

UTAH  
AIR MONITORING  
NETWORK REVIEW 2000

Prepared by the Division of Air Quality  
Utah State Department of Environmental Quality

## TABLE OF CONTENTS

1.0	Introduction
1.1	Current Utah Air Monitoring Network
1.2	Current Network Modification Issues
1.3	Review of Last Year Network Modifications
2.0	Utah Air Monitoring Network
2.1	Sulfur Dioxide
2.2	Nitrogen Dioxide
2.3	Carbon Monoxide
2.4	Ozone
2.5	Lead
2.6	PM <sub>10</sub>
2.7	PM <sub>2.5</sub>
2.8	Meteorological Data
2.9	Air Toxics
2.10	Emergency Episode Monitoring
3.0	Network Modification Forms
3.1	Equipment Replacement and New Purchases
3.1.1	Prioritized Equipment Needs List
4.0	Summary and Conclusions
Appendix A	Emissions Inventory
Appendix B	Population Growth In Utah

## MONITORING NETWORK REVIEW

### 1.0 INTRODUCTION

The monitoring network has been described in the network reviews from 1982 through 2000. 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., AIRS #, SAROAD #	SO <sub>2</sub>	CO	O <sub>3</sub>	NO <sub>2</sub>	LEAD	PM <sub>10</sub>	PM <sub>2.5</sub>
Beach #4 12100 W. 1200 S., GSL Beach Marina, Magna, UT 49-035-2004 460900005F02	SLAMS High Neigh.		SLAMS* High Neigh.				
Bountiful, 65 West 300 South, Behind Fire Station Bountiful, UT 49-011-0001 460060001F01	SLAMS Impact Neigh.	SLAMS* Pop. Neigh.	NAMS* High Neigh.	SLAMS Pop. Neigh.			SLAMS Pop. Neigh.
Brigham City 140 West Fishburn Drive Brigham City, UT 49-003-0003			SLAMS* Pop. Neigh.				SPMS Pop. Neigh.
Cottonwood, 5715 South 1400 East, Behind School, Holladay, UT 49-035-0003 4600003F01		NAMS Pop. Neigh.	NAMS* Pop. Neigh.	SLAMS High Neigh.		NAMS Pop. Neigh.	SLAMS Pop. Neigh.
Grantsville 90 S. Park, Grantsville, UT 49-045-0002							SPMS back- ground Reg.
Hawthorne 1675 S 600 E, Salt Lake City, UT 49-035-3006		SLAMS* High Neigh.	SLAMS* High Neigh.	SLAMS High Neigh.		SLAMS High Neigh.	SLAMS Pop. Middle

\*Indicates Seasonal Monitoring  
\*\*Should be redesignated to NAMS

TABLE 1 Date 8/30/00  
 UTAH AIR MONITORING NETWORK Page 2

STA., LOC., AIRS #, SAROAD #	SO <sub>2</sub>	CO	O <sub>3</sub>	NO <sub>2</sub>	LEAD	PM <sub>10</sub>	PM <sub>2.5</sub>
Harrisville 405 West 2550 North, Ogden, UT 49-057-1003			SLAMS Pop. Neigh.				SLAMS back- ground Reg
Herriman 5600 W. 12885 S., Herriman, UT 49-035-3003			SLAMS* High Neigh.				SPMS Back ground Neigh
Highland 10865 N. 6000 W., Highland, UT 49-049-5008			NAMS* High Neigh.				SPMS Pop. Neigh.
Lindon 30 N. Main, Behind School, Lindon, UT 49-049-4001 461220001F01						NAMS Impact Neigh.	SLAMS Pop. Neigh.
Logan 55 2 W. 200 N., Logan, UT 49-005-0002		SLAMS* Pop. Neigh.	SLAMS* Pop. Neigh.			SLAMS Pop. Neigh.	SPMS Pop. Neigh.
Magna 2935 S. 8560 W., On School, Magna, UT 49-035-1001 460520001F02	NAMS Impact Neigh.				SLAMS Impact Neigh.	NAMS High Neigh.	
Moab #6 168 W. 400 N., Moab, UT 49-019-0006						SLAMS Pop. Neigh.	

\* Indicates Seasonal Monitoring

\*\* Should be redesignated to NAMS

TABLE 1  
UTAH AIR MONITORING NETWORK

STA., LOC., AIRS #, SAROAD #	SO <sub>2</sub>	CO	O <sub>3</sub>	NO <sub>2</sub>	LEAD	PM <sub>10</sub>	PM <sub>2.5</sub>
North Ogden 263 E. 2600 N., No. Ogden, UT 49-057-1002			NAMS* Pop. Neigh.				SLAMS Pop. Neigh.
North Provo 1355 North 200 West, Behind Armory, Provo, UT 49-049-0002      460800002F01		SLAMS* Pop. Neigh.	NAMS* Pop. Neigh.	SLAMS High Neigh.		NAMS Pop. Neigh.	SLAMS Pop. Neigh.
North Salt Lake #2 1795 N. 1000 W., Salt Lake City, UT 49-035-0012 460920012F02	** SLAMS High Middle					NAMS High Middle Co-Loc	SPMS High Middle
South Orem 1580 S. State, Orem, UT 49-049-5005		SLAMS* High Micro					
Spanish Fork Spanish Fork/Springville Airport 49-049-5010			SLAMS* Pop. Neigh.				SPMS Transport Regional
State Street #3 1400 S. State Street, Salt Lake City, UT 49-035-0014		NAMS High Micro					

\*Indicates Seasonal Monitoring

\*\* Should be redesignated NAMS

TABLE 1  
UTAH AIR MONITORING NETWORK

STA., LOC., AIRS #, SAROAD #	SO <sub>2</sub>	CO	O <sub>3</sub>	NO <sub>2</sub>	LEAD	PM <sub>10</sub>	PM <sub>2.5</sub>
University Ave. #3 363 N. University Ave., Provo, UT 49-049-0005		SLAMS High Micro					
Washington Blvd. #2 2540 S. Washington Blvd., In Office Building, Ogden, UT 49-057-0006		SLAMS High Micro					
Washington Terrace 4601 S. 300 W., Washington Terrace, UT 49-057-0007		SLAMS* Pop. Neigh.	NAMS* Pop. Neigh.				SPMS Pop. Neigh.
West Valley 3100 S. 3275 W., West Valley, UT 49-035-3007		SLAMS* Pop. Neigh.	SLAMS* Pop. Neigh.				SLAMS Pop. Neigh.

\*Indicates Seasonal Monitoring

\*\* Should be redesignated NAMS

**UTAH DIVISION OF AIR QUALITY**  
**OFFICIAL AND SPEICAL STUDIES MONITORING NETWORK SUMMARY SEPTEMBER 2000**

Section 1.1

Revision 6

Date 9/28/00

Page 4

	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	1			*SEASONAL/TECO		TECO	DYNACAL/DASIBI/CYLINDER	YES	TEMP		SIGMA ONLY		SO2/CO/03
BRIGHAM CITY	BR	ESC	3-DAY	1						DASIBI	YES	TEMP		SIGMA ONLY		
COTTONWOOD	CW	ESC	3-DAY	1	3 DAY	1	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/TECO			DASIBI	YES	TEMP		SIGMA ONLY		
HAWTHORNE	HW	ESC	TEOM&ED	2	TEOM & ED	2				DYNACAL/API/CYLINDER	YES	TEMP&RH	SR & BP			TEOM(2.5&10)/03/CO
HERRIMAN	HE	ESC								DASIBI	YES	TEMP&RH	SOLAR	SIGMA & DT		
HIGHLAND	HG	ESC	3-DAY	1						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				DASIBI/CYLINDER	YES	TEMP		SIGMA ONLY		CO & 03
MAGNA	MG	ESC			3 DAY	1				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/DASIBI			DYNACAL/DASIBI/CYLINDER	YES	TEMP		SIGMA ONLY		03/CO
N. SALT LAKE	N2	ESC	3-DAY	1	*E/D & CL	3				DYNACAL	N/A					S02
NORTH OGDEN	ON	ESC	3-DAY	1			*SEASONAL/DASIBI			DASIBI	YES	TEMP		SIGMA ONLY		
PROMONTORY	PP	CAMPBELL									YES	TEMP&RH		SIGMA ONLY		
SALTAIRE	SA	CAMPBELL									YES	TEMP&RH	SOLAR	SIGMA ONLY		
SOUTH OREM	SO	ESC								CYLINDER	N/A					
1400 S STATE	S3	ESC								CYLINDER	N/A					CO
SPANSIH FORK	SF	ESC	3-DAY	1						API	YES	TEMP		SIGMA ONLY		
SYRACUSE	SY	CAMPBELL									YES	TEMP&RH		SIGMA ONLY		
UNIVERSITY AVE	U3	ESC								CYLINDER	N/A					CO
WASH. BLVD	W2	ESC								CYLINDER	N/A					CO
WASH. TERR.	ST	ESC	3-DAY&CL	2						DASIBI/CYLINDER	YES	TEMP&RH		SIGMA ONLY		03/CO
WEST VALLEY	WV	ESC	3-DAY	1						DASIBI/CYLINDER	YES	TEMP				
WEST JORDAN	WJ	ESC									YES	TEMP&RH				
SITES	29	29	15		8		11	14	4	4	23	23	3	20	1	12
REPORTING SMPLRS.				17		11									1	
CO-LOC SMPLRS.			2		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 has been made to continue to implement the PM<sub>2.5</sub> monitoring network as previously identified to EPA. The basis of the decision is to collect the data necessary to address some of the questions raised by the Court of Appeals in their narrative on the decision. This results in five more PM<sub>2.5</sub> sites being installed this year.

Knowing the chemical make up of the PM<sub>2.5</sub> particles is very important. That information can identify the source or sources of the PM<sub>2.5</sub>. If State Implementation Plans are needed to reduce PM<sub>2.5</sub> concentrations, knowing the sources of the emissions is essential to properly designing control measures. In response to this need, the DAQ has been involved in a Amini trends@ study initiated by EPA for PM<sub>2.5</sub> speciation. The mini trends study began in February 2000. Special PM<sub>2.5</sub> speciation samplers began operation at the Hawthorne monitoring station. This site will continue as a trends site. As the speciation program develops, speciation samplers will be installed at Lindon and North Provo sites. EPA needs to make some decisions about sampler modified design or changes and purchasing procedure before the speciation network develops further.

In response to the PM<sub>2.5</sub> NAAQS and the decision to continue to develop the PM<sub>2.5</sub> network the following stations need modified or installed:

1. Install a PM<sub>2.5</sub> monitor at the Herriman station. New PM<sub>2.5</sub> equipment has been purchased.
2. Install a new monitoring station in Brigham City to measure ozone, PM<sub>2.5</sub>, wind speed, wind direction, sigma theta, delta T stability, relative humidity and temperature. An old monitoring station will be used. It will use existing, but outdated, ozone equipment and existing meteorological equipment will be used. New PM<sub>2.5</sub> equipment a has been purchased.
3. Install a new PM<sub>2.5</sub> monitor at the Logan station. New PM<sub>2.5</sub> equipment has been purchased.
4. Install a new PM<sub>2.5</sub> monitor at the Highland station. New equipment has been purchased.
5. Install a new PM<sub>2.5</sub> monitor at the North Ogden station. New equipment has been purchased.
6. Install a new PM<sub>2.5</sub> speciation sampler at the Lindon station. New equipment will be purchased.
7. Install a new PM<sub>2.5</sub> speciation sampler at the North Provo station. New equipment will be purchased.

No monitoring site changes have been required to the ozone monitoring network because of the new 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. Ambient air data is needed in a number of areas to evaluate the impact of growth on air quality and to compare the air quality with the NAAQS. The following modifications are necessary because of population growth:

1. Install a new monitoring station in Brigham City as identified above. This site is to access population impacts.

### PSD Increment Tracking

Normally PSD increments are tracked with computer models. The models show all the increment for NO<sub>2</sub> is consumed in Carbon County around the city of Cleveland. The concern is that the NAAQS for NO<sub>2</sub> may be violated. Ambient air monitoring for NO<sub>2</sub> is needed in or near Cleveland to verify the model and to determine the status of the NAAQS.

### Demolition and Reconstruction of I-15 (ongoing)

The Utah Department of Transportation continues a 4-year plus demolition and reconstruction of I-15, the main freeway through Salt Lake County. During the 4-year period, seventeen miles of the freeway have been or are being demolished and the existing three lane roadway in each direction will be expanded to five lanes. The air quality concerns associated with the I-15 demolition activity are: the reconstruction and construction activity, traffic congestion resulting from closure of freeway lanes, and traffic congestion on parallel roads and alternate routes. The decision was made that no additional ambient monitoring will be performed in response to the demolition and construction activities. Compliance efforts will keep air pollution emissions at an acceptable level. Also, none of the existing monitoring stations will be closed during the reconstruction. Where possible, air monitoring stations impacted by construction will be identified by using data from related stations, traffic information, and emission inventory information.

The Hawthorne monitoring station has been installed as a replacement site for particulate sampling for the Air Monitoring Center. We determined the old AMC location would be impacted by demolition and reconstruction activities of the I-15 rebuild that is the initial reason the Hawthorne site was established. In June 1999, the lease was lost on the old AMC facility, at 261 West 500 South, and the site has been closed. This leaves the Hawthorne site as the Salt Lake City center site.

### 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. On November 10, 1994, the Technical Analysis Section, which performs the computer modeling, completed a "Review of the Meteorological Monitoring Network for the Wasatch Front Airsheds." The review identifies a number of sites where new meteorological monitoring stations need to be located to give the computer modelers adequate coverage for complex computer modeling. The review also evaluates the siting of the existing meteorological monitoring stations against the criteria that has been established for meteorological inputs for computer modeling. That review identifies a number of meteorological monitoring stations that need to be relocated to meet

the criteria and a number of stations that should be closed because they do not provide data that is needed for the computer modeling. Many of the recommendations of the review have been completed. The following network modifications are the result of the review and actions that still need to be completed:

1. Relocate the wind tower at the North Ogden monitoring station to avoid the wind shadow of the Weber County Library. Site selection is in progress. It cannot be located in the present area of the ozone monitoring station. The final site selected will dictate the equipment that is necessary. A new Harrisville site
2. Relocate the wind tower at the Bountiful monitoring station to better meet the siting criteria for computer modeling. Site selection has not begun. It cannot be located in the area of the monitoring station. The final site selected will dictate the equipment that is necessary. Site have been reviewed and no acceptable replacement sites have been found.
3. Remove the wind tower from the North Provo monitoring site. The requirements for wind data are met by the wind tower at the Lindon monitoring station. The equipment has not been removed. The data have been of value during winter temperature inversion periods to evaluate pollutants.

#### Monitoring for Toxic Air Pollutants

The Environmental Protection Agency (EPA) is initiating 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 has funding for an Urban Air Toxics Monitoring Program. DAQ has applied to be part of the Urban Air Toxics Monitoring Program. Evaluation of computer maps showing primary wind patterns and the locations of the sources of toxic air pollutants suggests the West Valley site is the best location to determine the public exposure to urban air toxics. Monitoring will begin the fall of 1999.

1. The Urban Air Toxics Monitor was installed at the West Valley site the fall of 1999. New equipment was supplied by EPA.

1.3 REVIEW OF LAST YEAR NETWORK MODIFICATIONS

1. The AMC monitoring site was closed on June 15, 1999.

## 2.1 SULFUR DIOXIDE

The sulfur dioxide (SO<sub>2</sub>) 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<sub>2</sub> 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<sub>2</sub> 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<sub>2</sub> Monitoring sites were installed in response to that computer modeling.

### SO<sub>2</sub> NETWORK

#### Salt Lake County

There are three types of major SO<sub>2</sub> 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<sub>2</sub> sources in Davis County are oil refineries. In recent years the crude oil being processed by the oil refineries has become increasingly more sour, so the refineries have installed sulfur scrubbing systems to reduce their SO<sub>2</sub> 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 past, relatively high SO<sub>2</sub> concentrations have been measured at this station. It is the only SO<sub>2</sub> 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<sub>2</sub> 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<sub>2</sub> impacts are occurring, SO<sub>2</sub> monitoring has been discontinued in Grantsville.

### Existing Monitoring Network

The existing SO<sub>2</sub> monitoring network presently meets the federal requirements and existing state needs. DAQ does need to identify a NAMS station for Salt Lake County.

### Additional Monitoring

No additional monitoring or monitoring sites are necessary.

### Special Studies

Computer modeling needs to be completed using current emissions inventory to determine if the areas of maximum concentrations are still at the same locations. EPA Region VIII said they will perform computer modeling for SO<sub>2</sub>. That work has not been completed.

## 2.2 NITROGEN DIOXIDE

The existing NO<sub>2</sub> 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<sub>x</sub> emissions from automobiles and NO<sub>x</sub>'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<sub>x</sub> 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<sub>x</sub> for the counties with the highest emissions. The information shows that 21% of NO<sub>x</sub> emissions come from automobiles and 65% comes from point source process industries. Sixty percent of point source NO<sub>x</sub> 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 be a potential need for additional NO<sub>2</sub> monitoring to help understand the formation of secondary PM<sub>10</sub> and PM<sub>2.5</sub> particulate matter. This need will be discussed in the future.

The oxidation of NO to NO<sub>2</sub> takes time, therefore, the highest NO<sub>2</sub> concentrations should be located some distance downwind from major NO sources. The ideal location for NO<sub>2</sub> monitors is at the edge of an urban area.

### NO<sub>2</sub> NETWORK

#### Existing Monitoring Network

The existing NO<sub>2</sub> 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<sub>2</sub> monitoring to help understand the formation of secondary PM<sub>10</sub> and PM<sub>2.5</sub> 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.

An additional ozone monitoring station needs to be installed in Brigham City to Provide data for the UAM modeling as for the northern part of the modeling domain. A site has been selected and station installation is under way.

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.

#### Additional Monitoring

No additional lead monitoring sites will be installed.

#### Changes In Monitoring Network

The lease was lost for the Air Monitoring Center and lead monitoring ended with the loss of the lease. No additional lead monitoring site was installed. The urban lead levels are so low urban lead monitoring is no longer necessary. Lead monitoring is now focused on industrial sources of lead.

## 2.6 PM<sub>10</sub>

The PM<sub>10</sub> 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<sub>10</sub> samplers, but has now been completed for the PM<sub>10</sub> SIP. The modeling primarily dealt with source impact identification. There are two types of PM<sub>10</sub> particles which complicates PM<sub>10</sub> monitoring. Primary PM<sub>10</sub> 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<sub>10</sub> 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<sub>10</sub> 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<sub>10</sub> sites have been located based on primary particulates.

### Revised Ambient Standard

On July 18, 1997 the Environmental Protection Agency promulgated a revised NAAQS for particulate matter measured as PM<sub>10</sub>. States are to modify their air monitoring networks in response to the revised NAAQS and implement those changes by January 1, 1998. In response to the revised NAAQS PM<sub>10</sub> monitoring at the Bountiful, Cedar City, Grantsville, St. George, Washington Terrace and West Orem have been discontinued.

### Existing Monitoring Network (See Table 1)

The existing PM<sub>10</sub> monitoring network meets the minimum requirements for PM<sub>10</sub> data for state and federal government needs. The existing network is not keeping pace with population growth.

### Additional Monitoring

Additional PM<sub>10</sub> monitoring is necessary in rapidly growing areas of Utah. PM<sub>10</sub> 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 PM<sub>2.5</sub>

On July 18, 1997, the Environmental Protection Agency promulgated a new NAAQS for particulate matter measured as PM<sub>2.5</sub>. States were required to modify their air monitoring networks to include measurements for PM<sub>2.5</sub> by January 1, 1999. Particulate sampling has been conducted first for TSP and then PM<sub>10</sub> at several locations in each county. In addition, computer modeling for TSP and PM<sub>10</sub> and some limited PM<sub>10</sub> 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<sub>2.5</sub> particles. Primary PM<sub>2.5</sub> 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<sub>2.5</sub> 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<sub>2.5</sub> 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<sub>10</sub> sites have been located based on primary particulates. Initially PM<sub>2.5</sub> will be located based on concentrations of PM<sub>10</sub>. The following table shows the locations and installation dates for the PM<sub>2.5</sub> network. IMPROVE samplers are operated by the National Park Service and are included as part of the PM<sub>2.5</sub> monitoring network. The IMPROVE samplers are located in the National Parks in Utah.

The major part of the funding for the PM<sub>2.5</sub> monitoring network is being provided by the EPA. The samplers for the twelve sites in operation were purchased through a National Procurement Contract. Five additional Federal Reference Method (FRMs) plus two additional FRMs for co-location will be obtained for use in the PM<sub>2.5</sub> network. As shown in the table, eleven of the samplers began operation January 1, 1999. Five additional sites are being installed during 2000. As shown on the table, two of the IMPROVE samplers are already in operation. One is in Bryce Canyon National Park and one is in Canyonlands National Park. Two more IMPROVE samplers are scheduled for installation in 2000 and are to begin operation in January 2001. The installation of the additional IMPROVE sites have been delayed and will occur in late 2000. One will be located in Capitol Reef National Park and the other in Zion National Park. As shown in the table, 5 more DAQ operated PM<sub>2.5</sub> samplers are to be installed in 2000 and are to begin operation January 1, 2001.

**NEW PM<sub>2.5</sub> 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	Sandy	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. Relocate the wind tower at the North Ogden monitoring station to avoid the wind shadow of the Weber County Library. Site selection is in progress. It cannot be located in the present area of the ozone monitoring station. The final site selected will dictate the equipment that is necessary. A site has been selected in Harrisville and installation is in progress.
2. Relocate the wind tower at the Bountiful monitoring station to better meet the siting criteria for computer modeling. Site selection has not begun. It cannot be located in the area of the monitoring station. The final site selected will dictate the equipment that is necessary. No acceptable sites have been found.
3. Remove the wind tower from the North Provo monitoring site. The requirements for wind data are met by the wind tower at the Lindon monitoring station. The equipment has not been removed. The data are of value during the winter inversion periods as part of evaluating the pollutants.

## 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 experienced 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

No additional air toxics monitoring is planned for 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

There are no network modification forms being prepared for submittal to EPA Region VIII for Network Modifications completed last fiscal year or anticipated for the current 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 had \$55,000 available from the legislature for equipment replacement in FY99. In addition, \$33,000 was available for equipment replacement from the Operating Permits Program. 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 Diaphragm 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
	<b>Total</b>	\$ 77,092.40

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

<b>NUMBER</b>	<b>DESCRIPTION</b>	<b>UNIT COST</b>	<b>TOTAL</b>
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
		<b>TOTAL</b>	<b>\$102,500.00</b>

#### 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.

APPENDIX B

POPULATION GROWTH IN UTAH

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

Urban Area or City	Population 1990 Census	% Change Since 1980	# Monitoring Stations In Area
Salt Lake County	725,956	+17%	8 (5)*
Utah County	263,590	+21%	6 (9)
Davis County	187,941	+28%	1
Weber County	158,330	+ 9%	4
Logan	32,762	+22%	1
Vernal	6,644	- 7%	(1)
Brigham City	15,644	+ 0%	(1)
Tooele	13,887	- 3%	1 (1)
St. George	28,502	+117%	O <sub>3</sub> , CO, PM <sub>10</sub> (1)
Cedar City	13,443	+23%	(3)
Price	8,712	- 4%	(1)
Moab	3,971	-26%	1 (2)
Roosevelt	3,915	+ 2%	(1)*
Green River	744	-22%	(1)*

\* ( ) Indicates monitoring done in the past.

Source: U.S. Bureau of the Census, Reported in Utah Data Guide, January 1991

FASTEST GROWING CITIES OVER 5,000 POPULATION

CITY	1980 CENSUS	1990 CENSUS	PERCENT CHANGE
St. George	13,146	28,502	+117%
Highland	2,435	5,002	+105%
Farmington	5,062	9,028	+78%
South Jordan	7,492	12,220	+63%
Riverton	7,032	11,261	+60%
Layton	26,403	41,784	+58%
West Jordan	27,327	42,892	+57%
Sandy	52,210	75,058	+44%
Centerville	8,069	11,500	+43%
Clinton	5,777	7,945	+38%
Kaysville	10,331	13,961	+35%
Draper	5,521	7,257	+31%
Orem	52,399	67,561	+29%
Woods Cross	4,263	5,384	+26%
North Ogden	9,309	11,668	+25%
Roy	19,694	24,603	+25%
Pleasant Grove	10,833	13,476	+24%
Lehi	6,848	8,475	+24%
Cedar City	10,972	13,443	+23%

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