PARTICULATE MATTER
MONITORING NETWORK DESCRIPTION
FOR THE
GREAT BASIN VALLEYS
MONITORING PLANNING AREA

PREPARED BY

Great Basin Unified Air Pollution Control District
157 Short Street, Suite 6
Bishop, CA 93513

June 24, 1998

TABLE OF CONTENTS

LIST OF TABLES

1.0 INTRODUCTION

This plan describes the PM2.5 monitoring network for the Great Basin Valleys Monitoring Planning Area (MPA).

1.1 Physical Setting

The Great Basin Valleys MPA is located in California generally between the eastern Sierra Nevada mountains and Nevada border. Three counties, Inyo, Mono, and Alpine are contained within the Great Basin Valleys MPA. Geographically the Great Basin Valleys MPA is a complex system of high elevation mountain ranges and deep valleys. Death Valley, the point of lowest elevation, and Mount Whitney, the point of highest elevation in the continental United States, are located within the Great Basin Valleys MPA.

1.2 Population Characteristics

The population within the Great Basin Valleys MPA is mostly located in small communities along the eastern flank of the Sierra Nevada mountain range. The communities are rural in nature with a total population of approximately 30,000 individuals. The largest communities are Bishop, Mammoth Lakes, and Lone Pine.

1.3 Climate and Weather

The Great Basin Valleys MPA is located within the North America temperate zone, but the climate is dramatically affected by the extremes in elevation. In the Sierra Nevada the temperatures are generally cold with glaciers at the highest elevations. The Owens Valley has a mild high-desert climate with temperatures in summer ranging from 45^0 F (6.6^0 C) to 103^0 F (39^0 C), and in winter from 18^0 F (-8^0 C) to 70^0 F (21^0 C). Death Valley, southernmost of the Great Basin Valleys, has some of the highest temperatures in the United States, often exceeding 120^0 F (49^0 C) during summer.

Storms affecting the valleys generally originate over the Pacific Ocean and move from west to east across the Sierra Nevada mountain range on the western boundary of the Great Basin Valleys MPA. As a result, most of the Great Basin Valleys MPA is located in the "rain shadow" of the Sierra Nevada. Precipitation gradients from 30 inches (76 mm) to less than 3 inches (7.6 mm) occur within several miles as the elevation changes. Winds in the area can exceed hourly average speeds of 40 mph (18 m/s) as measured at a 33 foot (10 m) height.

1.4 Dominant Economic Activities and Emission Sources

Tourism is the predominant year-round economic activity in the Great Basin Valleys MPA. Skiing, fishing, hunting, camping, and hiking are the common activities that attract tourists from all over the world. The Mammoth Mountain ski resort, located in the town of Mammoth Lakes, attracts hundreds of thousands of skiers every winter. As a result of this activity, wood stoves and fireplaces produce the highest PM emissions in the town of Mammoth Lakes. Cinders placed on the snow-and-ice-covered streets and highways also produce significant PM emissions.

The City of Los Angeles Department of Water and Power, State of California, and Federal government employ many people to manage the predominately publicly-owned lands within the Great Basin Valleys MPA. Most of the PM emissions within the Owens Valley are related to the water gathering activities of the City of Los Angeles Department of Water and Power. Diversion of the water tributaries to the Owens Lake by the City of Los Angeles have desiccated the Owens Lake exposing the lake bed soil to wind erosion. The resulting dust storms from the dry Owens Lake bed impact areas several hundred miles downwind of the lake. Wind blown dust from the sparsely vegetated desert valley floor, vehicle traffic, and residential wood smoke also produce PM emissions in the Owens Valley area. Permitted industrial sources are very few and minor contributors to the overall PM inventory in the Great Basin Valleys MPA, which is dominated by the previously mentioned area sources.

1.5 PM2.5 Monitoring Requirements

Previous PM10 monitoring has identified four heavily impacted areas within the Great Basin Valleys MPA. Mono Basin, Searles Valley and Mammoth Lakes are designated as PM10 non-attainment areas by the EPA. The Southern Owens Valley has been designated as a serious non-attainment area for PM10. PM10 State Implementation plans have been completed and sent to the State for all four areas. PM2.5 monitoring will be conducted within the Mammoth Lakes and Owens Valley PM10 non-attainment areas.

2.0 PM2.5 MONITORING NETWORK ELEMENTS

This section summarizes the PM2.5 monitors that will be deployed in the Great Basin Valleys MPA over the next two years. Please refer to the statewide summary for sites outside the Great Basin Valleys MPA. The Great Basin Valleys MPA PM2.5 monitoring network will consist of two sites: one in the town of Mammoth Lakes and one in Keeler

2.1 PM2.5 Monitors Planned for Deployment

PM2.5 monitors will be deployed at two sites in 1998 to build a data base for comparison to the annual average and 24-hour average PM2.5 NAAQS. The monitors will be located at existing PM10 monitoring sites that have monitored exceedance-level 24-hour average PM10 concentrations. One PM2.5 FRM will be located in Mammoth Lakes at the existing Mammoth Lakes-Gateway HC PM10 monitoring site. The other PM2.5 FRM will be located at the existing Keeler-Cerro Gordo PM10 monitoring site.

An additional collocated PM2.5 FRM will be deployed in 1998 to collect precision data at the Keeler-Cerro Gordo site. Twenty-four-hour-average PM10 concentrations collected at the Keeler-Cerro Gordo monitoring site have been some of the highest collected in the United States. A collocated sampler at this site will be useful in the evaluation of sampler performance under high loadings.

A PM2.5 speciation monitor will be deployed in 1999 at the Mammoth Lakes Gateway HC monitoring site. Table 2.1.1 is a summary of sites.

Table 2.1.1 PM2.5 Monitoring Network

Site Location	AIRS Site ID	PM2.5 FRM	PM2.5 Speciation	PM2.5 TEOM/BAM	Other PM2.5 Monitors
Mammoth Lakes -Gateway HC	060510001	X	Y		
Keeler-Cerro Gordo	060271003	XX			

Codes:

X Monitor to be deployed in 1998
Y Monitor to be deployed in 1999
XX Collocated particulate monitors used for precision data to be deployed in 1998

2.2 Existing Particulate Matter Monitors

The District currently operates nine PM10 air monitoring sites. The monitoring instruments operating in the network include:

* 11 High-Volume Size Selective Inlet (SSI) samplers collecting 24-hour PM10 samples;
* 1 Low-Volume Rupprecht & Patashnick Partisol 2000 PM-10 sampler collecting 24-hour PM10 samples
* 2 dichotomous samplers collecting 24-hour PM10 samples; and
* 4 continuous mass samplers collecting PM10 measurements hourly, using a Tapered Element Oscillating Microbalance (TEOM) sampler.

The planned PM2.5 monitoring sites will be located at existing PM10 sites. Table 2.2.1 summarizes the location and samplers operated at each site. TEOM and GMW SSI PM10 monitors are currently in operation at the Mammoth Lakes-Gateway HC site. The Mammoth GMW SSI PM10 will be operated on the same 1-in-3-day sampling schedule along with the PM2.5 FRM. A TEOM, GMW SSI, Dichotomous, and two Wedding SSI PM10 monitors are currently in operation at the Keeler monitoring site. All of the existing filter based Keeler PM10 monitors will continue to be operated on the 1-in-6-day schedule and by episode. These monitors operate during Owens Lake dust episodes when the TEOM hourly average PM10 concentration equals or exceeds 150 ug/m3. The collocated Keeler PM2.5 FRM monitors will be operated on a 1 in 3 day sampling schedule and will not be operated by episode.

Table 2.2.1 Existing Particulate Matter Monitors

Site Location	AIRS Site ID	Dichot	PM10 SSI	PM10 TEOM/BAM	Other Particulate Matter Monitors
Mammoth Lakes -Gateway HC	060510001		X	X	
Keeler-Cerro Gordo	060271003	X	Y	X	

Codes:

X Existing monitor
Y Collocated particulate matter monitor used for precision data

2.3 PM2.5 Quality Assurance

The reader is referred to the quality assurance section in the statewide summary for a discussion of the quality assurance program that will be implemented in the Great Basin Valleys MPA network. The quality assurance program for the Great Basin Valleys MPA will include the program administered by the Air Resources Board, as well as any additional activities required for full compliance with the U.S. EPA PM-2.5 monitoring guidelines.

2.4 Laboratory Analysis

The District currently operates a dedicated temperature and humidity controlled filter laboratory which contains both an analytical balance and a micro balance. The District has proposed that the PM2.5 filters collected in the Great Basin Valleys MPA be weighed at the District filter processing laboratory located in Bishop, California. The PM2.5 filters will be provided to the District by the Air Resources Board. The District filter processing laboratory would be maintained within the temperature and relative humidity limits specified in the U.S. EPA guidelines and would be subject to the ARB laboratory pre-certification process. Modification of the laboratory to improve the temperature and humidity control is tentatively scheduled to begin in July 1998. Funding for laboratory upgrades would be provided from a variety of sources.

3.0 PM2.5 MONITORING SITES TO BE DEPLOYED IN 1998

Two PM2.5 monitoring sites are planned to be deployed in 1998. This section discusses the criteria used in the selection of the PM2.5 monitoring sites along with the important parameters that characterize each site.

3.1 Monitor Siting

PM10 monitoring in the Great Basin Valleys MPA has been conducted since 1985. This large PM10 data base was used as the primary factor for selection of the locations for PM2.5 monitoring. The Keeler PM10 monitoring site has recorded the highest concentrations within the United States. This site is heavily impacted by the dust that blows off the dry Owens Lake, frequently measuring concentrations that exceed the PM10 NAAQS.

The Mammoth monitoring site is located in a community impacted by the seasonal use of wood stoves and fireplaces in the winter. A ski resort located adjacent to the community attracts thousands of tourists each winter. This monitoring site has also recorded PM10 concentrations in excess of the PM10 NAAQS.

3.2 Site Description

Table 3.2.1 summarizes the characteristics that apply to the proposed two PM2.5 monitoring sites that will be deployed in 1998. The sites will be neighborhood-scale core SLAMS sites that represent high concentrations in a populated area.

Table 3.2.1 PM2.5 Monitoring Sites to be Deployed in 1998

Site Location	AIRS Site ID	Operating Agency	Spatial Scale	Monitoring Objective	Site Type	Measurement Method
Mammoth Lakes -Gateway HC	060510001	GBU	Neighborhood	R	C	FRM/SQ
Keeler-Cerro Gordo	060271003	GBU	Neighborhood	R	C	FRM/SQ

The following codes are used in this table:

Operating Agency:

GBU Great Basin Unified APCD

Monitoring Objectives:

R Represent high concentrations in a populated area.
M Determine the highest concentration expected to occur in the area covered by the network (more than one site per area may be needed).
T Determine the extent of regional pollutant transport.

Site Type:

C Core SLAMS
S non-core SLAMS
P Special Purpose Monitors

Measurement Method:

FRM/SCH Federal Reference Method Single Channel Sampler
FRM/SQ Federal Reference Method Sequential Sampler

4.0 PM2.5 MONITORING SITES TO BE DEPLOYED IN 1999

There are no plans to establish any additional PM2.5 monitoring sites in 1999. One of the PM2.5 sites deployed in 1998 will have a chemical speciation monitor added in 1999.

4.1 Monitoring Sites Operating PM2.5 FRM Monitors

At this time there are no plans to establish an additional PM2.5 monitoring site in 1999 that would operate a FRM.

4.2 PM2.5 Chemical Speciation Sampling

In 1999 a PM2.5 sampler will be added to the Mammoth Lakes-Gateway HC site to complete chemical speciation.

Table 4.2.1 PM2.5 Chemical Speciation Sampling

Site Location	AIRS Site ID	Operating Agency	Monitoring Method
Mammoth Lakes -Gateway HC	060510001	GBU	to be determined

ARB California Air Resources Board
GBU Great Basin Unified APCD

4.3 Continuous PM2.5 Monitoring

The Federal regulation 40 CFR 58, Appendix D, 2.8.2.3, requires that continuous PM2.5 samplers be placed in metropolitan areas where there is a population greater than 1 million people. Continuous PM2.5 data are useful for public reporting of short-term concentrations, for understanding diurnal and episodic behavior of fine particles, and for use by health scientists investigating exposure patterns. The Great Basin Valleys MPA is not required to have a continuous PM2.5 monitor.

5.0 PM2.5 SAMPLING FREQUENCY

The U.S. EPA requirements call for everyday sampling of PM2.5 at certain Core SLAMS sites and one-in-three-day sampling at all other PM2.5 and PM10 sites. The District's proposed sampling schedules are presented below.

5.1 PM2.5 FRM Sampling Frequency

Beginning in 1998, a one-in-three day sampling schedule will be implemented at the Great Basin Valleys MPA sites during the high-particulate season(s) and will be reduced to a frequency of one-in-six-days during the low-particulate season(s) as indicated in Table 5.1.1.

Table 5.1.1 PM2.5 FRM Sampling Frequency

Site Location	AIRS Site ID	Operating Agency	Sampling Frequency	
			Required	Proposed
Mammoth Lakes -Gateway HC	060510001	GBU	1 in 3 day	1 in 3 day - high PM season 1 in 6 day - low PM season
Keeler-Cerro Gordo	060271003	GBU	1 in 3 day	1 in 3 day - high PM season 1 in 6 day - low PM season

ARB California Air Resources Board
GBU Great Basin Unified APCD

5.2 PM2.5 Chemical Speciation Sampling Frequency

The federally required sampling frequency for PM2.5 chemical speciation is once in 12 days. This sampling frequency may not be sufficient in some cases to adequately support plans to control PM2.5 source emissions. The appropriate sampling frequency will be determined at a later date and will depend largely on PM2.5 data needs and available resources.

5.3 PM10 Sampling Frequency

The new U.S. EPA minimum requirement for PM10 sampling frequency is once every three days. The Air Resources Board and the local air pollution control districts in California are requesting that the U.S. EPA Region 9 grant a statewide waiver allowing sampling at the current schedule of one-in-six-days, with certain exceptions to be determined on a case by case basis. In the case of the Great Basin Valleys MPA four of the nine existing PM10 monitoring sites are currently operating on an everyday schedule. One PM-10 monitoring site was restarted in May 1998 in the Mono Basin for assessing progress of the mitigation measures at Mono Lake. Table 5.3.1 lists the proposed sampling frequency for the nine PM10 sites in the Great Basin Valleys MPA.

Table 5.3.1 PM10 Sampling Frequency

Site Location	AIRS Site ID	Operating Agency	Sampling Frequency	
			Required	Proposed
Mono Lake-Simis Residence	060510007	GBU	1 in 3	1 in 3 day - high PM season 1 in 6 day - low PM season
Warm Springs	To be determined	GBU	1 in 3	1 in 3 day - high PM season 1 in 6 day - low PM season
Lee Vining-SMS	060510005	GBU	1 in 3	1 in 3 day - high PM season 1 in 6 day - low PM season
Mammoth Lakes-Gateway HC	060510001	GBU	1 in 3	everyday
Lone Pine-501 East Locust	060270004	GBU	1 in 3	everyday
Keeler-Cerro Gordo Road	060271003	GBU	1 in 3	everyday
Olancha-Walker Creek	060270021	GBU	1 in 3	everyday
Coso Junction-Highway 395	060271001	GBU	1 in 3	1 in 3
Coso Junction-10 miles East	060271014	GBU	1 in 3	1 in 6

ARB California Air Resources Board
GBU Great Basin Unified APCD

Exceedances of the PM10 NAAQS have been measured at all of the District PM10 monitoring sites with the exception of the site at Lee Vining, an upwind population-based monitoring location for the Mono Basin. The filter-based PM-10 samplers at Mono Lake, Warm Springs, and Lee Vining will be operated on a 1-in-3-day schedule during the high-particulate concentration seasons. The monitoring frequency at these sites will be reduced to a 1-in-6-day frequency during the low-particulate concentration seasons. Coso Junction-Highway 395 will be operated on a schedule of 1-in-3 days year round. Since the Coso Junction-10-miles East site is a special purpose monitor and not a SLAMS site, it is proposed that the monitor continue operating on the 1-in-6 day sampling schedule.