}$ at two new sites, one in West Jordan or South Jordan and the other in Draper. These modifications will allow the installation of more expensive real-time monitors for use in detailed modeling analysis and for notification to the public of current air quality conditions. Additional $PM_{2.5}$ monitoring sites may be established to respond to growth associated state monitoring needs.

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 DAQ 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 complex wind patterns, it is difficult to collect enough monitoring data to adequately represent the meteorology within the air shed.

There is a need to collect Solar Radiation/Delta T (SRDT) data 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. Sources outside the Wasatch Front will be required to collect SRDT data as part of any PSD permitting actions. However, in nonattainment areas such as along the Wasatch Front where PSD permitting is not required, it may be necessary for DAQ to begin to collect SRDT data, based on available funding.

Existing Monitoring

The current meteorological monitoring network is described in Table 1 of this plan.

Additional Monitoring

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. DAQ will be using the AERMOD computer model to analyze $PM_{2.5}$ and ozone data. AERMOD requires an extensive amount of meteorological information. The current meteorological monitoring network does not collect SRDT data, so the network may be modified to begin collecting SRDT data as funding is identified to purchase the necessary equipment.

Changes To The Meteorological Monitoring Network

DAQ will discontinue meteorological monitoring at Beach, Harrisville, Herriman, Highland, Lindon, West Valley and Washington Terrace; continue to perform meteorological monitoring at Antelope Island, Badger Island, Bountiful, Brigham City, Cottonwood, Hawthorne, Logan, Magna, North Provo, Ogden, Salt Air, Spanish Fork, Syracuse and Tooele; and begin meteorological monitoring at two new sites, one in West Jordan or South Jordan, and the other in Draper.

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 became the 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 pressure to increase monitoring for toxic air pollutants has been increased by the National Monitoring Policy, in response to which, EPA is reducing the number of criteria pollutant monitors required by regulation, allowing states to 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 the extent needed to answer the questions being raised about toxic air pollutants, particularly in light of recent cuts in federal funding for monitoring. Any increase in the toxic monitoring network will depend on additional funding by EPA.

Mercury as an air toxic is of significant interest in Utah. Advisories to limit the consumption of fish from certain lakes and water sheds have been issued because of the mercury content of the fish flesh. The sediment of the Great Salt Lake has mercury to an extent that has raised concern about its origin. The public, politicians and regulators want to know the source of ambient mercury and the effect it may have on human health. With these concerns as a driving force, DAQ became part of the national Mercury Deposition Network and began monitoring for mercury in the ambient air in May 2007.

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 DAQ. Toxic monitoring at these sources was not conducted 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, VOCs, 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 provide for a more complete evaluation of the air mass being monitored. Using EPA funds, an aethalometer has been added to the Bountiful site to measure ambient carbon particles. In addition, sampling for hexavalent chromium (Cr^{VI}) was initiated in 2005. A new carbon sampler began operation in 2007.

The Mercury Deposition Network sampler is located on the roof of the Air Monitoring Center in the western Salt Lake City suburb of West Valley City. Monitoring for Mercury began in May 2007.

Existing monitoring

The one Urban Air Toxics monitoring site provides a baseline for air toxics data in the urban areas along the Wasatch Front.

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, DAQ will identify needed changes to the toxics monitoring network.

DAQ is seeking resources to conduct additional mercury sampling work to include expanded wet and dry deposition monitoring.

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. Rule R307-105 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 will be prepared for submittal to EPA Region VIII to implement the network modifications identified in this network plan.

5.0 SUMMARY AND CONCLUSIONS

The monitoring requirements identified by federal regulation are currently 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 modifications noted, the data necessary to meet the needs of the Utah Division of Air Quality. The Division is seeking funding from various sources to meet the scientific and public demand for reliable air quality data. The current network has stretched available resources to meet the minimum data needs.