**GASEOUS POLLUTANT MONITORING PROGRAM
QUALITY MANAGEMENT PLAN (QMP)**

Prepared for the:

**NATIONAL PARK SERVICE
AIR RESOURCES DIVISION**
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QUALITY MANAGEMENT PLAN IDENTIFICATION AND APPROVAL

The attached Quality Management Plan for the Gaseous Pollutant Monitoring Program of the National Park Service is hereby recommended for approval and commits the resources and personnel to follow the elements described within.

Approved by:
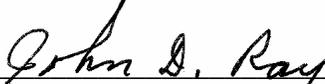
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National Park Service, Air Resources Division   Date
Gaseous Pollutant Monitoring Program
Program Manager, John D. Ray

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National Park Service, Air Resources Division   Date
Air Quality Monitoring Specialist and
QA Coordinator, David Maxwell
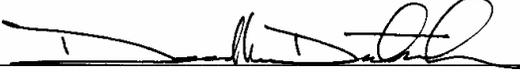
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Air Resource Specialists, Inc.   Date
Program Manager, David Dietrich

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Air Resource Specialists, Inc.   Date
Quality Assurance Manager, Gloria Mercer
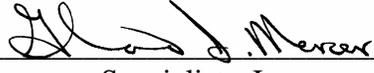
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U.S. Environmental Protection Agency   Date

FOREWORD

The following document is a Quality Management Plan (QMP) for the environmental data operations of the Gaseous Pollutant Monitoring Program (GPMP) of the National Park Service Air Resources Division (NPS ARD). This QMP outlines the roles of organizations involved in the program.

This QMP was generated using the EPA Quality Assurance (QA) regulations and guidance as described in EPA QA/R-2, *EPA Requirements for Quality Management Plans*[1]. All pertinent elements of the QMP regulations and guidance are addressed in this document.

ACRONYMS AND ABBREVIATIONS

ARS	Air Resource Specialists, Inc.
AQDB	Air Quality Database
AQS	Air Quality System
CASTNet	Clean Air Status and Trends Network
CD	Compact Disc
CFR	Code of Federal Regulations
CI	Checklist Instruction
COR	Contracting Officer's Representative
COTR	Contracting Officer's Technical Representative
DAS	Data Acquisition System
EPA	U.S. Environmental Protection Agency
GPMP	Gaseous Pollutant Monitoring Program
IMC	Information Management Center
IT	Information Technology
NAAQS	National Ambient Air Quality Standards
NAMS	National Air Monitoring Stations
NPS ARD	National Park Service Air Resources Division
PSD	Prevention of Significant Deterioration
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
QMP	Quality Management Plan
SLAMS	State and Local Air Monitoring Stations
SOP	Standard Operating Procedure
TI	Technical Instruction

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1.0   PROGRAM MANAGEMENT AND ORGANIZATION

The purpose of this section is to document the overall quality assurance policy, scope, applicability, and management responsibilities of the Gaseous Pollutant Monitoring Program of the National Park Service Air Resources Division (NPS ARD). The section describes the program, organization, and management as it relates to quality assurance.

1.1   INTRODUCTION

The primary objective of the Gaseous Pollutant Monitoring Program (GPMP) is to measure existing levels of air pollution in National Park Service units. This objective is mandated by the Clean Air Act of 1963 (including the 1970, 1977, and 1990 amendments) and the Organic Act of 1916, which assign the Federal Land Managers the responsibility of protecting the natural resources in national parks. Data on the concentrations of air pollutants in the parks are needed to support the permit review, biological effects, and research functions of the Air Resources Division and to assist parks in evaluating their resource management needs. Accordingly, the Air Resources Division has established a network of stations to monitor ozone (O_3), sulfur dioxide (SO_2), oxides of nitrogen (NO_x), carbon monoxide (CO), and meteorological conditions in the parks. This Quality Management Plan (QMP) specifically addresses these longer-term trend GPMP monitoring sites. Note that the NPS ARD also conducts shorter-term air quality monitoring including passive ozone, portable ozone, and special studies monitoring in selected parks. In addition, ARD cooperates with other national and state programs that monitor ambient gases, meteorology, deposition chemistry, particulate matter, ultraviolet radiation, and visibility. The operational protocols for these unique sites are not included in this QMP. The GPMP monitoring sites in each park are selected to represent the air within the park. Other monitoring objectives of the network are to:

- Establish existing, or baseline, concentrations in NPS units;
- Assess trends in air quality in NPS units;
- Judge compliance with national air quality standards;
- Assist in the development and revision of national and regional air pollution control policies for rural areas;
- Provide data for national and regional pollution control policies;
- Provide data for atmospheric model development and evaluation; and
- Identify those air pollutants with the potential to injure or damage park biological resources, monitor these pollutants, and correlate measurable effects to these resources to existing ambient levels of these pollutants.

These objectives are the foundation of a network design in accordance with the Environmental Protection Agency (EPA) regulations of 40 CFR, Part 50, Appendix D[2], which, although addressing primarily health-effects based monitoring in areas of high population, are generally pertinent to the Gaseous Pollutant Monitoring Program. Further information on the GPMP can be found at http://www2.nature.nps.gov/air/monitoring/network.htm.
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1.2   GASEOUS AND METEOROLOGY MONITORING

To meet the program's objectives, the NPS ARD established a network of stations to monitor gaseous and meteorological conditions in the parks. A standard monitoring station includes a UV-absorption ozone analyzer, an ozone transfer standard, a weather station including temperature at two heights, relative humidity, wind speed, wind direction, precipitation, wetness, and solar radiation sensors. These parameters are itemized in Table 1. Many stations also include a Clean Air Status and Trends Network (CASTNet) stacked filter-pack designed to measure sulfur dioxide, sulfate, nitrate, ammonium, and nitric acid. Several sites have continuous sulfur dioxide analyzers, carbon monoxide analyzers, or fine particulate analyzers.

Table 1. Gaseous Pollutant Monitoring Program Sensor and Sampling Specifications.

Parameter	Sensor	Units	Averaging Interval	Notes

Ozone	Monitor Labs 8810
	Dasibi 1003-AH
	Dasibi 1003-PC
	Thermo Environmental Instruments
	  49 and 49C
	Advanced Pollution Instrumentation
	  Model 400 Series
		ppb	Hourly average
			O_3 concentrations	

Sulfur Dioxide	Thermo Environmental Instruments 43C Thermo Environmental Instruments 43TL	ppb	Hourly average SO_2 concentrations	
Carbon Monoxide	Thermo Environmental Instruments 48C	ppm	Hourly average CO concentrations	
Oxides of Nitrogen	Thermo Environmental Instruments 42C	ppb	Hourly average NO, NO_2, and NO_X concentrations	
Ambient Air Temperature	RM Young 41342 Climatronics 100088-2 Rotronics MP-101A Vaisala HMP 45C	°C	Hourly averages	Sensors in fan-aspirated radiation shield
Delta Temperature	RM Young 41342 Climatronics 100088-2	°C	Hourly averages	Sensors in fan-aspirated radiation shield
Ambient Relative Humidity	Rotronics MP-101A Rotronics MP-601A Vaisala HMP45AC	%	Hourly averages	Sensor in fan-aspirated radiation shield
Wind Speed	Climatronics F460 RM Young #05305	m/s	Hourly averages	
Wind Direction	Climatronics F460 RM Young #05305	degrees true	Hourly averages	
Standard Deviation of Wind Direction		degrees	Calculated using Ymartino method	Datalogger calculated
Precipitation	Climatronics 100097-1-90	mm	Hourly total	
Wetness	RM Young	%	Hourly total	
Solar Radiation	RM Young	Watts/meter^2	Hourly averages	
Barometric Pressure	Climatronics Vaisala	mmHg	Hourly averages	

1.3   ROLES AND RESPONSIBILITIES

1.3.1   National Park Service Air Resources Division

The NPS ARD is the operating agency of the GPMP. The agency is responsible for implementing the technical direction of the program; issuing and administering all contracts; performing final quality assurance (QA) on all data; performing data analyses; and distributing the data, analyses results, and project information.

1.3.2   National Park Service Units

Individual parks provide the location for the monitoring equipment, utilities, and most often the site operator.

1.3.3   Air Resource Specialists, Inc.

Air Resource Specialists, Inc. (ARS) is the field support and information management contractor for the monitoring effort. ARS is responsible for managing the operational aspects of all monitoring equipment, including initial testing, installation, operator training, twice-annual calibrations and maintenance, site operator telephone support, emergency repairs, and periodic auditing. ARS is also responsible for data collection, validation, reporting, and archive, and maintains a database that houses all data and other monitoring-related information. ARS prepares, updates, and maintains all field QA documents (standard operating procedures (SOPs), technical instructions (TIs), checklist instructions (CIs), and the project Quality Assurance Project Plan (QAPP)), equipment inventory, and other program documentation.

A project organizational chart is provided as Figure 1. Responsibilities of the key project participants are listed in the following section.

1.4   KEY QUALITY ASSURANCE PERSONNEL

1.4.1   Gaseous Pollutant Monitoring Program (GPMP) Program Manager – Dr. John Ray

Under the guidance and direction of NPS ARD management, (Michael Soukup and Christine Shaver) and NPS contracting office oversight, Dr. Ray directs the technical aspects of the Gaseous Pollutant Monitoring Program, including field monitoring operations, contractor performance reviews, analyzing and approving data, reporting data and analysis results, and reviewing and approving quality assurance procedures. He coordinates with all project participants to ensure that the program develops and maintains an adequate quality system.

1.4.2   Air Quality Monitoring Specialist and QA Coordinator – David Maxwell

Mr. Maxwell of the NPS ARD tracks contract fiscal and technical performance, coordinates contract modifications, reviews data from the network, and provides other technical support as directed from the GPMP program manager. He is also responsible for program QA including contractor responsibilities, coordination of national monitoring programs, and partnership arrangements with state and local agencies to provide QA audits and calibration checks.

National Park Service Air Resources Division

Associate Director
Natural Resource Stewardship and Science
Michael Soukup, Ph.D.

Division Chief
Air Resources Division
Natural Resource Program Center
Christine Shaver

Branch Chief
Resource and Monitoring Branch
John Vimont

NPS Contracting Officer
Bill Spigel

Gaseous Pollutant Monitoring Program
Program Manager
John Ray, Ph.D.
(COTR)

NPS ARD Data Analysts
David Joseph
Debbie C. Miller

Air Quality Monitoring Specialist
and QA Coordinator
David Maxwell
(COR)

Superintendent at each NPS park
unit with monitoring station

Chief of Natural Resources
for each park unit

Site Operator
for each park unit

Air Resource Specialists, Inc.

ARS Program Manager
David L. Dietrich, Ph.D.

ARS Quality
Assurance Manager
Gloria Mercer

ARS Network Operations
Section Manager
John Faust

ARS Information Management
Center (IMC) Section Manager
Joe Adlhoch

Figure 1. National Park Service Gaseous Pollutant Monitoring Program
Quality Assurance Organizational Chart.

1.4.3   ARS Program Manager – Dr. David Dietrich

Dr. Dietrich of ARS has overall contractor project responsibility and oversees QA operations.

1.4.4   ARS Network Operations Section Manager – Mr. John Faust

Mr. Faust of ARS is responsible for the QC aspect of the field programs, and reviews the QA procedures for the field and laboratory aspects of the program, in cooperation with the program manager and QA manager. He is responsible for ensuring the direction of the program manager is carried out.

1.4.5   ARS Information Management Center (IMC) Section Manager – Mr. Joe Adlhoch

Mr. Adlhoch of ARS is responsible for the QA aspect for data collection, validation, reporting, and archiving activities, and reviews the QA procedures for these aspects of the program, in cooperation with the program manager and QA manager.

1.4.6   ARS Quality Assurance Manager – Ms. Gloria Mercer

Ms. Mercer of ARS is responsible for ensuring that updated QAPPs are in place for all environmental data operations associated with the program, and ensuring that current SOPs/TIs/CIs are maintained for the program.

2.0 QUALITY SYSTEM COMPONENTS

A quality system is defined as a structured and documented management system describing the policies, objectives, principals, organizational authority, responsibilities, accountability, and implementation of an organization for ensuring quality in its work processes, products (items), and services. The quality system provides the framework for planning, implementing, and assessing work performed by the organization and for carrying out required quality assurance (QA) and quality control (QC). This section describes the principle components comprising the quality system and how they are used to implement the quality system. In addition, the latter part of this section briefly discusses the monitoring system and how samples and data flow through the system.

2.1 DESCRIPTION OF THE GASEOUS POLLUTANT MONITORING PROGRAM

The NPS air quality monitoring strategy has focused primarily on Class I areas as defined by the Clean Air Act and its amendments, but also includes Class II areas with significant natural resources. The GPMP network consists of individual stations located in NPS units throughout the United States.

During 2004, 53 monitoring sites in 42 units of the national park system conducted some combination of ozone, sulfur dioxide, and meteorological monitoring. The locations of the sites that operated during the year are presented on the map in Figure 2. The parameters monitored at each park unit are indicated with colored flags. The enhanced gaseous category indicates that additional or high resolution gaseous monitoring occurs at that park. Monitoring agencies and park units with more than one monitoring site are indicated. A list of monitoring sites and the parameters monitored at those sites are presented in Table 2.

Continuous data and site documentation are compiled on site by a data acquisition system (DAS). The GPMP DAS consists of a datalogger and DataView (site documentation) computer. The datalogger collects and averages instantaneous data from the monitoring instrumentation into hourly averaged parameters (in engineering units). The datalogger also documents instrument status flags. The DataView computer tracks the station's operational status including flags and alarms and serves as the digital station log where the results of the site operator's manual system checks and programmed automatic checks are recorded. At sites with telephone access, the datalogger is interrogated and contents are downloaded to ARS on an automated daily basis. The DataView computer is interrogated and operator-entered lognotes are retrieved on an automated basis twice per week. At sites without a working telephone, data and lognotes are retrieved locally by the station operator and e-mailed to ARS on a weekly basis.

Hourly raw data from selected sites are uploaded to the NPS ARD Web site and to the EPA AIRNow program to support near real-time data presentations. The hourly data are automatically screened and manually reviewed daily by ARS to identify any operational inconsistencies. Any noted problem initiates corrective actions. All raw data and site documentation are appended to the IMC air quality database (AQDB). Network data are fully validated and reported monthly. Validated data are also posted monthly to the EPA Air Quality System (AQS) and to the NPS Data Retrieval Web site. Data are backed up daily and archived off-site monthly to ensure that no raw or validated data are lost. An annual report is also prepared and distributed. All procedures are summarized in the GPMP QAPP[3] and fully documented in a series of standard operating procedures, technical instructions, and checklist instructions[4].
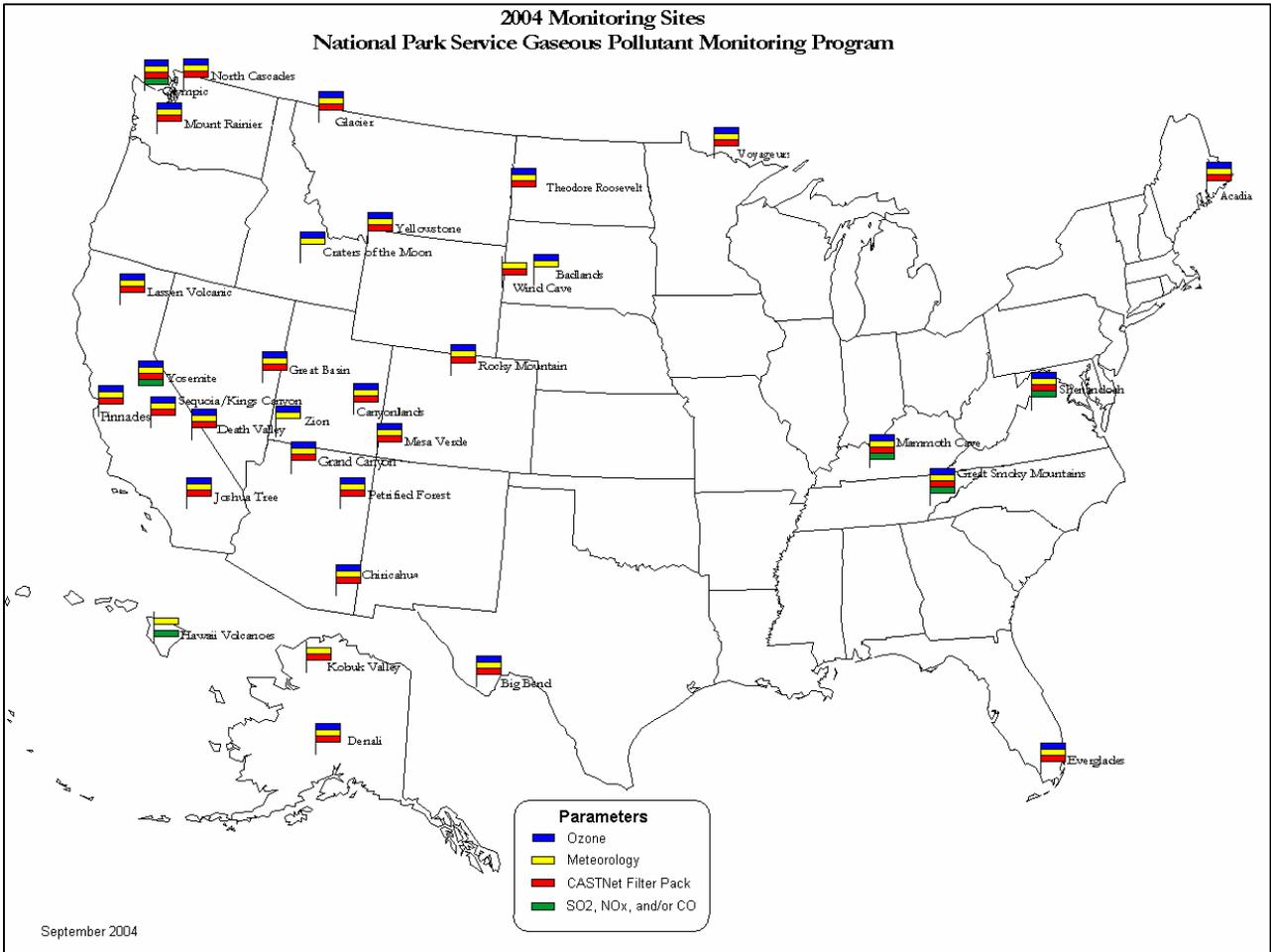
Figure 2. National Park Service Gaseous Pollutant Monitoring Program Monitoring Locations.

Table 2. National Park Service Gaseous Pollutant Monitoring Program Monitoring Sites and Parameters Measured (as of September 2004).

Site Operating Information		O₃	SO₂	NOₓ	CO	CASTNet	TMP	DTP	RH	WS/WD	PPT	W	SOL
Site Name and Abbreviation		O_3	SO_2	NO_x	CO	CASTNet	TMP	DTP	RH	WS/WD	PPT	W	SOL
Acadia NP	ACAD	X				X	X	X	X	X	X	X	X
Badlands NP	BADL	X					X		X	X	X		X
Big Bend NP	BIBE	X				X	X	X	X	X	X	X	X
Canyonlands NP	CANY	X				X	X	X	X	X	X	X	X
Chiricahua NM	CHIR	X				X	X	X	X	X	X	X	X
Craters of the Moon NM	CRMO	X					X			X	X		X
Death Valley NP	DEVA	X				X	X	X	X	X	X	X	X
Denali NP and Preserve	DENA	X				X	X	X	X	X	X	X	X
Everglades NP	EVER	X				X	X	X	X	X	X	X	X
Glacier NP	GLAC	X				X	X	X	X	X	X	X	X
Grand Canyon NP	GRCA	X				X	X	X	X	X	X	X	X
Great Basin NP	GRBA	X				X	X	X	X	X	X	X	X
Great Smoky Mountains NP	GRSM												
Cades Cove	-CC	X					X		X	X	X		X
Clingmans Dome	-CD	X					X		X	X	X		X
Cove Mountain	-CM	X	X	X	X		X		X	X	X		X
Look Rock	-LR	X				X	X	X	X	X	X	X	X
Hawaii Volcanoes NP	HAVO												
Visitors Center	-VC		X				X		X	X	X		X
Observatory	-OB		X				X		X	X	X		
Joshua Tree NP	JOTR	X				X	X	X	X	X	X	X	X
Kobuk Valley NP	KOVA					X	X	X	X	X	X	X	X
Lassen Volcanic NP	LAVO	X				X	X	X	X	X	X	X	X
Mammoth Cave NP	MACA	X	X	X	X	X	X	X	X	X	X	X	X
Mesa Verde NP	MEVA	X				X	X	X	X	X	X	X	X
Mount Rainier NP	MORA	X				X	X	X	X	X	X	X	X
North Cascades NP	NOCA	X				X	X	X	X	X	X	X	X
Olympic NP	OLYM	X	X			X	X	X	X	X	X	X	X
Petrified Forest NP	PEFO	X				X	X	X	X	X	X	X	X
Pinnacles NM	PINN	X				X	X	X	X	X	X	X	X
Rocky Mountain NP	ROMO	X				X	X	X	X	X	X	X	X
Sequoia/Kings Canyon NP	SEKI												
Ash Mountain	-AM	X					X		X	X	X		
Lower Kaweah	-LK	X					X		X	X	X		X
Lookout Point	-LP	X				X	X	X	X	X	X	X	X
Shenandoah NP	SHEN	X	X			X	X	X	X	X	X	X	X
Theodore Roosevelt NP	THRO	X				X	X	X	X	X	X	X	X
Voyageurs NP	VOYA	X				X	X	X	X	X	X	X	X
Wind Cave NP	WICA					X	X	X	X	X	X	X	X
Yellowstone NP	YELL	X				X	X	X	X	X	X	X	X
Yosemite NP	YOSE												
Turtleback Dome	-TD	X				X	X	X	X	X	X	X	X
Merced River	-MR	X		X	X		X		X	X	X		X
Zion NP	ZION	X					X		X	X	X		X

Monitoring Site Names		Pollutant Analyzers		Meteorological Sensors	
NP	- National Park	O_3	- Ozone	TMP	- Temperature
NM	- National Monument	SO_2	- Sulfur Dioxide	DTP	- Delta Temperature
		NO_x	- Oxides of Nitrogen Analyzer	RH	- Relative Humidity
		CO	- Carbon Monoxide	WS/WD	- Wind Speed / Wind Direction
		CASTNet	- Dry Deposition Filter Pack	PPT	- Precipitation
				W	- Wetness
				SOL	- Solar Radiation
				X	- Installed and operational as of September 2004

2.2 QUALITY ASSURANCE SYSTEM

2.2.1 <u>National Park Service Air Resources Division</u>

The NPS ARD provides oversight to the entire program. This group meets on a regular basis to review the program and discuss any and all issues that concern the program. In addition, they meet with ARS managers to discuss field and data management activities at least monthly. The NPS ARD also receives weekly project status reports and quarterly project reports prepared by ARS.

2.2.2 <u>NPS Units</u>

NPS site operators visit the monitoring sites once each week to assess the operational status of the instrumentation. The operator can also be directed to perform troubleshooting and maintenance, as directed by ARS, to resolve a problem. All operator actions and observations are documented on the DataView computer and are used in the data validation process. The site operators can also contact ARS by telephone or e-mail at anytime.

2.2.3 <u>Air Resource Specialists, Inc.</u>

ARS program and project managers (network operations section manager and information management center section manager) and quality assurance manager oversee the work performed by its field staff and site operators. They meet periodically to discuss QA issues as they arise throughout the program. Instrument assessment/audit reports are reviewed on a twice-annual basis. ARS' responsibility is to ensure that field operations and data management activities are performed with QA in mind and that the monitoring activity schedule is maintained.

The quality assurance manager maintains the Quality Assurance Project Plan (QAPP), Quality Management Plan (QMP), standard operating procedures (SOPs), technical instructions (TIs), and checklist instructions (CIs) for the program. The appropriate documents are maintained on-site by site operators, in both hardcopy and in electronic form. The documents detail operational and maintenance procedures for each instrument at the monitoring location. ARS field specialists also provide site operator training upon initial start-up of the monitoring site, and every six months during twice-annual site visits. This is an on-hands training and questions are encouraged at this time. The site operators can also contact ARS by telephone (toll-free 800 number) or by e-mail to discuss issues and resolve problems.

Additional standard operating procedures and technical instructions are also maintained in the ARS air quality laboratory for equipment calibration and maintenance, and in the Information Management Center for data collection, validation, reporting, and archive activities. All personnel working on the project are familiar with these documents. The quality assurance manager, program manager, and project managers review all documents annually and update them as necessary.

Instrument assessments are performed on all instrumentation during twice-annual site visits. Field specialists document the assessment/audit results in a written site visit trip report, which is forwarded to the NPS ARD. ARS also prepares weekly status reports and quarterly project reports for the GPMP.

In addition, the NPS ARD and ARS personnel participate in a monthly program review meeting. Topics discussed include quality review of each monitoring site, and review of all collected data for the prior month. Corrective actions are taken as necessary.

2.3   QUALITY DOCUMENTS

The following documents, plans, and guidelines have been implemented in the GPMP.

2.3.1   Quality Management Plan (QMP)

This QMP (described herein) outlines the management structure and how the QA system is implemented. All entities listed in this QMP adhere to these guidelines. The QMP is developed by the ARS quality assurance manager with the cooperation and approval of the GPMP program manager. It is reviewed and approved by the network operations section manager, the Information Management Center section manager, and ARS program manager.

2.3.2   Quality Assurance Project Plan (QAPP)

As directed by the GPMP program manager, a QAPP was developed for the field and data operations. All monitoring organizations adhere to the QAPP and SOPs, TIs, and CIs applicable to the program. The QAPP and supporting QA documentation are reviewed and updated no less than annually as approved by the GPMP program manager and ARS managers.

2.3.3   Assessment Reports

Program progress reports are prepared weekly to relate current monitoring status to the NPS ARD. Data reports are prepared monthly and annually. A quarterly contract status report is prepared by ARS to track contract task orders and task order modifications. Site assessment, or audit reports, are prepared by field specialists after their twice-annual site visits. The reports reflect internal performance audit results, summary of parameter maintenance, notes and observations taken at the monitoring site, and completed calibration forms. The reports are forwarded to the NPS ARD.

3.0   PERSONNEL QUALIFICATION AND TRAINING

This section outlines the process involved and training available for air monitoring professionals in the Gaseous Pollutant Monitoring Program.

3.1   PERSONNEL QUALIFICATIONS

ARS is responsible for providing training to site operators, field staff, and data collection/validation staff. Personnel assigned to the GPMP should meet the educational, work experience, responsibility, personal attributes, and training requirements for their positions.

3.2   TRAINING

Appropriate training is made available to persons supporting the GPMP, commensurate with their duties:

Site operators (provided by the NPS) are given training on routine operations, data collection, log recording, preventive maintenance, troubleshooting, and remedial repairs by ARS field specialists. A training session is conducted during new site installations and repeated during the twice-annual maintenance visits. This training session consists of all steps needed to service and maintain the monitoring instrumentation, the datalogger, and the DataView system. ARS also provides ongoing telephone support to site operators. Site operators can call for assistance to resolve operational issues. Written SOPs, TIs, and CIs provide detailed guidance for all procedures. These SOPs, TIs, and CIs are also available digitally on DataView and are linked for ready reference from the digital log sheets. In addition, a training CD is available on-site and is accessible through DataView. The CD describes and illustrates the basic duties required by the site operator. Semiannual newsletters that include the description of a network operational procedure are mailed to the site operators twice each year to supplement their training and encourage their continued interest in data quality.

The network operations section manager trains the field specialists on all instrument calibration, maintenance, audit, and site operator training procedures at the time of employment, and periodically reviews these procedures. Written SOPs provide detailed guidance for all procedures.

The IMC section manager trains all data analysts on data polling, collection, validation, reduction, reporting, and archiving procedures at the time of employment. Written SOPs provide detailed guidance for all procedures.

NPS Web management staff are trained in their respective duties by NPS ARD staff.

NPS ARD staff working on the GPMP are trained in their prospective validation, analysis, and documentation duties by senior NPS ARD staff and scientists. Most NPS ARD staff have professional experience in their individual disciplines.

3.3   CERTIFICATION

No formal certifications for network operators or IMC staff or site operators are available or required. The performance of all individuals is reflected in the quality of monitoring documentation and in the validity of the collected data.

ARS field staff are all trained and formally certified in tower climbing procedures.

4.0   PROCUREMENT OF EQUIPMENT AND SERVICES

This section summarizes the procedures in place to ensure that all acquired equipment and services are procured within federal regulations, are delivered in a timely fashion, and are within the required specifications.

4.1   PROCUREMENT

GPMP network services are procured by the NPS ARD through direct purchase, contracts, or cooperative agreements. All procurement procedures strictly follow federal procurement regulations as administered by the NPS ARD.

As authorized under the NPS contract, ARS procures required equipment and services to operate the network. All capital and subcontract purchases are itemized and reported monthly to the Contracting Officer's Technical Representative (COTR) and Contracting Officer's Representative (COR). All ARS purchases are fully documented through ARS purchase order procedures. Newly purchased gaseous analyzers are calibrated at the manufacturer and are calibrated after receipt at ARS. Sensors are accepted if documentation of the calibration is received with the analyzer and after successful calibration at ARS. Newly purchased meteorological sensors are calibrated at the manufacturer. Sensors are accepted if documentation of the calibration and calibration results are received with the sensor. All other purchased systems are acceptance tested by ARS and accepted if they meet manufacturer and industry standard specifications. All procured capital equipment is tracked in ARS' equipment inventory database.

4.1.1   Direct Purchase

The NPS ARD has the responsibility to procure all equipment and services for the GPMP network. The NPS procures equipment in two ways. Depending upon the scope of work in a particular contract, the NPS ARD may direct the contractor to purchase the equipment. The other option is for the NPS ARD to prepare a purchase order and procure equipment directly from the vendor.

4.1.2   Contracts

The NPS ARD utilizes contractors to coordinate, operate, and maintain the GPMP. All contracts are competitively awarded. Bidder's proposals are evaluated for both technical merit and cost.

The National Business Center (http://ideasec.nbc.gov/j2ee/login.jsp) provides NPS procurement opportunities. Commercial vendors seeking federal markets for their products and services can search, monitor, and retrieve opportunities by the federal contracting community.

NPS ARD normally awards contracts for one year with the option to extend the contract on an annual basis for up to an additional four years. When additional tasks are required during the term of a contract, the NPS ARD issues a task order amendment and provides the necessary funding based upon an agreed scope of work and cost with the contractor. Contractors are reimbursed for their labor and equipment purchased on behalf of the NPS (cost plus fixed fee contract).

4.1.3 <u>Cooperative Agreements</u>

The NPS ARD may enter into cooperative agreements with other federal, state, or tribal agencies to perform mutually beneficial services. For example, the NPS ARD has agreements with several states to cooperatively operate monitoring stations in selected parks and with the EPA CASTNet program to support deposition monitoring in selected parks. Agreements are negotiated between the contracting officers of the cooperating agencies.

Special monitoring is often done in cooperation with other federal agencies or university researchers under interagency or cooperative agreements. These programs typically have their own technical plans and quality assurance plans, but may use the monitoring sites, shelters, infrastructure resources, and data from the GPMP network.

4.2 PROGRAM PERFORMANCE AND QUALITY ASSURANCE REQUIREMENTS

The NPS ARD administers the GPMP to ensure that all procured equipment and services are delivered in a timely fashion and are within required performance specification.

5.0   DOCUMENTS AND RECORDS

The primary responsibility of recordkeeping falls upon the NPS ARD and their contractors. For this program, a number of documents and records need to be retained. A document, from a record management perspective, is a volume that contains information which describes, defines, specifies, reports, certifies, or provides data or results pertaining to environmental programs. As defined in the Federal Records Act of 1950 and the paperwork Reduction Act of 1995 (now 44 U.S.C. 3101-3107), records are: "books, papers, maps, photographs, machine readable materials, or other documentary materials, regardless of physical form or characteristics, made or received by an agency of the U.S. Government under Federal Law or in connection with the transaction of public business and preserved or appropriate for preservation by that agency or its legitimate successor as evidence of the organization, functions, policies, decisions, procedures, operations, or other activities of the Government or because of the informational value of data in them..." All agencies will adhere to this guideline. Section 5.2 discusses the process that are implemented for storing documents and records. For more information see the Gaseous Pollutant Monitoring Program QAPP.

5.1   DOCUMENT HIERARCHY AND PROCESS

This QMP encompasses the entire program and is the highest document covering this program. The QAPP also governs the program. All project participants must adhere to the statements made in the QMP and QAPP. SOPs, TIs, and CIs are created and maintained for specific components of monitoring; individuals must adhere to the procedures in the documents related to their components (e.g., site maintenance, calibrations, etc.).

These documents are prepared by the quality assurance manager and reviewed, approved, and revised by the key quality assurance personnel listed in Section 1.4.

5.2   DISPOSITION AND STORAGE OF DOCUMENTS AND RECORDS

Project-related standard operating procedures, technical instructions, and checklist instructions are controlled documents that are maintained in the ARS Quality Assurance Documentation Library. A copy of the documents are maintained on-site (in both hardcopy and digitally on DataView). Documents can also be viewed on http://ard-aq-request.air-resource.com/project (password protected). The QAPP and QMP are also controlled documents. The quality assurance manager is responsible for keeping the documents current and maintain a distribution list. Parties on the distribution list will receive updated versions of the plans as they are made.

All hardcopy records, field documentation, digital data, DataView documentation, and other documents for the current and previous monitoring years reside in the IMC database and archive files. The preceding five years of hardcopy records are housed in an off-site storage facility. Field documentation includes log sheets, daily summaries, audit results, calibration results, quality control checks, and procedures and maintenance performed.

Project data (raw and validated) reside in the IMC database and are available for use during the life of the project. All raw data are archived onto CD quarterly and delivered to the NPS ARD. Validated data are also uploaded to the NPS Data Retrieval Web site (http://12.45.109.6) and EPA AQS database for public access and archive.

The electronic data system utilized by ARS is described in Section 6.1 of this QMP. The raw electronic data are stored for a minimum of 5 years, and as long as program participants deem necessary. ARS performs daily archives of all information in the database, which represent the primary source of GPMP data. A disaster recovery and data backup plan for all GPMP data files is in place. All raw data are archived onto CD quarterly and delivered to the NPS ARD. Validated data are also uploaded to the NPS Data Retrieval Web site and EPA AQS database for access and archive.

5.3   DISPOSITION OF REPORTS

All the information, electronic and written, are retained for a minimum of 5 years and as long as program participants deem necessary.

6.0   COMPUTER HARDWARE AND SOFTWARE

There is an increasing dependence upon computers and computer-related hardware in the collection of environmental data. Indeed, all environmental programs within and outside of the NPS use computers extensively to collect, store, validate, and analyze environmental data. This section outlines briefly what computer systems are employed throughout the GPMP. This section also describes the roles and responsibilities for system hardware and software.

The ARS computer system has comprehensive protection and levels of security to protect against external and internal attacks. The security systems are under continuous review and upgrade to meet changes in technology. To be fully prepared in the event of a natural disaster or malicious attack, ARS developed and currently maintains a clearly defined disaster recovery plan to ensure recovery from catastrophic computer system failure. Details of this plan are summarized below.

Raw data acquisition – In the event of a network file server failure, each IMC workstation is configured for stand-alone data collection. Daily automated data polls and auxiliary data acquisition can be made from any workstation. ARS owns several laptop computers with similar software on-board and network sties can be called from off-site locations if necessary.

Backup and archive of data, software, and documentation – Using current state-of-the-art technology, backups of data, operating system, and application software are created as follows:

- Nightly tapes Monday through Friday
- Each Friday tape is stored off-site for 6 weeks
- Each month-end tape is stored off-site and is never overwritten

This procedure is industry standard to ensure the level of integrity necessary for recovering from a significant computer or disk failure.

Database recovery – Database tables are backed up each night after the database is automatically downed for a 'cold archive' ensuring synchronization of all tables and fail-safe recovery. The raw, ASCII data files collected from the sites during each daily data acquisition step are written quarterly to two writable CDs for off-site storage, at NPS ARD and off-site ARS facilities in Fort Collins. Should the ARS computer system fail or the database files become corrupted, any of these system backups can be used.

Computer hardware maintenance support – ARS maintains extended warranty service for up to 3 years on all file servers with on-site service within 24 hours. Beyond the 3-year coverage, ARS relies on the long-standing relationships with reliable vendors for fast response in parts replacement. ARS' IT staff is experienced in on-site hardware maintenance.

DataView records – At sites with DataView computers, all logged data and lognotes are stored on the on-site computer for 90 days. In the case of a prolonged site communications problem or catastrophic failure of the IMC data collection system, the independent data record from each site could be retrieved by telephone or by generating site-specific CDs.

Facilities – In the event a catastrophic event destroys or disables ARS offices and the IMC (such as flood or fire), it will be necessary to expediently reestablish operations. ARS has established strong working relationships with office equipment suppliers, computer suppliers, and office space owners, and has a sound credit rating. Available lines of credit are in-place so that office space, equipment, and computers can be leased or purchased quickly. In addition, insurance to cover catastrophic events allows the company to quickly reestablish operations at ARS' current offices or an alternate location. Hardcopy site documentation could be destroyed in a catastrophic event, but digital data files and hardcopy reports are stored at off-site locations and NPS ARD.

Personnel – Although the GPMP contract represents a very important part of the ARS workload, at least 25 other employees at ARS have similar backgrounds and expertise. ARS sufficiently cross-trains employees to ensure complete coverage of work even under normal operating schedules of vacation, sick leave, holiday, and extended leave. ARS collects data from over 150 air quality stations daily and has a consistent record of service to clients.

7.0   PLANNING

7.1   PROJECT GOALS AND OBJECTIVES

This section outlines planning and implementation procedures that are employed in the GPMP. To ensure that the work is being performed and that the quality of the data is acceptable, clear communication must be employed for this program.

The NPS ARD operates a network of air quality monitoring stations (referred to as the Gaseous Pollutant Monitoring Program; GPMP) to assess the status and trends of air pollution in NPS units. Monitoring has been ongoing in a number of parks since the early 1980s. The fundamental monitoring plan was documented in the 1991 NPS Monitoring Strategy (http://www2.nature.nps.gov/air/Monitoring/docs//trenddoc.htm). A primary objective of the GPMP is to measure existing levels of air pollution in National Park Service units, and to establish the status and trends of park unit air quality. This objective is mandated by the Clean Air Act of 1963 (including the 1970, 1977, and 1990 amendments) and the Organic Act of 1916, which assign the Federal Land Managers the responsibility of protecting the natural resources in national parks. Data on the concentrations of air pollutants in the parks are needed to support the permit review, biological effects, and research functions of the Air Resources Division and to assist parks in evaluating their resource management needs. Accordingly, the Air Resources Division (ARD) has established a network of stations to monitor ozone (O_3), sulfur dioxide (SO_2), oxides of nitrogen (NO_x), carbon monoxide (CO), and meteorological conditions in the parks. This QMP specifically addresses these longer-term trend GPMP monitoring sites. Note that the NPS ARD also conducts shorter-term air quality monitoring including passive ozone, portable ozone, and special studies monitoring in selected parks. In addition, ARD cooperates with other national and state programs that monitor ambient gases, meteorology, deposition chemistry, particulate matter, ultraviolet radiation, and visibility. The operational protocols for these unique sites are not included in this QMP. The GPMP monitoring sites in each park are selected to represent the air within the park. Other monitoring objectives of the network are to:

- Establish existing, or baseline, concentrations in NPS units;
- Assess trends in air quality in NPS units;
- Judge compliance with national air quality standards;
- Assist in the development and revision of national and regional air pollution control policies for rural areas;
- Provide data for national and regional pollution control policies;
- Provide data for atmospheric model development and evaluation; and
- Identify those air pollutants with the potential to injure or damage park biological resources, monitor these pollutants, and correlate measurable effects to these resources to existing ambient levels of these pollutants.

These objectives are the foundation of a network design in accordance with the EPA regulations of 40 CFR, Part 50, Appendix D[2], which, although addressing primarily health-effects based monitoring in areas of high population, are generally pertinent to the Gaseous Pollutant Monitoring Program.

7.2   PLANNING AND CONCEPTUALIZATION

GPMP network planning is a continual process led by the NPS ARD. The planning process responds to the needs of individual parks, results of recent research, needs of cooperating state and national programs, and annual budgets. Further planning occurs during the monthly program review meetings. This is the opportunity for all members to congregate and discuss the previous results and look forward to the challenges of the upcoming months and year.

The NPS ARD makes all executive decisions regarding the program, which includes selection and funding of contractors, expansion or reduction of the network, and all other technical and non-technical issues.

7.3   KEY PLANNING PERSONNEL

7.3.1   <u>National Park Service Air Resources Division</u>

The NPS ARD has the responsibility to assess all options and make the final decision on the implementation of the program. The agency is responsible for implementing the technical direction of the program, issuing and administering all contracts, obtaining site operators, operating the program sites, performing final QA on the data, performing data analyses, and distributing data, analyses, and all project information.

7.3.2   <u>ARS Program and Project Managers</u>

ARS' managers must verify that they have enough manpower to perform the duties required of the GPMP. They must communicate with the NPS ARD to ensure that project schedules are defined and are being met.

7.4   PLANNING OF DATA AND PERFORMANCE CRITERIA

Data quality is a network priority. The NPS ARD has adopted the following EPA guidance documents for instrument performance and data quality:

- 40 CFR 50, Appendix D. *Measurement Principle and Calibration Procedure for the Measurement of Ozone in the Atmosphere*[2]

- 40 CFR 58, Appendix A. *Quality Assurance Requirements for State and Local Air Monitoring Systems (SLAMS)*[5]

- 40 CFR 58, Appendix B. *Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD)*[6]

- *EPA Quality Assurance Handbook for Air Pollution Measurement Systems*[7]*:*
    - Volume I, Principles
    - Volume II, Ambient Air Specific Methods
    - Volume IV, Meteorological Measurement Systems

- *EPA On-Site Meteorological Program Guidance for Regulatory Modeling Applications[8]*

The GPMP QAPP and referenced SOPs, TIs, and CIs define all aspects of the program. Data quality is assured through documented, consistent procedures that include internal and external audits; periodic instrument maintenance and calibration; continuing data review; comprehensive, thorough validation; monthly program data reviews; systematic data archives; and frequent, timely data reports. All program functions are fully documented and consistently applied. The quantity, quality, and timeliness of the data meet the program goals and objectives of the NPS and the needs of cooperating and dependent state and federal agencies and programs. The GPMP is structured to respond quickly, as needs, requirements, technology, or advancing scientific understanding changes.

7.5   INTERNET PLANNING ACTIVITIES

The Internet is used by the NPS ARD to provide program information and access to GPMP data through the NPS ARD Web site: http://www2.nature.nps.gov/air/data/index.htm.

This site includes:

- Monitoring program descriptions.
- Program and research results.
- Access to validated data and data reports.
- Monitoring history.
- Real-time display of data from selected sites.
- Links to cooperating sites (including EPA AIRNow).
- Links to related sites.

Expanding the use of the Internet to publicly provide information and distribute data is an NPS ARD priority.

In addition, the GPMP uses the Internet to communicate program plans, status, and useful information to all internal project participants, including site operators, through a password-protected project Web site.

The NPS ARD is responsible for planning and directing the implementation of project-related Internet applications.

8.0   IMPLEMENTATION OF WORK

The GPMP organization has developed a QAPP that describes the process and work performed for the program. This section outlines each agency that is required to implement the work. The NPS, through its contractors, is ultimately responsible for the preparation of documented GPMP field operations and data management procedures.

8.1   IMPLEMENTATION ROLES

8.1.1   National Park Service Air Resources Division

The NPS ARD is the primary operational agency for the GPMP. The NPS ARD awards and administers all operational contracts for the GPMP. Funding for all contracted work flows through the NPS ARD. The agency ensures program schedules and quality data collection are maintained through weekly status reports and monthly project meetings.

8.1.2   Field Operators

Field operators are generally employed by the NPS and are responsible for most work performed at the monitoring sites. This includes:

- All routine on-site servicing operations, on a weekly basis.
- Equipment operation.
- Equipment maintenance.
- Data collection/documentation.
- Site maintenance and security.

8.1.3   ARS Staff

ARS field staff review the operational status of the network daily, including data quality assurance indicators, provide site operator technical support, initiate corrective actions to address any identified inconsistency, and perform any required remedial maintenance on all program monitoring instrumentation and support equipment. ARS field specialists are also responsible for semiannual on-site internal performance audits, maintenance, and calibrations of all monitoring equipment systems. Field staff are responsible for acquiring all necessary monitoring equipment and maintain site-specific equipment inventories. ARS works in conjunction with NPS staff to select appropriate monitoring sites and coordinate the installation of necessary utilities.

ARS data analysts retrieve data and system documentation by telephone modem each day. The data analysts and the field specialist independently review the incoming data to verify proper operation of the monitoring systems. ARS validates the data monthly and reviews all data with the COTR and COR. Validated data are reported, archived, and posted monthly to the Data Retrieval Web site and the EPA AQS. An annual data report is prepared to summarize each year's monitoring results.

8.1.4   Cooperating State Agencies

External audits of a number of network sites are performed by cooperating state agencies as their schedules permit. Audit results are forwarded to the NPS ARD. Agencies that collect data in national parks in accordance with EPA QA protocols submit their validated data to EPA AQS. These data are downloaded annually, reviewed, and included in the GPMP annual report by ARS.

8.2   IMPLEMENTATION OF QA DOCUMENTATION

Quality assurance documentation for the program (SOPs, TIs, and CIs) are created and revised according to SOP 2001, *Guide to Writing of Quality Assurance Program Plans, Quality Assurance Project Plans, Standard Operating Procedures, and Technical Instructions*[9]. Documents are created by personnel familiar with the proper procedures, including the project manager, program manager, technical staff, and quality assurance manager. The quality assurance manager, project manager, and program manager review and approve the documents.

The documents are reviewed and approved on an annual basis, or sooner if changes are necessitated. Control and distribution of all QA/QC documents is performed by the quality assurance manager to ensure that all recipients possess the most current versions. All requests for QA/QC documents shall be made through the quality assurance manager. A database containing all documents and recipients is maintained to assure recipients are delivered the most current versions.

9.0 ASSESSMENT AND RESPONSE

This section describes the quality-related activities necessary to support the GPMP for assessment and reporting.

9.1 PROGRAM ASSESSMENT TECHNIQUES

System operation, data quality, and data completeness are assessed each business day by reviewing the data downloaded by telephone from the datalogger. Any inconsistencies noted in the data are reported to the IMC section manager and network operations section manager, who initiates appropriate corrective action. Corrective action begins with review of the inconsistency by a field specialist. If warranted, the field specialist initiates or requires that the data analyst begin troubleshooting activities with the site operator. If troubleshooting results indicate an analyzer or sensor has failed, a replacement unit is shipped to the site and the malfunctioning unit returned for repair. If the problem is determined to be too complex for the site operator to fix alone, a field specialist is sent to the site to evaluate and correct the problem.

Assessments of the program include periodic internal performance audits of the instrumentation by trained ARS field staff. The audits are based upon accuracy goals.

9.2 REPORTS TO MANAGEMENT

Reports to management include weekly and quarterly progress reports, as well as monthly and annual data reports.

Weekly progress reports (via e-mail) contain technical information regarding network status and detail any network issues, resolution to those issues, site visits, reporting and data requests, any changes in contract information, and any significant events of note.

Monthly data reports are delivered electronically to station operators and NPS ARD within 45 days of month end and include a monthly summary of gaseous and meteorological data by site, and the monthly data collection statistics for all collected parameters for each site.

Quarterly contract status reports summarizes the status of each contract task order and task order amendment. No data are included in the report. The report is delivered within 15 days of the end of each calendar quarter to NPS ARD.

Annual data reports are delivered once per year and my include site specification information, data collection statistics, gaseous data summaries, pollutant roses, summary of meteorological data, summary of episodic pollution events, and comparison of collected gas concentrations to the National Ambient Air Quality Standards (NAAQS).

Site visit maintenance reports contain detailed information regarding procedures performed and conditions found during semiannual and emergency site visits. They also contain completed calibration forms for all parameters checked. They are delivered to the project operations Web site for review by NPS ARD.

9.3   PLANNING, TRAINING, AND AUTHORITY

9.3.1   Planning

The QMP is an essential component of an effective planning process. This QMP outlines how assessors, QA managers, and field and data collection staff will plan, schedule, implement, and participate in assessments. The GPMP contractor prepares an annual work plan, as approved by the COTR, to outline each year's activities. Assessment of the network contractor is continuously performed by the NPS ARD COTR. Monthly meetings or more frequent e-mail and telephone contact are used to refine the broader plan, respond to issues, and resolve conflict. At the beginning of the year, those who have been assigned to perform site assessments set out their tentative schedule for assessments. This schedule is first submitted to the NPS ARD and the field operators who are scheduled to be assessed. Usually, one month before the assessment, the sites to be assessed are notified by telephone of the exact dates and times.

9.3.2   Training

Training is essential to assessors in two ways: the assessor needs to understand the process by which data are generated, without this knowledge the assessment may be inadequate, and in order to communicate clearly with the operational function that is being assessed, the assessor must be competent. Training fills these needs. A part of training that is not seen or documented is the fact that those chosen for assessment should have experience in the field in which they are assessing. Although most QA criteria and theory are universal, understanding the process by being experienced in working in that field is essential.

9.3.3   Authority

All personnel that are chosen to conduct assessments have the authority to do so through the NPS ARD. The ARD has the overall responsibility and authority over this QA portion of this program. It delegates this authority to perform assessments to its agents that perform such duties. All personnel in this capacity have the right and responsibility to:

- Identify problems.
- Identify and cite noteworthy practices that may be shared with others to improve the quality of their operations.
- Propose recommendations for resolving quality problems.
- Independently confirm implementation and effectiveness of solutions.
- Report these findings to the GPMP program manager and site operator.

9.3.4   Disputes

Occasionally, findings in an assessment report may be disputed by field staff. Any disputes that are announced should first be handled as it is described in Section 10 of this document. If this fails to satisfy the situation, then the NPS ARD has the final authority to make a decision concerning a dispute.

10.0 QUALITY IMPROVEMENT

This section outlines planning and implementation procedures that are employed for improving the quality of the program. All project participants involved have the responsibility to improve the quality of the program over an unspecified period of time. There can be no set dates on when this improvement can or will occur, however, all of the project participants will make every effort to improve the system during the life of the GPMP.

10.1 QUALITY IMPROVEMENT PROCESS

The NPS ARD COTR is responsible for reviewing and directing the implementation of a corrective action. At the direction of the COTR, the network contractor evaluates, tests, and recommends any needed procedural changes including field, data management, or reporting functions. With the approval of the COTR, the change is implemented and documented through changes in SOPs, TIs, and CIs, and referenced in a revised QAPP as appropriate. All parties subject to the change are fully trained in the revised procedures.

10.2 QUALITY IMPROVEMENT ASSURANCE

Open and direct communication is encouraged at all levels of this project. ARS staff and site operators are encouraged to openly communicate through management channels or directly with the COTR. There are no restrictions to direct communication among all project participants, although the ARD project manager is to be copied or kept informed of significant communication. ARS has the primary responsibility to communicate with and resolve issues with equipment or subcontract vendors and suppliers. The NPS has the primary responsibility to resolve performance issues with the site operators.

11.0   REFERENCES

1   EPA QA/R-2, 2001, *EPA Requirements for Quality Management Plans*, (EPA/240/B-01-002). U.S. Environmental Protection Agency, Washington, D.C., March.

2   40 CFR 50, Appendix D. *Measurement Principle and Calibration Procedure for the Measurement of Ozone in the Atmosphere. (http://ecfr.gpoaccess.gov/)*

3   Air Resource Specialists, Inc. 2004, *Gaseous Pollutant Monitoring Program Quality Assurance Project Plan (QAPP)*. October.

4   Air Resource Specialists, Inc. 1990-2004, *Ambient Air Quality and Information Management Center Standard Operating Procedures, Technical Instructions, and Checklist Instructions.*

5   40 CFR 58, Appendix A. *Quality Assurance Requirements for State and Local Air Monitoring Systems, (SLAMS). (http://ecfr.gpoaccess.gov/)*

6   40 CFR 58, Appendix B. *Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD). (http://ecfr.gpoaccess.gov/)*

7   *EPA Quality Assurance Handbook for Air Pollution Measurement Systems*:
        Volume I, A Field Guide to Environmental Quality Assurance.
                (http://www.epa.gov/ttn/amtic/files/ambient/qaqc/r94-038a.pdf)
        Volume II, Ambient Air Specific Methods
                (http://www.epa.gov/ttn/amtic/files/ambient/qaqc/redbook.pdf)
        Volume IV, Meteorological Measurement Systems
                (http://www.epa.gov/scram001/guidance/met/vol4metmeas1.pdf)

8   *EPA On-Site Meteorological Program Guidance for Regulatory Modeling Applications* (http://www.epa.gov/scram001/guidance/met/mmgrma.pdf)

9   Air Resource Specialists, Inc. 1990, *Standard Operating Procedure 2001, Guide to Writing of Quality Assurance Program Plans, Quality Assurance Project Plans, Standard Operating Procedures, and Technical Instructions.* Revision 1.0, March 2004.

GLOSSARY OF QUALITY ASSURANCE AND RELATED TERMS

Activity – An all-inclusive term describing a specific set of operations of related tasks to be performed, either serially or in parallel (e.g., research and development, field sampling, analytical operations, equipment fabrication) that, in total, result in a product or service.

Assessment – The evaluation process used to measure the performance or effectiveness of a system and its elements. As used here, assessment is an all-inclusive term used to denote any of the following: audit, performance evaluation, management system review, peer review, inspection, or surveillance.

Audit (quality) – A systematic and independent examination to determine whether quality activities and related results comply with planned arrangements and whether these arrangements are implemented effectively and are suitable to achieve objectives.

Certification – The process of testing and evaluation against specifications designed to document, verify, and recognize the competence of a person, organization, or other entity to perform a function or service, usually for a specified time.

Checklist instruction (CI) – A document containing step-by-step procedures applicable to a specific instrument, system, method, etc. The procedures are in the form of a checklist.

Corrective action – Any measures taken to rectify conditions adverse to quality and, where possible, to preclude their recurrence.

Data reduction – The process of transforming the number of data items by arithmetic or statistical calculations, standard curves, and concentration factors, and collating them into a more useful form. Data reduction is irreversible and generally results in a reduced data set and an associated loss of detail.

Document – Any written or pictorial information describing, defining, specifying, reporting, or certifying activities, requirements, procedures, or results.

Environmental data – Any parameters or pieces of information collected or produced from measurements, analyses, or models of environmental processes, conditions, and effects of pollutants on human health and the ecology, including results from laboratory analyses or from experimental systems representing such processes and conditions.

Finding – An assessment conclusion that identifies a condition having a significant effect on an item or activity. An assessment finding may be positive or negative, and is normally accompanied by specific examples of the observed condition.

Independent assessment – An assessment performed by a qualified individual, group, or organization that is not a part of the organization directly performing and accountable for the work being assessed.

Inspection – The examination or measurement of an item or activity to verify conformance to specific requirements.

Management – Those individuals directly responsible and accountable for planning, implementing, and assessing work.

Management system – A structured, non-technical system describing the policies, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan of an organization for conducting work and producing items and services.

Organization – A company, corporation, firm, enterprise, or institution, or part thereof, whether incorporated or not, public or private, that has its own functions and administration.

Organization structure – The responsibilities, authorities, and relationships, arranged in a pattern, through which an organization performs its functions.

Procedure – A specified way to perform an activity.

Process – A set of interrelated resources and activities that transforms inputs into outputs. Examples of processes include analysis, design, data collection, operation, fabrication, and calculation.

Project – An organized set of activities within a program.

Quality – The totality of features and characteristics of a product or service that bears on its ability to meet the stated or implied needs and expectations of the user.

Quality assurance (QA) – An integrated system of management activities involving planning, implementation, assessment, reporting, and quality improvement to ensure that a process, item, or service is of the type and quality needed and expected by the client.

Quality Assurance Project Plan (QAPP) – A formal document describing in comprehensive detail the necessary quality assurance (QA), quality control (QC), and other technical activities that must be implemented to ensure that the results of the work performed will satisfy the stated performance criteria. The QAPP components are divided into four classes: 1) Project Management, 2) Measurement/Data Acquisition, 3) Assessment/Oversight, and 4) Data Validation and Usability. Guidance and requirements on preparation of QAPPs can be found in EPA QA/R-5 and QA/G-5.

Quality control (QC) – The overall system of technical activities that measures the attributes and performance of a process, item, or service against defined standards to verify that they meet the stated requirements established by the customer; operational techniques and activities that are used to fulfill requirements for quality. The system of activities and checks used to ensure that measurement systems are maintained within prescribed limits providing protection against "out of control" conditions and ensuring the results are of acceptable quality.

Quality improvement – A management program for improving the quality of operations. Such management programs generally entail a formal mechanism for encouraging worker recommendations with timely management evaluation and feedback or implementation.

Quality Management Plan (QMP) – A formal document that describes the quality system in terms of the organization's structure, the functional responsibilities of management and staff, the lines of authority, and the required interfaces for those planning, implementing, and assessing all activities conducted.

Quality system – A structured and documented management system describing the polices, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan of an organization for ensuring quality in its work processes, products (items), and services. The quality system provides the framework for planning, implementing, and assessing work performed by the organization and for carrying out required quality assurance (QA) and quality control (QC).

Requirement - A formal statement of a need and the expected manner in which it is to be met.

Specification – A document stating requirements and referring to or including drawings or other relevant documents. Specifications should indicate the means and criteria for determining conformance.

Standard operating procedure (SOP) – A controlled document containing general procedures, protocols, methods, schedules, responsibilities, etc., for a given class or group of related tasks. SOPs should reference TIs for further detail.

Technical instruction (TI) – A controlled document containing step-by-step procedures applicable to a specific instrument, system, method, etc.

Vendor – Any individual or organization furnishing items or services or performing work according to a procurement document or a financial assistance agreement. An all-inclusive term used in place of any of the following: seller, contractor, subcontractor, fabricator, or consultant.