UTAH

AIR MONITORING

NETWORK REVIEW 2001

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 2001. 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 scales, which describe concentrations in air volumes associated with area dimensions 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 city wide conditions, usually about 4.0 to 50 kilometers. Needs 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}	$PM_{2.5}$
Beach #4 12100 West. 1200 S. GSL Beach Marina, Magna, UT 49-035-2004 460900005FO2	SLAMS High Neigh.		SLAMS* High Neigh.			.	
Bountiful 65 West 300 South, Behind Fire Station Bountiful, UT 49-011-0001 460060001F01	SLAMS Impact Neigh.	SLAMS Population Neigh.	NAMS* High Neigh.	SLAMS Population Neigh.			SLAMS Population Neigh.
Brigham City 140 West Fishburn Dr Brigham City, UT 49-033-0003			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.
Grantsville 90 South Park Grantsville UT 49-045-0002							SPMS Background Reg.
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 Middle
Harrisville 405 West 2550 North Ogden, UT 49-057-1003			SLAMS Population Neigh.				SLAMS Background Reg
Herriman 5600 West 12885 South Herriman, UT 49-035-3003			SLAMS* High Neigh.				SPMS Background Reg

*Indicates Seasonal Monitoring
**Should be redesignated to NAMS

- Indicates Seasonal Monitoring

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.
Lindon 30 North Main, Behind School Lindon, UT 49-049-4001 461220001F01						NAMS Impact Neigh.	SLAMS Population Neigh.
Logan 125 West Center Street Logan, UT 49-005-0002		SLAMS* Pop Neigh.	SLAMS* Pop Neigh.			SLAMS High Neigh.	SPMS Population Neigh.
Magna 2935 South 8560 West, On School Magna, UT 49-035-1001 460520001F02	NAMS Impact Neigh.				SLAMS Impact Neigh.	NAMS High Neigh.	
Moab #6 168 West 400 North Moab, UT 49-019-0006						SLAMS Population Neigh.	
North Provo 1355 North 200 West Behind Armory 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

** Should be redesignated 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.
South Orem 1580 South State Orem, UT 49-049-5005		SLAMS* High Micro					
Spanish Fork Spanish Fork/Springville Airport 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					
University Avenue #3 363 North University Avenue Provo, UT 49-049-0005		SLAMS High Micro					
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 Terace, UT 49-057-0007		SLAMS* Pop Neigh.	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 redesignated NAMS

UTAH DIVISION OF AIR QUALITY

OFFICIAL AND SPECIAL STUDIES MONITORING NETWORK SUMMARY APRIL 2001

		TELEMETRY.	PM2.5	#PM2.5	PM10	#PM10	CO	03	SO2	NO2	SPAN SOURCE	WIND	TEMP/RH	SR/BP*	SG/DT/PRE*	LEAD	API
ANTELOPE ISLAND	AI	CAMPBELL										YES	TEMP*RH		SIGMA ONLY		
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 & CL	2			*SEASONAL/TECO	*SEASONAL /DASIBI		TECO	DYNACAL/DASIBI/CYLINDER	YES	TEMP		SIGMA ONLY		SO2/CO/03
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		03/CO
GRANTSVILLE	GV	ESC	3-DAY	1							DYNACAL	YES	TEMP&RH		SIGMA ONLY		
HARRISVILLE	HV	ESC	3-DAY	1				*SEASONAL/DASIBI			DASIBI	YES	TEMP		SIGMA ONLY		
HAWTHORNE	HW	ESC	TEOM&ED	2	TEOM &ED	2	*SEASONAL/TECO	*SEASONAL/DASIBI		TECO	DYNACAL/API/CYLINDER	YES	TEMP&RH	SR & BP			TEOM(2.5&10)03/C0
HERRIMAN	HE	ESC						*SEASONAL/DASIBI			DASIBI	YES	TEMP&RH	SOLAR	SIGMA & DT		
HIGHLAND	HG	ESC	3-DAY	1				*Seasonal/Dasibi			DASIBI	YES	TEMP		SIGMA ONLY		
LINDON	LN	ESC	TEOM/CL/ED	3	TEOM & ED	3					N/A	YES	TEMP&RH		SIGMA ONLY		TEOM(PM10/2.5)
LOGAN	L4	ESC	3-DAY	1	3 DAY	1	*SEASONAL /TECO	*SEASONAL/DASIBI			DASIBI/CYLINDER	YES	TEMP		SIGMA ONLY		CO & 03
MAGNA	MG	ESC			3 DAY	1			TECO		DYNACAL	YES	TEMP		SIGMA ONLY	*HV/CL	S02
MOAB	M6	N/A			6 DAY	1					N/A	N/A					
NORTH PROVO	NP	ESC	3-DAY	1	3 DAY & CL	2	*SEASONAL/TECO	*SEASONAL/DASIBI		TECO	DYNACAL/DASIBI/CYLINDER	YES	TEMP		SIGMA ONLY		03/C0
N. SALT LAKE	N2	ESC	3-DAY	1	*E/D & CL	3			TECO		DYNACAL	N/A					S02
NORTH OGDEN	ON	ESC	3-DAY	1				*SEASONAL/DASIBI			DASIBI	YES	TEMP		SIGMA ONLY		
OGDEN	O2	ESC	3-DAY	1	ED	2				TECO	DYNACAL						TEOM(PM10/2.5)
PROMONTORY	PP	CAMPBELL										YES	TEMP&RH		SIGMA ONLY		
SALTAIRE	SA	CAMPBELL										YES	TEMP&RH	SOLAR	SIGMA ONLY		
SOUTH OREM	SO	ESC					*SEASONAL/TECO				CYLINDER	N/A					
1400 S STATE	S3	ESC					TECO				CYLINDER	N/A					CO
SPANSIH FORK	SF	ESC	3-DAY	1				*SEASONAL/API			API	YES	TEMP		SIGMA ONLY		
SYRACUSE	SY	CAMPBELL										YES	TEMP&RH		SIGMA ONLY		
UNIVERSITY AVE	U3	ESC					TECO				CYLINDER	N/A					CO
WASH. BLVD	W2	ESC					TECO				CYLINDER	N/A					C0
WASH. TERR.	ST	ESC	3-DAY&CL	2			*SEASONAL/TECO	*SEASONAL.DASIBI			DASIBI/CYLINDER	YES	TEMP&RH		SIGMA ONLY		03/C0
WEST VALLEY	WV	ESC	3-DAY	2			*SEASONAL/TECO	*SEASONAL/DASIBI			DASIBI/CYLINDER	YES	TEMP				
WEST JORDAN	WJ	ESC										YES	TEMP&RH				
SITES	30	30	16		9		11	14	4	5		23	23	3	20	1	12
REPORTING SMPLRS.				19		11										1	
CO-LOC SMPLRS.				4		2										1	
SEASONAL SMPLRS.							7	14									
TEOM & BETA (PM2.5&10)				2		2											

ISPM - SPECIAL PURPOSE MONITOR
***ED - EVERY DAY SAMPLING**
ESC DATA LOGGER

***SEASONAL TECO - COLLECT CO DURING WINTER SEASON (NOV-MAR)**
***SEASONAL DASIBI - COLLECT 03 DURING SUMMER SEASON (MAY-SEPT)**
***EOD - EVERY OTHER DAY SAMPLING SG/DT/PRE**

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

1.2 CURRENT NETWORK MODIFICATION ISSUES:

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

Response to New or Proposed NAAQS

No new National Ambient Air Quality Standards (NAAQS) have been promulgated. On May 14, 1999, the U.S. Court of Appeals for the District of Columbia Circuit issued an opinion regarding the NAAQS for ozone and particulate matter that EPA promulgated on July 18, 1997. The court ruling added a level of uncertainty and confusion concerning ambient monitoring for ozone and particulate matter and the direction to be taken by air monitoring programs. The decision was made to continue to implement the $PM_{2.5}$ monitoring network as previously identified to EPA. On February 27,2001 the Supreme Court upheld the NAAQS for $PM_{2.5}$ and the 8 hour average NAAQS for ozone.

Population Growth

Utah has experienced significant population growth over the past 15 years. A table showing the growth rate is attached as Appendix B. New housing starts indicate the growth rate has even continued over the past 3 years. Changes to the monitoring network the past couple of years has addressed most of the population growth. Draper City in south east Salt Lake County has grown the most since the 1990 census with a growth rate of 248%. That significant growth results in Draper City being the eighteenth largest city in Utah. Draper City is part of the Salt Lake-Ogden Metropolitan Area. Air pollution in the metropolitan area has been addressed for many years. New growth information will be evaluated to see if additional data are necessary.

PSD Increment Tracking

Normally PSD increments are tracked with computer models. The models show all the increment for NO_2 is consumed in Carbon County around the city of Cleveland. The concern is that the NAAQS for NO_2 may be violated. Ambient air monitoring for NO_2 is needed in or near Cleveland to verify the model and to determine the status of the NAAQS.

Modifications to Meteorological Monitoring

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. Wind speeds and wind direction aloft is an important part of three dimensional computer modeling. A Doppler wind sensor uses sound to measure wind speed and direction at various elevations in the atmosphere. We were operating a Doppler instrument at the Central Valley Water Reclamation facility at 900 West and 3300 South. Noises associated with the water reclamation process and sound echoing off of the buildings of the facility resulted in very poor data capture. The Doppler had to be relocated to improve data capture. A location as near the middle of the Salt Lake Valley is preferred. A replacement site for the West Jordan wind tower is also necessary to provide adequate coverage for complex computer modeling.

1. Relocate the Doppler to a location in the middle of Salt Lake Valley.

2. Find a replacement site for the West Jordan wind tower.

Monitoring for Toxic Air Pollutants

The Environmental Protection Agency (EPA) is continuing monitoring for non-criteria pollutants called Toxic Air Pollutants. Several thousand air pollutants that are harmful are released into the air every day. EPA has identified 188 of those pollutants as a priority for evaluation and possible control. In doing this, EPA is funding an Urban Air Toxics Monitoring Program. The Urban Air Toxics Monitor was installed at the West Valley site the fall of 1999. A new sampler to allow the collection of heavy metal samples will be installed this next year.

1. Install metal sampler at the West Valley Urban Air Toxics monitoring site.

1.3 REVIEW OF LAST YEAR NETWORK MODIFICATIONS

1. A new monitoring station was installed in Harrisville to measure ozone and $PM_{2.5}$.

1. A new monitoring station was installed in Brigham City to measure ozone and $PM_{2.5}$.

2. A new monitoring station was installed in Ogden to replace the old Ogden station. PM10, $PM_{2.5}$, NO2 and NOx are measured at the site.

3. A $PM_{2.5}$, Speciation sampler was installed an began operating at the Lindon Monitoring Station.

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 was performed as part of the SO_2 State Implementation Plan in the 1980's. No more recent computer modeling has been completed. EPA Region VIII has offered to perform computer modeling, but that effort has not been completed. The results of the 1980's modeling show 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. Current modeling show a potential for elevated SO_2 concentrations on the bench areas of Bountiful City. The modeling results are continuing to be reviewed.

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 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 SO2 emissions. Their emissions are adequately monitored by the North Salt Lake Station near the Salt Lake County-Davis County border. The Bountiful monitoring station in Davis County is population oriented. It has been in operation for years and will continue to operate to evaluate population exposure. In the distant past, relatively high SO_2 concentrations have been measured at this station. It is the only SO_2 monitoring station in Davis County and is meeting DAQ needs and objectives.

Tooele County

The Kennecott Copper Smelter is located adjacent to the eastern end of Tooele County. In 1978 the smelter was changed to new technology. No violations of the NAAQS have been measured since the change was made at the smelter. SO_2 monitoring has been conducted in Grantsville in Tooele County to determine if the smelter plume impacts the community. Most of the values measured were zero. No concentrations were measured that were even one third of the NAAQS. Because the concentrations are so low and no SO_2 impacts are occurring, SO_2 monitoring has been discontinued in Grantsville.

Existing Monitoring Network

The existing SO2 monitoring network presently meets the federal requirements and existing state needs.

Additional Monitoring

No additional monitoring or monitoring sites are necessary.

Special Studies

No special studies are planned or needed.

2.2 NITROGEN DIOXIDE

The existing 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 NO_x emissions from automobiles and NO_x 's involvement 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 less than populations of 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. Appendix A lists both the point source and area source emissions of NO_x for the counties with the highest emissions. The information shows that 21% of NO_x emissions come from automobiles and 65% comes from point source process industries. Sixty percent of point source NO_x emissions are associated with power plants. They are located in rural southern Utah areas and have received Prevention of Significant Deterioration permits. They have also performed post construction monitoring, verifying that the NAAQS is not violated. Additional monitoring is necessary at Cleveland to determine PSD impacts. There also may a potential need for additional NO_2 monitoring to help understand the formation of secondary PM10 and PM2.5 particulate matter. This need will be discussed in the future.

The oxidation of 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 NETWORK

Existing Monitoring Network

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

Additional Monitoring

Additional monitoring is necessary at Cleveland to determine PSD impacts. There also may be a potential need for additional NO_2 monitoring to help understand the formation of secondary PM10 and PM2.5 particulate matter. This need will be discussed in the future.

Special Studies

No additional studies are necessary.

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. The emissions inventory in Appendix A indicates the amount of CO emissions from different sources in the Wasatch Front. Eighty-five percent (85%) of the carbon monoxide emitted is generated by vehicles.

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. The models verify the original site selections and indicate that existing CO monitoring stations are appropriately located.

In 1992, a CO Saturation Study was performed. The results of the study indicate the monitoring sites were not at the point of maximum CO concentrations. One of the highest sites identified was near the intersection of 1300 South and State Street in Salt Lake City. Sites with high CO concentrations were also identified along 700 East Street near the 2100 South intersection, 3300 South and 3900 South intersections. The 1400 South State Street microscale CO site was installed as a result of the saturation study. In December 1996, a new monitoring site for PM10 was installed at Hawthorne Elementary School because of the reconstruction of I-15. The site is located near 700 East and 1700 South which is an area the CO saturation study showed to be a high area and is near the central business district. A CO monitor was installed at this location.

Bag Sampling

No bag sampling is planned for next year.

CO NETWORK

The existing Network CO monitoring stations that operate all year are: Cottonwood, State Street, Washington Blvd., and University Avenue. The CO Monitoring stations that operate seasonally are: Bountiful, Hawthorne, Logan, North Provo, South Orem, Washington Terrace and West Valley. This network presently meets the needs and objectives of DAQ.

Additional Monitoring

As Appendix D shows, the population is increasing rapidly in the south end of Salt Lake Valley. This identifies a need to conduct CO monitoring in this area. A site should be selected in the Sandy/Draper area to measure CO.

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, and reacts 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. 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.

New NAAQS

July 18, 1997, EPA promulgated new NAAQS for ozone. The new standard is an eight-hour average of the measured one-hour concentrations. The existing monitoring sites are located where the highest hourly ozone concentrations occur. We anticipate the highest 8 hour averages will occur at the same locations. Experience may modify that opinion. The new 8 hour NAAQS for ozone does not specifically require any new monitoring sites. The impact of the 8 hour standard has been exceedances at stations in more rural locations that did not exceed the 1 hour standard.

Existing Network

The existing monitoring network for ozone consists of twelve 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.

Special Studies

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

Additional Monitoring

An additional ozone monitoring station needs to be installed in the east side of the

Sandy/Draper area. EPA has suggested that ozone concentrations may be higher in the south east 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. Site selection has not identified an acceptable site.

1. Install a new ozone monitoring site in the Sandy/Draper area.

Ozone monitoring needs to be conducted in Grantsville to provide data for the western boundary of the UAM modeling domain. Power supply is erratic enough that an ozone analyzer will not operate properly in Grantsville.

Additional Saturation Studies.

No additional studies are planned.

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

Presently, lead monitoring is being performed at the Magna air monitoring station. The Magna sampler is near an industrial source that emits 22 tons of lead per year. Most of the measurements made over the past 5 years have been below the detection limits of the measurement method. Lead monitoring, in reality, is now only necessary near industrial lead sources which emit 5 tons or more of lead a year to the atmosphere. 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 operations in the north west part of Salt Lake valley.

Additional Monitoring

No additional lead monitoring sites will be installed.

Changes In Monitoring Network

No changes occurred in the lead monitoring this past year.

2.6 PM10

The PM_{10} samplers were initially installed at the same sites as the Total Suspended Particulate 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.

Additional Monitoring

Additional PM_{10} monitoring is necessary in rapidly growing areas of Utah. PM_{10} is necessary in Sandy/Draper and Park City.

Saturation Studies

No saturation studies are planned for the next year.

Special Studies

No special studies are planned for the next year.

2.7 PM2.5

On July 18, 1997, the Environmental Protection Agency promulgated a new NAAQS for particulate matter measured as $PM_{2.5}$. Particulate sampling has been conducted first for TSP and then PM_{10} 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. Previous particulate monitoring has also shown the existing locations to have elevated particulate concentrations. There are two types of particles which 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. Establishing monitoring sites to measure both types of particles can be a concern. Historically TSP, PM_{10} sites have been located based on primary particulates. Initially $PM_{2.5}$ will be located based on concentrations of $PM_{10.}$ The following table shows the locations and installation dates for the $PM_{2.5}$ network. 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 National Parks in Utah.

NEW $PM_{2.5}$ MONITORING NETWORK:

	PM2.5 Network for 2000-2001								
	Name of Site	AIRS ID	Type of Site	Type of Sampler	Sampling Frequency	Collocation	Speciation	Date of Install	County
1	West Valley	49-035-3007	Core- population>500,000	Sequential	1 in 3 CY99	FY99	FY99	FY-98	Salt Lake
2	Ogden	49-057-0001	Core- population>500,000	Sequential	1 in 3 CY99		No	FY-98	Weber
3	Hawthorne	49-035-3006	Core- population MSA>1,000,000	Sequential	Daily/Continuous	FY98	No	FY-98	Salt Lake
4	North Provo	49-049-0002	Core- population MSA 200K-500K	Sequential	1 in 3		FY99	FY-98	Utah
5	Lindon	49-049-4001	Non-core-population MSA 200K	Sequential	Daily CY99	FY99	FY99	FY-98	Utah
6	Grantsville	49-045-0002	Non-core-background/transport	Sequential	1 in 3		No	FY-98	Tooele
7	Spanish Fork	49-049-5010	Non-core-background/transport	Sequential	1 in 3		No	FY-98	Utah
8	North Salt Lake	49-035-0012	Supplemt-high population & emis.	Sequential WS	1 in 3		No	FY-98	Salt Lake
9	Cottonwood	49-035-0003	Supplemt-discretionary	Sequential WS	1 in 3		No	FY-98	Salt Lake
10	Bountiful	49-011-0001	Supplemt-discretionary	Manual WS	1 in 3		No	FY-98	Davis
11	Washington Terrace	49-057-0007	Supplemt-discretionary	Prototype R&P	1 in 3		No	FY-99	Weber
12	Logan	49-005-0002	Supplemt-discretionary	Manual EMAD	1 in 3		No	FY-99	Cache
13	Highland	49-049-5008	Supplemt-discretionary	Prototype R&P	1 in 3		No	FY-99	Utah
14	Brigham City	New	Supplemt-discretionary	Prototype R&P	1 in 3		No	FY-99	Box Elder
15	North Ogden	49-057-1002	Supplemt-discretionary	Manual WS	1 in 3		No	FY-99	Weber
16	Herriman	New	Supplemt-discretionary	Prototype R&P	1 in 3		No	FY-99	Salt Lake
17	Bryce Canyon	Improve	Improve-reg	Improve	1 in 3		Yes	Existing	Garfield

	PM2.5 Network for 2000-2001								
			haze/transport/bckgrnd						
18	Canyon Lands	Improve	Improve-reg haze/transport/bckgrnd	Improve	1 in 3		Yes	Existing	Grand
19	Capitol Reef	Improve	Improve-reg haze/transport/bckgrnd	Improve	1 in 3		Yes	FY-98	Wayne/Garfield
20	Zion	Improve	Improve-reg haze/transport.bckgrnd	Improve	1 in 3		Yes	FY-98	Washington

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 micro meteorology in Utah. Because the terrain produces the complex wind patterns, there are not enough monitoring sites which measure meteorological parameters.

Existing Monitoring (See Network Summary Table)

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. Some sites have been discontinued because they were redundant to other sites; and new sites have been installed in locations where no data were available.

Additional Monitoring

Additional meteorological monitoring was identified earlier and is restated here. The need is based on the report prepared by the Technical Analysis Section. The Technical Analysis Section has also identified a need for additional meteorological monitoring for the CMB computer model.

1. Replace the West Jordan wind tower to allow characterization of the wind patterns in the central part of the Salt Lake Valley.

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.

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 station, Lindon, and North Provo. Sampling systems are periodically co-located to establish repeatability between systems. Selected samples are re-analyzed to verify the analytical system. If the program allows, the sampling schedule will be modified to obtain more samples. The sampling effort has been reduced and now focuses on hydrogen chloride and chlorine monitoring in Tooele County and responding to complaints. An air toxics sampler has been installed in the West Valley Station. It is part of the national air toxics monitoring effort.

Existing monitoring

In January 1997, a continuous chlorine analyzer was installed in the Grantsville monitoring station. The continuous chlorine analyzer augments the sampling for HCl in Grantsville using manual collection methods. In May 1998 chlorine monitoring ended so the analyzer could be converted to a continuous hydrogen chloride analyzer. The continuous hydrogen chloride analyzer was installed in July 1998. Many difficulties have been experience in operating the hydrogen chloride analyzer. The data collection is intermittent due to analyzer problems. Other samples for toxic air pollution are performed on a complaint basis. An EPA funded Urban Air Toxics Monitoring Program site was installed at West Valley in October 1999. Samples are being collected every 6 days for speciated hydrocarbon analysis and carbon analysis. These samples are being analyzed for 19 of the 33 Urban Air Toxics Strategy Target Compounds.

Additional Monitoring

The addition of monitoring for metals as part of the Urban Air Toxics. A TSP sampler will be installed at the West Valley site this next year.

Additional Studies

No additional studies are planned for next year.

2.9 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 are alerted whenever the Alert, Warning, or Emergency levels are approached. The monitoring staff have 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.

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

3.0 NETWORK MODIFICATION FORMS

Network modification forms are being prepared for submittal to EPA Region VIII for the Brigham City, Harrisville and Ogden monitoring sites. The Network Modifications were completed last fiscal year.

3.1 EQUIPMENT REPLACEMENT AND NEW PURCHASES:

The size of the Air Monitoring Network fluctuates in response to the air monitoring needs of the Division. Presently analyzers and samplers are operated at 30 locations in Utah. The network includes 107 individual analyzers, sensors and samplers. Four issues are of concern in maintaining an adequate air monitoring program. The first issue is the timely replacement of aging and worn out instruments and equipment. Second is increasing the capability of the air monitoring network to address ever increasing needs. Third is the evaluation and inclusion of new and innovative technology into the monitoring network. Fourth is providing an appropriate number of trained employees to operate an increasingly more complex air monitoring program and to operate any additional instruments as the size of the network may increase.

The Division of Air Quality has been fortunate to have received funding to replace a large number of the analyzers in the ambient air monitoring network. EPA recommends equipment replacement on a five-year basis. After five years, data loss increases significantly if the equipment maintenance effort is not increased appropriate to the age of the equipment. We have developed a five-year replacement cycle for existing equipment. Because the first equipment that was replaced is more than five years old, some of that equipment has been replaced and some still needs to be replaced. Additional equipment will need to be replaced each year from now on. At present, the primary source of funding for equipment is state supplemental budget authorization or the use of unexpended state or federal funds.

The Division did not have any money available for equipment replacement in FY01. The Division is attempting to provide money for equipment replacement for FY02. Money from EPA through the 105 Grant for equipment replacement has been limited and infrequent. Since EPA is encouraging the replacement of old equipment, we wish to see more federal money identified for that purpose.

3.1.1 PRIORITIZED EQUIPMENT NEEDS LIST

We have not been able to obtain enough funding to fully implement the 5-year plan for replacement of old equipment. The following is the priority list for equipment replacement.

2000 CAPITOL EQUIPMENT NEEDS PRIORITY LIST		
ITEM	**DESCRIPTION**	**COST**
1	7 Ozone Photometers (Span Sources)	$ 37,642.50
2	7 Diaphram Compressors (Pumps)/With Feet	1,404.90
3	7 High Resolution Rotometers with Tripod Base	2,611.00
4	5 Scrubber Assemblies, and Replacement Ozonator	966.00
5	30 SDRAM Memory Kit	2,280.00
6	6 Computer/Data Loggers	5,388.00
7	3 Canister Flow Restrictors	1,500.00
8	1 Metone Software Upgrade	1,000.00
9	1 Previously Ordered Items (Toxics)	6,000.00
10	1 typewriter	300.00
11	4 ESC Data Loggers	18,000.00
	Total	$ 77,092.40

FY 00 ITEMS NOT PURCHASED TO MAINTAIN 5YR EQUIPMENT REPLACEMENT PLAN

NUMBER	DESCRIPTION	UNIT COST	TOTAL
3	Stand Alone Met Systems	$ 11,000	$ 33,000
3	Monitoring Stations	16,000	48,000
1	Partisol Sampler (Hub & Sat)	8,000	8,000
2	Wind Direction Sensors	500	1,000
4	Wind Speed Sensors	1,000	2,000
1	Temperature & RH Sensors	1,000	1,000
1	110 Volt T & RH System	2,000	2,000
1 set	Cal Gasses	3,000	3,000
3	Stairways	500	1,500
1 lot	Fencing	3,000	3,000
		TOTAL	**$102,500.00**

4.0 SUMMARY AND CONCLUSIONS

The conclusion that is drawn from this network review is that 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 supporting documentation for the monitoring sites needs to be improved. Computer modeling needs to be performed to show the monitoring sites are located properly in response to industrial, commercial, and mobile sources of air pollution. Presently, this is a problem because the computer modelers do not have the time necessary to perform the modeling. Their time is involved in performing computer modeling for State Implementation Plans. Saturation studies have been completed for carbon monoxide and ozone as a substitute for computer modeling in documenting site locations.

APPENDIX A

EMISSIONS INVENTORY

The completed Emissions Inventory for 1996 is included in this appendix. It is the most recent revision of the Emissions Inventory available.

Beaver	**PM10**	**SOx**	**NOx**	**VOC**	**CO**
Area/Non-Road Mobile	968.84	1,063.34	966.39	8,802.61	6,538.49
On-Road Mobile	726.61	0.00	684.13	606.52	6,723.24
Point Source	0.91	0.31	3.27	0.43	0.99
Total	*1,696.36*	*1,063.65*	*1,653.79*	*9,409.56*	*13,262.71*

Box Elder	**PM10**	**SOx**	**NOx**	**VOC**	**CO**
Area/Non-Road Mobile	3,919.37	7,155.84	2,159.98	15,823.96	19,069.21
On-Road Mobile	3,194.44	0.00	2,845.22	2,726.53	27,943.41
Point Source	480.92	87.35	472.31	598.44	2,824.72
Total	*7,594.73*	*7,243.19*	*5,477.52*	*19,148.93*	*49,837.34*

Cache	**PM10**	**SOx**	**NOx**	**VOC**	**CO**
Area/Non-Road Mobile	5,014.90	14,893.69	2,891.32	16,189.67	15,287.91
On-Road Mobile	2,638.88	0.00	1,784.54	2,583.50	20,194.39
Point Source	115.18	145.44	132.55	140.14	56.30
Total	*7,768.96*	*15,039.13*	*4,808.41*	*18,913.31*	*35,538.60*

Carbon	**PM10**	**SOx**	**NOx**	**VOC**	**CO**
Area/Non-Road Mobile	1,188.14	3,892.25	1,297.35	10,707.11	3,647.71
On-Road Mobile	1,207.18	0.00	818.39	1,119.19	8,728.08
Point Source	263.56	5,958.21	3,843.20	277.29	392.22
Total	*2,658.88*	*9,850.46*	*5,958.94*	*12,103.59*	*12,768.02*

Daggett	**PM10**	**SOx**	**NOx**	**VOC**	**CO**
Area/Non-Road Mobile	76.26	138.59	32.41	5,276.21	314.31
On-Road Mobile	86.30	0.00	58.68	75.56	587.70
Point Source	0.05	0.33	731.02	46.68	80.79
Total	*162.62*	*138.92*	*822.10*	*5,398.45*	

982.80 **Davis**

	PM10	SOx	NOx	VOC	CO
Area/Non-Road Mobile	972.00	914.64	3,422.62	7,557.12	20,533.82
On-Road Mobile	7,141.72	0.00	5,845.40	4,764.57	43,123.38
Point Source	396.49	2,684.98	2,053.65	1,846.39	718.04
Total	*8,510.22*	*3,599.61*	*11,321.66*	*14,168.09*	*64,375.24*

Duchesne

	PM10	SOx	NOx	VOC	CO
Area/Non-Road Mobile	1,109.21	2,458.97	539.89	17,007.31	4,117.65
On-Road Mobile	684.53	0.00	464.55	620.10	4,831.79
Point Source	10.28	3.18	2,212.72	742.68	1,103.15
Total	*1,804.02*	*2,462.15*	*3,217.16*	*18,370.09*	*10,052.59*

Emery

	PM10	SOx	NOx	VOC	CO
Area/Non-Road Mobile	683.97	1,985.37	973.75	12,463.36	2,237.97
On-Road Mobile	1,183.94	0.00	941.43	1,023.70	9,411.80
Point Source	2,362.87	18,916.03	34,505.14	219.06	1,782.59
Total	*4,230.78*	*20,901.40*	*36,420.33*	*13,706.12*	*13,432.36*

Garfield

	PM10	SOx	NOx	VOC	CO
Area/Non-Road Mobile	310.50	789.06	155.25	23,586.96	1,085.76
On-Road Mobile	487.87	0.00	331.79	418.64	3,253.70
Point Source	0.00	0.00	0.00	0.00	0.00
Total	*798.37*	*789.06*	*487.03*	*24,005.60*	*4,339.46*

Grand

	PM10	SOx	NOx	VOC	CO
Area/Non-Road Mobile	474.48	1,627.12	727.31	24,252.68	1,420.25
On-Road Mobile	935.89	0.00	810.79	790.70	7,725.78
Point Source	163.24	6.42	465.76	561.44	287.03
Total	*1,573.61*	*1,633.54*	*2,003.86*	*25,604.81*	*9,433.07*

Iron

	PM10	SOx	NOx	VOC	CO
Area/Non-Road Mobile	1,758.01	5,162.39	1,773.39	10,360.54	5,708.80
On-Road Mobile	1,867.63	0.00	1,650.17	1,590.94	16,402.29
Point Source	8.58	5.05	25.74	87.88	7.68
Total	*3,634.22*	*5,167.44*	*3,449.30*	*12,039.36*	*22,118.76*

Juab

	PM10	SOx	NOx	VOC	CO
Area/Non-Road Mobile	4,720.00	1,377.79	2,200.87	17,605.21	42,436.34
On-Road Mobile	1,221.43	0.00	1,119.87	1,017.72	10,966.76
Point Source	203.59	42.22	1,238.91	109.64	3,860.41

Total	*6,145.01*	*1,420.01*	*4,559.64*	*18,732.57*	*57,263.51*

Kane	**PM10**	**SOx**	**NOx**	**VOC**	**CO**
Area/Non-Road Mobile	351.85	1,117.48	199.18	5,608.15	1,055.67
On-Road Mobile	461.66	0.00	301.20	419.70	2,966.96
Point Source	0.00	0.00	0.00	0.00	0.00
Total	*813.51*	*1,117.48*	*500.38*	*6,027.85*	*4,022.63*

Millard	**PM10**	**SOx**	**NOx**	**VOC**	**CO**
Area/Non-Road Mobile	2,215.79	2,271.86	2,125.25	18,632.09	14,404.52
On-Road Mobile	1,459.76	0.00	1,297.47	1,225.63	12,750.14
Point Source	610.80	4,231.02	20,570.00	120.54	1,525.80
Total	*4,286.35*	*6,502.87*	*23,992.72*	*19,978.26*	*28,680.46*

Morgan	**PM10**	**SOx**	**NOx**	**VOC**	**CO**
Area/Non-Road Mobile	471.56	1,219.81	726.07	10,729.26	1,888.62
On-Road Mobile	395.15	0.00	368.56	329.91	3,621.50
Point Source	601.43	3.45	583.95	1.94	8.61
Total	*1,468.15*	*1,223.25*	*1,678.58*	*11,061.11*	*5,518.74*

Piute	**PM10**	**SOx**	**NOx**	**VOC**	**CO**
Area/Non-Road Mobile	145.85	261.38	62.96	4,123.98	590.39
On-Road Mobile	120.04	0.00	81.44	111.44	869.33
Point Source	5.40	11.32	24.48	5.94	8.76
Total	*271.29*	*272.70*	*168.88*	*4,241.37*	*1,468.49*

Rich	**PM10**	**SOx**	**NOx**	**VOC**	**CO**
Area/Non-Road Mobile	489.53	326.42	152.55	3,539.93	2,471.56
On-Road Mobile	166.77	0.00	116.60	122.71	1,203.74
Point Source	0.49	1.48		0.44	1.48
Total	*656.79*	*326.42*	*270.63*	*3,663.08*	*3,676.78*

Salt Lake	**PM10**	**SOx**	**NOx**	**VOC**	**CO**
Area/Non-Road Mobile	3,226.06	3,298.17	14,699.75	28,099.83	75,225.94
On-Road Mobile	27,916.85	0.00	21,723.83	20,504.72	185,126.91
Point Source	3,986.12	4,975.34	7,319.67	3,251.17	3,209.49
Total	*35,129.02*	*8,273.51*	*43,743.25*	*51,855.73*	*263,562.34*

San Juan	PM10	SOx	NOx	VOC	CO
Area/Non-Road Mobile	870.04	2,412.05	458.40	25,851.05	2,984.58
On-Road Mobile	1,020.54	0.00	693.04	910.49	7,089.42
Point Source	31.45	1,410.40	1,230.24	110.89	787.06
Total	*1,922.03*	*3,822.45*	*2,381.68*	*26,872.43*	*10,861.06*

Sanpete	PM10	SOx	NOx	VOC	CO
Area/Non-Road Mobile	1,362.49	3,565.15	711.41	13,198.80	4,594.74
On-Road Mobile	860.21	0.00	583.21	795.19	6,201.08
Point Source	6.75	4.19	10.55	4.85	
4.11*Total*	*2,229.46*	*3,569.34*	*1,305.17*	*13,998.83*	*21,102.80*

Sevier	PM10	SOx	NOx	VOC	CO
Area/Non-Road Mobile	1,169.73	3,193.30	624.75	13,622.36	3,820.49
On-Road Mobile	1,285.69	0.00	1,125.54	1,113.36	11,334.11
Point Source	202.59	38.76	147.51	10.34	40.23
Total	*2,658.01*	*3,232.06*	*1,897.79*	*14,746.06*	*15,194.83*

Summit	PM10	SOx	NOx	VOC	CO
Area/Non-Road Mobile	1,304.38	4,259.90	1,492.22	24,602.37	3,776.31
On-Road Mobile	2,126.48	0.00	1,925.61	1,792.30	19,011.37
Point Source	100.93	66.28	703.72	357.81	366.95
Total	*3,531.79*	*4,326.18*	*4,121.55*	*26,752.48*	*23,154.63*

Tooele	PM10	SOx	NOx	VOC	CO
Area/Non-Road Mobile	2,795.51	5,656.33	3,162.84	10,734.40	15,685.84
On-Road Mobile	2,218.25	0.00	1,991.58	1,884.46	19,775.03
Point Source	2,521.26	145.07	1,394.16	311.49	446.18
Total	*7,535.02*	*5,801.40*	*6,548.58*	*12,930.35*	*35,907.04*

Uintah	PM10	SOx	NOx	VOC	CO
Area/Non-Road Mobile	1,518.94	4,391.16	827.48	15,263.01	4,891.43
On-Road Mobile	1,033.10	0.00	700.40	954.47	7,443.33
Point Source	525.13	1,035.53	7,719.74	629.46	554.39
Total	*3,077.17*	*5,426.69*	*9,247.61*	*16,846.95*	*12,889.15*

Utah	PM10	SOx	NOx	VOC	CO
Area/Non-Road Mobile	2,138.15	370.47	2,674.99	28,969.38	19,739.75
On-Road Mobile	10,112.69	0.00	7,640.05	7,628.10	60,466.18
Point Source	1,427.32	2,153.90	2,548.35	988.84	17,764.98
Total	*13,678.17*	*2,524.37*	*12,863.39*	*37,586.32*	*97,970.91*

Wasatch	PM10	SOx	NOx	VOC	CO
Area/Non-Road Mobile	739.80	2,277.56	507.64	18,486.67	2,372.33
On-Road Mobile	855.95	0.00	610.10	718.97	5,875.94
Point Source	25.35	3.06	30.15	2.85	9.93
Total	*1,621.09*	*2,280.61*	*1,147.89*	*19,208.50*	*8,258.20*

Washington	PM10	SOx	NOx	VOC	CO
Area/Non-Road Mobile	4,067.02	12,950.58	2,339.09	18,209.88	13,259.82
On-Road Mobile	2,959.60	0.00	2,319.80	2,641.30	22,876.12
Point Source	22.86	3.82	49.47	62.18	12.36
Total	*7,049.48*	*12,954.40*	*4,708.36*	*20,913.36*	*36,148.30*

Wayne	PM10	SOx	NOx	VOC	CO
Area/Non-Road Mobile	217.34	424.98	95.55	4,998.11	856.18
On-Road Mobile	137.09	0.00	95.73	106.56	1,041.39
Point Source	0.00	0.00	0.00	0.00	0.00
Total	*354.44*	*424.98*	*191.29*	*5,104.67*	*1,897.58*

Weber	PM10	SOx	NOx	VOC	CO
Area/Non-Road Mobile	496.44	698.42	2,487.03	12,642.12	17,487.25
On-Road Mobile	5,347.09	0.00	3,875.42	4,187.04	31,501.56
Point Source	444.08	101.61	667.17	140.92	1,031.39
Total	*6,287.61*	*800.03*	*7,029.63*	*16,970.08*	*50,020.20*

State Totals	PM10	SOx	NOx	VOC	CO
State Total (tons/year)	**139,147.16**	**132,187.30**	**201,977.12**	**500,357.89**	**913,738.60**

APPENDIX B

POPULATION GROWTH IN UTAH

This table of population growth in Utah shows the areas where additional air monitoring is necessary.

County, Urban Area or City	Population 2000 Census	% Change Since 1990	# Monitoring Stations In Area
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
Uintah County	25,224	+14%	(1)
Box Elder County	42,745	+17%	1 (1)
Tooele County	40,735	+53%	1 (1)
Washington County	90,354	+86%	2 (1)
Iron County	33,779	+63%	(3)
Carbon County	20,422	+1%	(1)
San Juan County	14,413	+14%	1 (2)
Duchesne County	14,371	+14%	(1)*

*( ) 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	7,257	25,220	247.5%	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	79.6%	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