2004

Quality Assurance Plan Photochemical Assessment Monitoring Station – PAMS, 2004

Maine Department of Environmental Protection

Group A – Project Management

A1. Title and Approval Sheet

Title of Plan:

Quality Assurance Plan Photochemical Assessment Monitoring Station – PAMS

Name of the Organization Implementing the Project:

State of Maine – Department of Environmental Protection

Names, Titles, Signatures of Appropriate Approvals Officials and Their Approval Date for:

Signature:_____ Date: _____
Malcom Burson, Quality Assurance Manager, Maine DEP

Signature: _____ Date: _____
John Chandler, Division Director, Field Services Division, Maine DEP

Signature: _____ Date: _____
PAMS Project Manager – Andrew Johnson, Maine DEP

Signature: _____ Date: _____
Lab/QC Manager – Rick Mayo, Maine DEP

EPA Region 1

Signature: _____ Date: _____
EPA PAMS QA Officer/Manager – Gerry Sotolongo, EPA Region 1

Signature: _____ Date: _____
Norman Beloin – EPA Region 1 – Air Monitoring Team Leader

A2. TABLE OF CONTENTS

Appendices

A3. Distribution List

This Quality Assurance Plan – Photochemical Assessment Monitoring Station – PAMS VOC Sampling and Analysis will be distributed to the following principles involved:

Analysts:

Marylee Mullen – Maine DEP
Paul Nichols – Maine DEP
Rick Mayo – Maine DEP

State Quality Assurance Manager – Malcom Burson

State Field Services Division Director – John Chandler

State PAMS Project Manager – Andrew Johnson, Maine DEP

State Lab/QA Manager – Rick Mayo, Maine DEP

EPA Air Monitoring Team Leader – Norm Beloin

EPA.PAMS QA Officer/Manager – Gerry Sotolongo, EPA Region 1

A4. Project/Task Organization

The following is a list of individuals in the PAMS VOC sampling and analysis program and their tasks as it pertains to the project.

Analyst: Marylee Mullen – Maine DEP
On-site operator of the Cape Elizabeth Two Lights State Park PAMS monitoring site. Performs the actual sampling and analysis, all record keeping, as well as the initial and final data validation, data reduction, final reports, and overall maintenance of the auto GC system.

Analyst: Paul Nichols – Maine DEP
On-site operator of the Cadillac Mountain, Acadia National Park PAMS monitoring site. Performs the actual sampling and analysis, all record keeping, as well as the initial and final data validation, data reduction, final reports, and overall maintenance of the auto GC system.

Analyst/LAB QA Manager: Rick Mayo – Maine DEP
On-site Lab Analyst, Central Maine Regional Office, Augusta, Maine. Backup site operator for the Cape Elizabeth and Cadillac Mountain PAMS site operators. Responsible for maintaining PAMS QA plans, documentation of site activities and overall site management.

State PAMS Project Manager: Andrew Johnson – Maine DEP
Responsible for the large scope of operation of all monitoring aspects of the PAMS stations as well as being the primary contact for other agency personnel and the public. Responsible for interagency communications and procurements.

EPA QA Manager: Gerry Sotolongo – EPA Region 1
Responsible for QAPP approval.

A5. Problem Definition and Background

Section 128 (c)(1) of the 1990 Clean Air Act Amendments (CAAA) required the Administrator to promulgate rules for the enhances monitoring of ozone, oxides of nitrogen (NO_x), and volatile organic compounds (VOC) to obtain more comprehensive and representative data on ozone air pollution. Immediately following the promulgation of such rules, the affected states were to commence such actions as were necessary to adopt and implement a program to improve ambient monitoring activities of NO_x and VOC. Each state Implementation Plan (SIP) for the affected areas must contain measures to implement the ambient monitoring of such air pollutants. The subsequent revisions to Title 40, code of Federal Regulations, Part 58 (40 CFR 58) (Reference 1) required states to establish Photochemical Assessment Monitoring Stations (PAMS) as part of their SIP monitoring networks ozone non-attainment areas classified as serious, severe, or extreme (Figure 1). The criteria for judging the severity of an ozone non-attainment area utilizing the ozone design is intended to provide a measure of the need for reduction in ozone concentrations essential to achieve attainment or, equivalently, the degree of severity the non-attainment area represented by the monitoring site. Given the expected exceedance form of the ozone National Ambient Air Quality Standard (NAAQS), the ozone design value is defined as the concentration with the expected number of exceedances equal to one.

Table 1.1: Non-attainment Severity Classifications

Non-attainment Area Classification	Ozone Design Value (ppm)
Marginal	0.121 up to 0.138
Moderate	0.138 up to 0.160
Serious	0.160 up to 0.180
Severe	0.180 up to 0.280
Extreme	0.280 and above

The principle reasons for requiring the collection of additional ambient air pollutant and meteorological date are, primarily, the lack of attainment of the NAAQS for ozone nationwide, and secondly, the need for a more comprehensive air quality database for ozone and its precursors.

The chief objective of the enhanced ozone monitoring revisions is to provide an air quality database that will assist air pollution control agencies in evaluating, tracking the progress of, and if necessary, refining control strategies for attaining the ozone NAAQS. Ambient concentrations of ozone and ozone precursors will be used to make attainment/non-attainment decisions, aid in tracking VOC and NO_x emissions inventory reductions, better characterize the nature and extent of the ozone problem, and prepare air quality trends. In addition, data from the PAMS will provide an improved database for evaluating photochemical and model performance, especially for future control strategy midcourse corrections as part of the continuing air quality management process. The data will be particularly useful to states in ensuring the implementation of the most cost-effective regularity controls.

Currently, the State of Maine is not classified as non-attainments are for ozone. The purpose of the current program is to get a better understanding of the regional transport of ozone and its associated precursors.

A6. Project/Task Description

From mid April to October 1st of each year, the Bureau of Air Quality will operate 2 multiparameter, Type 4 designated PAMS sites as part of the Regional Enhanced Ozone Monitoring Program. The site at Cape Elizabeth Two Lights State Park is intended to represent conditions at an extreme downwind location of an urban non-attainment area, which in this instance is greater Connecticut area. This site is equipped with the following:

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Perkin Elmer Auto System GC				✓	✓	✓	✓	✓	✓			
TECO 48C CO-Analyzer	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
TECO 49C 03 Analyzer	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
TECO 42S Low Level NO_x	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Met One MET System: Includes WS/WD/Temp/Rh/ Solar Radiation, Bp/UV-b	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Data Processing Data Analysis & Reporting	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

The site at Cadillac Mountain, Acadia National Park is intended to represent conditions at an extreme downwind location of our urban non-attainment area, which in this instance is the greater metropolitan Boston area. This site is equipped with the following:

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Perkin Elmer Auto System GC				✓	✓	✓	✓	✓	✓			
TECO 48C CO-Analyzer				✓	✓	✓	✓	✓	✓			
TECO 49C 03 Analyzer				✓	✓	✓	✓	✓	✓			
Climatronics MET System: WS.WD/Temp				✓	✓	✓	✓	✓	✓			
Data Processing Analysis & Reporting				✓	✓	✓	✓	✓	✓			

The lab is located at the Bureau of Air Quality Central Maine Regional Office at Augusta. It is principally geared to analyzing canisters from field sampling sites involved with the 24-hour HAPS monitoring program.

The individual PAMS sites are operated for the extended seasonal periods beyond the required time interval of June, July, August to provide an enhanced data base for seasonal changes, to ensure all of the analytical systems are performing satisfactorily and conduct extensive QC checks prior to and following the prime time monitoring period.

Each PAMS site is staffed by a fully trained and dedicates site operator who is solely responsible for all of the day to day tasks of ensuring that all systems are performing within specifications performing routine scheduled maintenance, weekly and monthly system checks using certified standards, data management, data resolution, and maintaining detailed log books on instrument performance. These individuals visit the sites daily Monday through Friday. If for some reason the site operator cannot visit the site, the system can be poled using the program PC Anywhere to determine its status and download data.

All PAMS VOC raw data is initially screened using TURBOCHROME software to verify that each chromatogram is valid from the standpoint of showing a normal peak profile, that peaks are within their retention time window and are correctly identified. After their review, each week of VOC data is batch processed against the calibration file that was generated for that week's method. Quantified data is then reviewed through the software

program VOCDAT and GCSUM that looks for anomalies and outliers that may be suspect and deleted from the database. Validated data is then sent to NCC, RTP, NC.

The total data output from each individual monitoring system will be used to obtain a more comprehensive and representative database on ozone air pollution and precursors. The output from this program will to be assist us in evaluating, tracking the progress of, and, if necessary, refining strategies for attaining the ozone National Ambient Air Quality Standard. Ambient concentrations for attaining the ozone and ozone precursors will be used to make attainment/non-attainment decision, aid in tracking VOC and oxides of nitrogen emissions inventory reductions, better characterize the nature and extent of the ozone problem, and prepare air quality trends.

A7. Data Quality Objectives & Criteria for Measurement

PARAMETER	PRECISION	ACCURACY	MEASURE RANGE
NO_x	±15%	± 15%	50 ppb
NO_y	±15%	± 15%	50 ppb
O3	±10%	± 10%	.5 ppm
CO	±10%	± 10%	2 ppm
VOC	Table 1	Based on historical proficiency studies conducted by EPA	--
WS		1.0 mph threshold	0 – 100 MPH
WD		1 mph threshold ±3 ±.5 mph accuracy to 10 mph ±5% above 10 mpg	0 - 360°
Rh		±2% (0% → 90%Rh) ±3% (90% → 100% Rh)	0 – 100%
Temp		±5°C	-30 to +50°C
BP		±0.04 in Hg	26 – 32 in Hg
SR		10w/m² threshold	0 – 1400 w/m²
UV-b		Threshold observed	208 –330 mm

Representatives:
Each of the PAMS sites were selected as Type 4 Photochemical Assessment Monitoring Site to represent conditions at an extreme downwind location of an urban ozone non-attainment area-greater metropolitan Boston area-and the State of Connecticut. These sites measures ozone and its precursors exiting the area and which then contribute to ozone levels further downwind. These locations are also based on the predominant afternoon downwind as determined at a Type 3 site.

Comparability:
To ensure comparability, an approved monitoring protocol has been established by the Bureau of Air Quality for assessment and analysis of the PAMS VOC data. Through this established procedure sampling, analytical methods, and units of reporting etc. will be

used that will permit the exchange and use of the data in similar studies on a local and national basis.

Completeness:
It is the desire and objective within this project to have a minimum 85% data capture per month. Historically the track record has been above 90% taking into account the weekly and monthly QC checks, audits, equipment malfunction, etc.

On any given day for a data set to be considered complete, there must be enough PAMS VOC data collected to reflect the actual conditions of that day. A minimum percent data capture has been set at 75%. That is out of 24 hourly analytical runs per day, there must be at least 18 valid and successful data sets. When QA/QC samples are run, i.e. blanks, audits, calibration standards, there can be no more than 6 of these types of analyses. If additional non-ambient samples were analyzed on any given day, that day would have to be removed and considered lacking the necessary completeness.

Data Quality Objectives

Data Quality Objectives (DQOs) are statements that relate the quality of environmental measurements to the level of uncertainty that decision-makers are willing to accept for results derived from the data. The process of developing DQOs starts with the program or project objectives, which state the kind of monitoring that will be performed. The DQOs then carry the process to its conclusion, stating how "good" the data need to be satisfying the program objectives, with a specified level of confidence. Thus, it is critical that any set of DQOs be tied closely to the Program Objectives, ensuring that the monitoring will truly address the stated needs.

It is never possible to be absolutely certain that a future data set will satisfy the data needs exactly. There is always a chance that variables, variation, and uncertainty beyond the program's control will lead to a "softness" in the data and a resulting uncertainty that the subsequent decisions are appropriate.

The DQOs themselves must quantify the variable or possible error was well as possible in order for the decision-making risk to be assessed fairly.

EPA has developed preliminary DQOs, which resulted from an extensive PAMS monitoring program in Atlanta, GA during the summer of 1990. These are tied directly to program objectives.

Detailed explanations may be found in EPA Region 1 PAMS QA initiative Quality Assurance Plan, July 1996, Appendix A.

Table 1 EPA Acceptance Criteria for PAMS QA Precision Cans		
Cor. Action:	#1	if EPA >1.0, State should be >.5 (if not, it is false negative) if EPA is <.5, State should be <1.0 (if not, is false positive)
	#2	if compound is reported to be >5.0, must be ±30%
Warning Level:	#1	if EPA >3.0 and <5.0, must be ±50%
	#2	if EPA >1.0 and <3.0, must be ±75%

A8. Project Narrative

Not required for Maine PAMS Program.

A9. Documentation and Records

Equipment operators will be provided on-site training by factory trained service engineers and experienced Bureau of Air Quality staff. Areas of instruction will include comprehensive understanding of the TURBOCHROME software, programming, system operation, maintenance, record keeping, file management and QA/QC procedures.

Due to the demanding nature of this continuous VOC monitoring, the site operator must be familiar with good laboratory practices as pertaining to analytical work using gas chromatography, be aware of the unique problems associated with gas analysis and air analysis, be resourceful and patient.

Individuals assigned to this endeavor should have a well-established baseline experience in ambient monitoring and environment studies to ensure the successful performance of their assigned task. No certification will be required to perform the PAMS VOC sampling and analysis.

A10. Documentation and Records

The Maine DEP-Air Bureau in conjunction with EPA Region 1 will perform joint QA tasks for the purpose of assessing data quality. This will be in the form of a once every

sixth day one hour precision can sample taken at each of the PAMS monitoring sites- Cape Elizabeth and Cadillac Mountain/Acadia National Park.

A Round Robin standard will also be sent out 2 to 3 times during the monitoring season.

Precision data will be stored in AQS. Hard copies of precision and Round Robin data will be stored on file at each regional office in accordance with standard policy.

Group B – Measurement/Data Acquisition

B1. Sampling Process Design

The State of Maine has established two PAMS Type 4 sampling and analysis sites. One is located at Two Lights State Park, Cape Elizabeth, Maine and is considered a downwind site for the State of Connecticut. The other is located on top of Cadillac Mountain in Acadia National Park, Bar Harbor, Maine and is considered a downwind site for the greater metropolitan Boston area. Each of these locations has been designated urban ozone non-attainment area. Support for the rationale behind the selection of these two selections may be found in the attached documentation. Summary listed below. Full documentation. Summary listed below. Full documentation may be found in Appendix P.

- 10/14/93 – CT PAMS network plan (network description) which discussed the Type 4 site being in Maine.

- OAQPS PAMS Network Approval Letter dated August 9, 1995 (Photochemical Assessment Monitoring Stations Network Plan Addendum – Greater Connecticut/New York/New Jersey/Long Island Network Approval letter from EPA Headquarters, which lists all of the sites, parameters and sampling frequencies). This approved Sherwood Island as a Type 1/3 site, Stafford as a Type 3 site, and contingent approval for a Type 2 site in New Haven, and a Type 4 site in the State of Maine (pending successful negotiations with Maine). This network is for the Greater Connecticut ozone non-attainment area.

- January 24, 1997 OAQPS approval letter – PAMS Network Plan Addendum for Greater CT

- December 30, 1993 – MA DEP's Network Plan, which discussed operating a PAMS site in Maine.

- OAQPS July 21, 1994, April 10, 1995 and October 19, 1995 PAMS approval letters for the Boston/Lawrence/Worcester ozone non-attainment area (lists all of the sites, parameters, and sampling frequencies).

- Maine DEP's background write up justifying the PAMS sites at Cape Elizabeth and Acadia National Park.

- 4/9/97 OAQPS OAMS Status Report which shows that both Cape Elizabeth and Acadia National Park have been approved as Type 4 sites.

The site at Acadia National Park is equipped with a Perkin Elmer Auto GC VOC Precursor system that is comprised of a Perkin Elmer Auto GC, ATD 400 sample

concentrator, 970 Interface, and an IBM Pentium computer to handle data acquisition and processing functions. This unit operates 24 hours per day taking an integrated ambient sample each hour for a period of 40 minutes beginning at five minutes after the top of the hour. Thermal desorption and analysis follow.

In addition to this, there is a TECO 49C/49CPS continuous monitoring system, a continuous TECO 42C/146 low level NO_y monitoring system, ESC 8816 data acquisition system, Climatronics three parameter met - WS/WD/temp and a TECO 48C Carbon Monoxide monitor. This is a seasonally operated site beginning about mid-April through October 1.

The site at Cape Elizabeth is also equipped with a Perkin Elmer Auto GC VOC precursor system equivalent in configuration to the Acadia National Park until and operates on the same daily and seasonal schedule. In addition to this, there is a continuous TECO 42S/146 low level NO_y monitoring system, a TECO 49C/49CPS continuous ozone monitoring system, ESC 8816 data acquisition system, MET ONE, 6 parameter met system WS/WD/TEMP/Rh/Bp/Solar Radiation, a UV-b monitoring system, and a TECO 48C Carbon Monoxide Monitor.

Quality Assurance Plans for the continuous ambient monitors and met system have been written. For meteorology, this may be found in the Meteorological Sensor Quality Assurance Plan dated February 1998 (Appendix Q) and for the remaining parameters may be found in the QA plan for SLAMS, NAMS, SPM, and PMS Networks Ambient Measurement Systems with updated revisions dated Nov. 1998. Remaining plan may be found on file with the Bureau QA Manager.

B2. Sampling Method Requirements

In the even of a system malfunction or failure, the site operator is to assess the magnitude of the difficulty and will be responsible for initiating corrective action. Based on the evidence and his/her professional experience, determine whether or not they can proceed with the repairs. To assist in the diagnostic evaluation, the site operator is to refer to the equipment manuals if need be, or call Perkin Elmer Technical assistance, the site manager or other experienced site operators to discuss malfunction/failure to seek a remedy as soon as possible.

B3. Sample Handling and Custody Requirements

This section pertains to the canister sampling network for the PAMS precision and SIP 24 hour sample cans from Cape Elizabeth and Cadillac Mountain.

1. PAMS Precision Can – Cape Elizabeth/Cadillac Mountain

A. Sample Handling

Cape Elizabeth Two Lights State Park and Cadillac Mountain have each been designated as Maine's regional PAMS co-located precision VOC sampling sites. Canisters from these sites are sent to EPA Region 1 Lexington lab for analysis. The standard operating procedure that is followed is documented number EPA-REG1-MEME/VOC-SAM-SOP, April 98, Rev. 7, SOP for Xontech Model 910A Sampler (Appendix J)

B. Shipping

Canisters will be shipped according to SOP EPA-REG--1-OEME/SHIPPING SOP, April 16, 1998, Rev. 7., SOP FOR RETURNING PAMS QA CANISTER AND CARBONYL CARTRIDGES TO EPA (Appendix K).

C. Log In

Upon receipt of samples by EPA Region 1 lab, Chelmsford, MA, log in procedures will be according to SOP EIA-ADMLOGN5.SOP,4/13/99 (Appendix L)

D. Holding Time

The holding time is 28 days; normally analysis of samples will be done within 14 days from the date of collection. EPA SOP EIA AIRBORNE 6. SOP, 3/17/99 OZONE PRECURSORS BY GC/FID.

2. PAMS 24-hour can from Cadillac Mountain, ANP and 24-hour can from Cape Elizabeth.

A. Sample Handling/Analysis

Canisters from these sites are analyzed on the analytical system at the respective sites. Data is compiled, edited, QA, and sent to US EPA Region 1.

B4. Analytical Method Requirements

Appendix D of this QAPP provides a detailed account of the procedures that the site operator is to follow on a daily, weekly, and monthly basis for the ozone precursor system. Appendix F provides for the Quality Assurance Program to be followed involving precision sampling, national performance audit program and method detection limit. In the even of a system malfunction or failure, the lab analyst is to assess the

magnitude of the difficulty and will be responsible for initiating corrective action. To assist in the diagnostic evaluation, the lab analyst is to refer to the equipment manuals for the Auto GC and ATD 400 Sample Concentrator. References for the Auto GC are in the Operator's Manual Section 6 - Leak Testing Capillary Column, page 6-42, Section 6 - F.I.D. Flow Check, page 7-6 to 7-9, Section 6 – Carrier Gas Flow Check, page 6-41 to 6-42, Section 12 – Troubleshooting, Section 6 – Maintenance – Cold Trap De-Icing, page 6-13.

If these service checks do not determine the cause of the system failure, the site operator is to call Perkin Elmer Technical Assistance and contact the Lab Manager to discuss the malfunction/failure to seek a remedy as soon as possible.

B5. Quality Control Requirements

It is the desire and objective within this project to have a minimum 85% data capture per month. Historically, our track record has been above 90%, taking into account the weekly and monthly QA/QC checks, audits, equipment malfunctions, etc.

On any given day for it to be considered complete, there must be enough PAMS VOC data collected to reflect the actual conditions of that day. A minimum percent data capture has been set at 75%. That is out of 24 hourly analytical runs per day, there must be at least 18 valid and successful data sets. When QA/QC samples are run, i.e. blanks, audits, calibration standards, there can be no more than 6 of these types of analyses. If additional non-ambient samples were analyzed on any given day, that day would have to be removed and considered lacking the necessary completeness.

To support this objective Appendix D of this QAPP provides a detailed account of the procedures that the site operator is to follow on a daily, weekly and monthly basis for the ozone precursor system. Appendix F provides for the Quality Assurance Program to be followed involving precision sampling, national performance audit program and method detection limit.

B6. Instrument/Equipment Testing, Inspection, and Maintenance Requirements

1. Canister Samples

   Before shipment of samplers to a specified monitoring site, the equipment is checked to ensure that it is working properly and certified clean. Each regional office will maintain an equipment logbook that will contain the data sheets on each sampler entitled "Maintenance Record and Field Checks for Canister Sampler", Figure 21. This includes flow checks, zero air checks, system leak checks, mass flow meter certifications, and pressure gauge certifications.

2. Perkin Elmer Auto GC – Cape Elizabeth/Cadillac Mountain

A detailed site logbook, see Figure 5/5A, is maintained for each entry of an hourly ambient raw data file on the date and time it was acquired, its file name and associated method and calibration data file that will be used to process the data. Included in this sequential sample file record, it will be notes when QC checks are made – which files are for the certified PAMS Retention Time Standard, VOC free air system blanks, precision sample checks and EPA performance audits. This way each sample file will be clearly identified for future reference.

Additional comments that will be notes are any unusual system malfunctions, repairs or adjustments made to the analytical equipment, weather evens, or events near the site which may affect the data.

B7. Instrument Calibration and Frequency

The Primary Calibration/Retention Time Standard contains all 56-target analysts are a concentration level between 20-60 ppbC. This is supplied to us by EPA Region 1. The NIST certified benchmark compounds are propane and benzene, which are used for developing the calibration response factor for each channel – PLOT column uses propane, the BPI column uses benzene. All other analytes are quantitated against the relative response of either propane or benzene. See Appendix B and Figure 2/2A/2B/2C.

Detailed weekly and monthly calibration Retention Time Standards and VOC Free Air sequences are outlined in the following sections of the QAPP for PAMS: Automates Method (Appendix D).

B8. Inspect/Acceptance Requirements of Supplies and Consumables

Each site operator/lab analyst will be responsible for maintaining those supplies and consumables needed for the continuous operation of the respective analytical systems. Of primary importance will be the procurement and maintenance of high purity, lab specialty grade support gases for the gas chromatographs. In addition to this are inline, indicating gas purifiers which when needed will be replaced. These are specified under Appendix B of the QAP for PAMS.

B9. Data/Acquisition Requirements (Non Direct Measurement)

The PAMS network array for an area should be fashioned to supply measurements, which will assist states in understanding and solving ozone non-attainment problems. Two sites within Maine have been designated as Type 4 – extreme downwind monitoring sites.

The #4 sites are located in the predominant afternoon downwind direction from the local area of maximum precursor emissions at a distance sufficient to obtain urban scale measurements. Typically, these sites will be located near the downwind edge of the photochemical grid model domain. These sites are established to characterize the extreme downwind transported ozone and its precursor concentrations exiting the area and will identify those areas, which are potentially contributing to overwhelming ozone transport into other areas.

Site one is located at Two Lights State Park, Cape Elizabeth, Maine and is considered a downwind site for the State of Connecticut. The other is located on top of Cadillac Mountain, Acadia national Park, Bar Harbor, Maine. It is considered a downwind for the greater metropolitan Boston area. Each of these states has been designated urban ozone non-attainment area. Support for and the rational behind the selection of these two sites may be found in the attached documentation (See Appendix P).

- 10/14/93 – CT PAMS network plan (network description) which discussed the Type 4 site being in Maine

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- Maine DEP's background write up justifying the PAMS sites at Cape Elizabeth and Acadia National Park.

- 4/9/97 OAQPS PAMS Status Report which shows that both Cape Elizabeth and Acadia National Park have been approved as Type 4 sites.

B10. Data Management

1. Auto GC Analysis – Cape Elizabeth/Cadillac Mountain

   A. Log Book

   The logbook at the PAMS site is set in an end bound book, which is 9 by 14 inches and has 500-lined pages. This logbook is updated each workday. Each day of monitoring is located on two consecutive pages. The two pages for each day holds the information for the A (A1203) column and the B (BP-1) column. The two pages have eight columns in which 24 rows are filled with information. Every row represents an hour. The column headers are:

   (1) DATE – day which sampling takes place, this entry is filled in just once a day for each page.

   (2) TIME ACQUIRED – the time which the sample is injected on to the head of the column, this is in Eastern Standard Time (EST), and corresponds to the sample being collected between five past and forty-five past that particular hour.

   (3) RAW DATA FILE – each hour has its own specific file name for each column, they are consecutive in numbering, these are the chromatograms which the GC generates.

   (4) CHANNEL A METHOD – this is the calibration file, which is used to process the raw chromatogram data generated from the A1203 column, it creates a result file from the raw file.

   (5) CHANNEL A COMMENTS – this column is for any information regarding the specific sample chromatogram for the A1203 column, e.g. reference chromatogram, status of QA of the chromatogram (OK or VOID), if peak lines up with the calibration peaks in the method file, etc.

   (6) CHANNEL B METHOD – this is the calibration file, which is used to process the raw chromatogram data generated from the BP-1 column. It creates a result file from the raw file.

   (7) CHANNEL B COMMENTS – this column us for any information regarding the specific sample chromatogram for the BP-1 column, e.g. reference chromatogram, status of QA of the chromatogram (OK or VOID), if peaks line up with the calibration peaks in the method file, etc.

(8) HIGHLIGHTS – this column is for information regarding the hour of data- it is a calibration, blank, audit, precision can run, VOID, etc.

At the bottom of the page there is a section for the weather for the day, and a section for general comments regarding the workings of the GC system for that day. If there are any VOIDs or any changes made to the system in that day, they are explained here, i.e., if the sample volume or the Dean's switch is changed, or if the computer malfunctions. Also, comments on the calibration and blank runs are documented here. See Figure 5/5A.

B. Backup of Data

The backup of data is done at least three times weekly using the Iomega zip drive at Cape Elizabeth or the Colorado Scheduler computer program at Acadia. At a minimum, the files modifies since the last backup is saved to disctape, some operators do a full TC4 data backup. All other files, for example, method files, result files, sequence files, and EXCEL files, should be backed up as soon as they are created. Sequence files and IDX files should also be backed up after the sequence is terminated. The total TC4 directory is backed up at least weekly. Each different type of backup has its own tape or disc backup stored on site and at least one is stored off site.

2. Data Processing

A. Software/Hardware

The computer software which accepts, QA's and puts the data into readable format id the 900 Interface and Turbochrom Navigator 4.0. Both are Perkin Elmer Co. products. Microsoft EXCEL and VOCDAT are used after the data is readable to put the data into different useable formats and to verify acceptability. The computer hardware that is used at this time is a Pentium 100, which has 16 MB RAM of memory and 1.2 GBytes of disk space. The monitor is an Ultra VGA high color. The printer is a laser printer with at least 2-MB memory installed.

B. Data File Designation

Data file designation is connected with the actual date that the **sequence** file was made. It is customary to begin a sequence every Monday and name it according to the date, for example, 718M. This would correspond to July 18th and the day of the week was Monday. Two files are generated for each hour. An "A" for the A1203 column and a "B" for the BP-1 column by default. Only four characters are allowed because the program tags on the individual **file name** three more characters starting

with 001 and continuing consecutively until the sequence is stopped. For example, the first file names for the first sample under the new sequence will be 718a001.raw for the "A" column and it will be 718a002.raw and 718b002.raw and so on.

The **method name** designation is also connected with the sequence file name. The method name is based on a specific calibration run. If a calibration is used in a method, which is run during the 718A sequence in 1997, the method for the "A" column would be A1297718.mth and method for the "B" column would be BP297718.mth.

C. Data Validation

The first step in data validation takes place in the Turbochrom software system. The process is as follows:

(1) Method File Creation – this is done before any daily data validation can take place. A calibration standard is run through the system and the peaks correctly identified and quantified using the Method Editor and Graphic Editor in Turbochrom.

(2) Reference Chromatogram – this chromatogram goes through the Graphic Editor with the most updated Method file. Usually the Reference Chromatogram is the first chromatogram to be QA'd. The Graphic Editor will determine if the peaks are not identified, another chromatogram is determined to be the reference Chromatogram. All other chromatograms which are to be QA'd at that time will be compared visually to this chromatogram. There should be a Reference chromatogram for at least every ten chromatograms for each day of QA.

(3) Compare Chromatograms – This is a visual comparison of the previous day's chromatograms. Using the Chromatogram Display in TURBOCHROM, a Reference chromatogram and the first portion of the previous day's chromatograms (approximately 5 at a time) are chosen. Each column, A1203 and BP-1, are treated separately. These chromatograms will appear on the screen. Any gross difference between chromatograms is noted on this notebook. Under the Window, the Overlay option, then the 3-D Preview with an elevation of 20 is chosen. Various times of the chromatograms are zoomed in on and any peak time discrepancies are notes in the logbook for that specific chromatogram. This may indicate a shift in the system and a new method file may need to be made, or sometimes an Audit can shift the system. Whatever it is, it is investigated. After these chromatograms are QA'd visually, the reference chromatogram is kept active, and the others are

deleted from the window. The next consecutive 5 or 6 chromatograms are brought in and treated the same. This process continues until the most recent chromatogram generated goes through this process.

(4) Reprocessing results – under the Batch ICON in the TURBOCHROM is where the data gets processed. The chromatograms are loaded into the processing by choosing the current sequence and the corresponding files are processed from Peak Detection through Report Generation. The Report Format is specific for the next step in validation, the GCSUM Program. After all of the files are batch processed, the data is verified in the Reprocessing section of the TURBOCHROM and adjustments are made here if necessary.

(5) GCSUM – The Report format made in TURBOCHROM needs to be very specific in order for GCSUM to work. It must include the following: Small System Header, Print Main Report Body, Identified Components, Unidentified Peaks, Missing Components, Create ASCII Delimited File, and Area Reject (to be determined). There are two different files generated by the processing of data, the ".rst and the .txo" files. The .rst file is specific for TURBOCHROM usage. The .txo file is an ASCII file and can be read by different programs, one being EXCEL. The .txo files are now loaded into the software program GCSUM. This creates an AQS file and a spreadsheet, which can be read into EXCEL.The spreadsheet is what is used at this time for quality control. The hours are along the top of the spreadsheet, and the compounds are listed down the left-hand side. This creates an easily readable spreadsheet. In reviewing the data in this manner, it is easy to pick out any anomalies, like missed identifications. If problems with the data are found here, the result file is brought up again in the Reprocessing portion of TURBOCHROM and adjusted. The final QA'd group of files is reintroduced into GCSUM and final AQS and CSV files are generated. Along with these files, GCSUM also generates an error file, which includes missing hours of data and null codes inserted into the AQS file.

(6) VOCDAT – the Report format made in TURBOCHROM needs to be very specific in order for VOCDAT to work. VOCDAT includes the file format needed to input VOCDAT files. Once the data is loaded into VOCDAT, quality assurance checks are completed on the data. VOCDAT functions such as Calculate stats, by looking at the data in time series and in scatter plot anomalies, are found and fixed.

D. Data Record

After all data validation is complete for a moth, all data generated for that specific month is stored in its own directory. The sequences are updated so that the files will go to the directory of choice. It is designated by YEAR and MONTH (97JULY). Therefore, the directory route for 1997 July can result data would be TC4\97JULY. There are also directories for calibrations, blanks, audits, voids, etc. These are separated from the ambient data.

E. Data Report

An important objective of data reporting is to get QA'd and complete version of the ambient data collected at the site into the Air Quality Subsystems (AQS) at the National Computer Center in North Carolina. This is accomplished in the following way: Once the GCSUM program generates a clean AQS File of the data, the file is sent to NCC via the File Transfer Program (FTP). It is then edited at NCC using the AQS system. Once the data reached Edit Level Three in AQS, the screening file is locked and ready for the next update to be put into the National Computer System. There are fifty-eight parameters reported for each hour. Fifty-five VOC ozone precursors, the total of the target compounds (PAMHC), the total of the unidentified compounds for that hour, and the total of all of the previous parameters are the reported parameters. The data will be stored in completeness on two or more backup tapes in the office, and the AQS and CSV files will also be stored on 3 1/2" disks at the respective office for the period of time which complies with the Statute of Limitations.

Group C – Assessment and Oversight

C1. Assessment and Response Actions

Review of the PAMS field monitoring activities is the responsibility of the PAMS project manager and the Lab/QA Manager. Each field site will be visited by one or both of these individuals each month during the 6 month monitoring program. During this time, an evaluation of the systems performance will be done (1) by reviewing the overall system performance with the site operator; (2) reviewing the system logbook for data entries and maintenance performed; (3) reviewing results and acceptance limits of QC checks, i.e. local, regional, national, to determine trends or inconsistencies that may indicate the development of potential problems; (4) reviewing current and post data processing on the system computer; (5) determine if there is needed equipment and/or software upgrading; (6) review need for equipment to be serviced by the manufacturer.

If during the evaluation a trend is noted that may be affecting the quality and quantification of the data, the site operator is to check for potential leaks, check flows, review system operating software programs, methods, and to perform a complete system performance check using theprimary calibration/retention time standard, VOC free air (blank), and the EPA QC standard. To verify this activity, if the site operator feels an outside performance check is needed, he/she is to contact EPA Region 1 for assistance and an onsite visit.

C2. Reports to Management

Oversight of the day to day activities of the continuous PAMS monitoring sites and the regional office lab is the responsibilities of the Lab/QA Manager. He reports directly to the PAMS project manager. He in turn reports to the director of the Field Services on the status of monitoring and analytical activities.

On a weekly basis, the Lac/QA manager will provide an updated status report to the project manager on the equipment operational status, results of inter/intra QC audits, internal QA assessments, project needs and supplies, system problems and their resolution, and assessment of data quality.

At the end of the monitoring season a year-end report will be produced and distributed by the Lab/QA manager evaluating the overall performance of the monitoring project, successes/failures and recommended improvements for the next monitoring season and an assessment of data quality.

The primary distribution list for the year-end report will be to the following:

Air – Field Services

- Division Director
- ES IV Project Manager
- Chemist III Lab Manager
- ES III PAMS Site Operators

Air – Technical Services

- Division Director
- Senior Meteorologist

US EPA Region 1

- EPA PAMS QA Officer

Group D – Data Validation and Usability

D1. Data Review, Validation and Verification Requirements

The Air Bureau has a number of procedures that are used for data review, validation or verification. These procedures may be equipment certification (Appendix E), or analysis of VOC data (Appendix D). Procedures used for data review, validation or verification are in Appendices D, E, F and L.

D2. Validation and Verification Methods

All PAMS data which has been determined to be defensible, reliable, accurate and validated based on the procedures stated in the QAPP is then entered into the AQS data system at NCC, North Carolina. Any future use of the data for individual or corporate project analysis will be via the AIRS data management system.

To support this, the following references, in this QAPP, provide a detailed account of the procedures and materials that the site operator is to follow and use. Appendix B – Reagents and Materials; Appendix C – Sampling System – Automated/Canister; Appendix D – Analytical System – which includes daily, weekly and monthly operational procedures; Appendix E – Canister and Sampler Cleaning – Certification Program; Appendix F – Quality Assurance – provides the quality assurance program to be followed involving precision sampling, national performance audit program, and method detection limit.

D3. Reconciliation with User Requirements

Data quality criteria have been established as part of the QAPP to ensure that the data is defensible, reliable and accurate, and provides the basis under which corrective action is to be implemented if needed.

As soon as possible after acquiring each daily set of data, calculations and determinations for precision completeness and accuracy will be made and any corrective action that needs to be taken may be implemented. If data quality indicators do not meet projected specifications, data may be voided and the cause will be evaluated. If the cause is found to be equipment failure, calibration or maintenance techniques, these will then be reassessed and improved. Any limitations on the data use will detailed in both interim and final reports and other documentation as needed.

If failure to meet project specifications is found to be unrelated to equipment methods or sampling error, specifications may be revised for the next sampling season. Revisions will be submitted to the EPA Quality Assurance Officer for approval.

To determine if the project objectives have been met, the measurement process will be evaluated by the site operator, QC Managers and the PAMS Project Manager. This is to include the measurement process as well as the representatives, comparability and completeness of the data that has been accumulated, validated and verified.

40 CFR Part 58 Appendix A

1. Selection of Method Analyzers

The selection of methods and analyzers used in this QAPP are in conformance with 40 CFR Part 58 and the PAMS Implementation Manual EPA-454/B-93-051 plus additional appendixes issues in 1994 and 1995.

The method used in this initiative are outlined in Sections 4,5 and 6 of Maine's QAPP for PAMS.

The analysis of photochemical compounds requires the use of an Auto GC and sample concentrator. The PAMS sites at Cape Elizabeth and Cadillac Mountain are each equipped with a Perkin Elmer Auto GC/ATD 400 Sample Concentrator with associated interface equipment, TURBOCHROME software and a computer data acquisition system.

2. Training

Instrument specific training, i.e. Perkin Elmer, will be provided to site equipment operators by factory trained service engineers at the time of equipment installation. This will include all aspects of the analytical hardware and system software. On an as needed basis, additional vendor offered training program may be offered to equipment operators to enhance their proficiency.

3. Installation of Equipment

Factory trained service engineers will be responsible for the installation and operational startup of the analytical systems. This will ensure that if any technical problems occur, they may be addressed before the hand over and responsibility of the equipment to the State takes place.

4. Selection and Control of Calibration Standards

- Calibration/Retention Time Standard

The primary Calibration/Retention Time Standard is a 56 compound target analyte standard of varying concentrations from 20-50 ppbC. Propane and Benzene are the only two components whose concentrations have been certified and are NIST traceable. They are used for developing the calibration response factors. All other analytes are quantified

against the relative response of either propane (Plot Col) or benzene (BPI Col.). In addition to this:

(1) This standard is humidified and is used during the initial setup of the GC/FID system to optimize critical peak separation parameters and determine individual retention timed for each of the target compounds.

(2) The response of the GC/FID to selected hydrocarbons in this standard can be used to monitor FOD performance and determine when recalibration of the FID using the Calibration/Retention Time Standard is necessary.

A new certified Calibration/Retention Time Standard is supplied to us at the beginning of each PAMS monitoring season by the US EPA Atmospheric Research and Exposure Assessment Lab, RTP, NC.

- QC Standard

A certified multi component variable concentration QC standard is made available to us each yeah from the US Region 1 Lab, Chelmsford, MA for the purpose of:

(1) Setting the minimum area reject level under TURBOCHROM Report Format at 0.1 ppbC level. This is done by taking the area counts of the designated 1 ppbC compounds in the QC standard and dividing by 10;

(2) verify calibration curve stability;

(3) verify compound retention times; and

(4) verify peak quantitation.

- VOC Free Air

This is used as an analytical system background performance check.

5. Calibration

- Pre-Season Evaluation – Startup

This may be found in Appendix D in the Maine's QAPP for Photochemical Assessment Monitoring Station, November 1996.

- Weekly – New Sequence

(1) Frequency

(a) Monday of each week – May, June, July, August, September

(b) To be initiated at the hours of either 9-10-11-12-1 EST. Conducting this calibration earlier conflicts with gathering ambient data when early morning concentrations of VOC are historically at their highest.

(c) If an ozone event is occurring or is predicted to occur on that day, delay the weekly calibration until the event is over.

(2) Purpose

Each week, a method with an updated calibration file will be established that will be applicable to that week's data set. The only component of the base method that will be changed is updating the detector response factors and retention times for each of the target compounds in the calibration table of the method.

(3) Equipment

(a) PAMS Calibration/Retention Time Standard – Humidified

(b) VOC – Free Air – Humidified

(c) Log book

(4) Concentration Sequence

- CAL/RT
- VOC FREE AIR
- VOC FREE AIR

(5) Gas Chromatograph

The GC will be in its normal sampling mode and test atmospheres will be introduced into the calibration port of the ATD 400 sample concentrator.

(6) Test Atmosphere Procedure

(a) Five to ten minutes prior to the Sample Collection cycle, introduce the humidified PAMS VOC Calibration/Retention Time Standard to the ATD 400 sample concentrator. Set delivery pressure at the regulator to 20 PSIG.

Note: *This pre-sample purge of the sample condition system will allow it to equilibrate to the new gas.*

(b) Allow the system to sample the PAMS Calibration/Retention Time Standard for 40 minutes at the normal sampling rate of 15.0 cc/min (a front panel display value of 13 on the mass flow controller is equal to 12 cc/min) for a total sample volume of 600 cc.

(c) At the end of one (1) analytical run for the Calibration/Retention Time Standard, switch to the VOC Free-Air humidified and introduce the sir 5 to 10 minutes prior to the sample collection cycle. Allow the ATD 400 to sample the VOC Free air as in 6(b) above for one sample run prior to returning to ambient.

(d) At the end of the three (3) analytical runs for the combined Calibration/Retention Time Standard, VOC Free Air using TURBOCHROM software, evaluate the zero chromatogram for background contamination and each Calibration/Retention Time Standard chromatogram for peak symmetry, separation resolution, area counts, and Retention Times using the most recent system calibration data set.

(3) Equipment

(a) PAMS Calibration/Retention Time Standard – Humidified

(b) VOC – Free Air –Humidified

(c) Log book

(4) Concentration Sequence

- CAL/RT
- VOC FREE AIR
- VOC FREE AIR

(5) Gas Chromatograph

GC will be in its normal sampling mode and test atmospheres will be introduced into the calibration port of the ATD 400 sample concentrator.

(6) Test Atmosphere Procedure

(a) Five to ten minutes prior to the Sample Collection cycle, introduce the humidified PAMS VOC Calibration/Retention Time Standard to the ATD 400 sample concentrator. Set delivery pressure at the regulator to 20 PSIG.

Note: *This pre-sample purge of the sample condition system will allow it to equilibrate to the new gas*

(b) Allow the system to sample PAMS Calibration/Retention Time Standard for 40 minutes at the normal sampling rate of 15.0 cc/min (a front panel display value of 13 on the mass flow controller is equal to 15 cc/min) for a total sample volume of 600 cc.

(c) At the end of one (1) analytical run for the Calibration/Retention Time Standard, switch to the VOC Free-Air and introduce the air 5 to 10 minutes prior to the sample collection cycle. Allow the ATD 400 to sample the VOC Free air as in 6(b) above for one sample run prior to returning to ambient.

(d) At the end of three (3) analytical runs for the combined Calibration/Retention Time Standard, VOC Free Air using TURBOCHROM software, evaluate the zero chromatogram for background contamination and each Calibration/Retention Time Standard chromatogram for peak symmetry, separation resolution , area counts, and Retention Times using the most recent system calibration data set.

(e) If the observed chromatograms are satisfactory based on historical system performance, proceed with updating the response factors and retention times in the calibration table of the weekly method.

(f) Of the two Calibration/Retention Time Standards files, select the most representative, preferable the 2nd, and incorporate this data set into the "weekly method" calibration data table with the updated retention times and detector response factors for each target compound using TURBOCHROM.

(g) Note all files and work in logbook.

6. Zero/Span Checks and Adjustment of Automated Analyzers

For the continuous ambient monitors procedures and data, forms may be found in Maine's QAPP for SLAM, NAMS, SPM and PMS Networks for Ambient Measurement Systems. This may be found on file with the Bureau QA Manager.

7. Control Checks and Adjustment of Automated Analyzers

- Weekly – Method Check

(1) Frequency

(a) Thursday of each week – May, June, July, August, September

(b) To be initiated at the hours either 10 or 11 or 12 EST. Conducting this calibration earlier conflicts with gathering ambient data when early morning concentrations of VOC are historically at their highest.

(c) If an ozone event is occurring or is predicted to occur on that day, delay the weekly calibration until the event is over.

(2) Purpose

To verify the weekly method mulitipoint calibration.

(3) Equipment

(a) PAMS Calibration/Retention Time Standard

(b) Log book

(4) Concentration Sequence

- CAL/RT
- VOC FREE AIR
- VOC FREE AIR

(5) Gas Chromatograph

GC will be in its normal sampling mode and test atmospheres will be introduced into the calibration port of the ATD 400-sample concentrator.

(6) Test Atmosphere Procedure

(a) Five to ten minutes prior to the Sample Collection cycle, introduce the humidified PAMS VOC Calibration/Retention Time Standard to the ATD 400-sample concentrator. Set delivery pressure at the regulator to 20 PSIG.

Note: *This pre-sample purge of the sample condition system will allow it equilibrate to the new gas.*

(b) Allow the system to sample PAMS Calibration/Retention Time Standard for 40 minutes at the normal sampling rate of 15.0 cc/min (a front panel display value of 13 on the mass flow controller is equal to 15 cc/min) for a total sample volume of 600 cc.

(c) At the end of one (1) analytical run for the Calibration/Retention Time Standard, switch to the VOC Free-Air and introduce the air 5 to 10 minutes prior to the sample collection cycle. Allow the ATD 400 to sample the VOC Free air as in 6(b) above for one sample run prior to returning to ambient.

(d) At the end of three (3) analytical runs for the combined Calibration/Retention Time Standard, VOC Free Air using TURBOCHROM software, evaluate the zero chromatogram for background contamination and each Calibration/Retention Time Standard chromatogram for peak symmetry, separation resolution , area counts, and Retention Times using the most recent system calibration data set.

ACCEPTABILITY LIMITS	
ZERO	< 20 ppbC TNMOC
CALIBRATION/RETENTION	Each of the target VOC's are within $\pm$ 10% of the certified concentrations
	RSD is $\leq \pm$ 30% between the accumulated concentrations for each of the target compounds
REF. PEAKS	All have been positively identified and are within the time windows specified.

(e) Using the Summary Routine in TURBOCHROM, assemble the individual calibration result files (A & B channel) as they are accumulated each week for the current month. (Summary is set up to do RSD on individual target compound concentration as (PPBC). Upon completion of the sequence, print the summary report. Review the data for any outliers that are not consistent with the overall accumulated data sets. Delete those that are not consistent and recalculate % RSD. RSD should be between $\leq \pm$ 30% between target compound concentrations.

(f) if the results of the Routine Weekly Checks **DO NOT** meet the acceptability limits, perform monthly calibration sequence.

Update the monthly methods with the new retention time and response factors.

(g) If the results of the zero and Calibration/Retention Time Standard check are satisfactory, return the system to ambient sampling.

- Accuracy – Performance Audit

Detailed in Appendix F in Maine's QAPP for Photochemical Assessment Monitoring Station.

- EPA QC Standard

This multi-component/variable concentration standard that is made available from the US EPA Region 1 lab for the purpose of"

(1) Setting the minimum are subject level under TURBOCHROM Report Format at 0.1 ppbC level. This is done by taking the area counts of the designated 1 ppbC compounds in the QC standard and dividing by 10;

(2) Verify calibration curve stability;

(3) Compound retention times;

(4) Peak quantitation.

(1) Procedure

(a) Frequency: when weekly calibration is done on first Monday of each month.

(b) Standard Sequence: QC standard as part of weekly calibration sequence.

- Calibration/Retention Time Standard
- VOC Free Air
- QC Standard Air
- QC Standard (EPA)
- VOC Free Air

(c) Introduce the standards through the calibration port of the ATD 400.

(d) Upon completion of this test sequence, verify that the Channel A and B chromatographs are acceptable (peak symmetry, separation, resolution and area counts). Perform peak identification and

quantification for each channel against current calibration curve. Print a report.

(e) Carefully review each analysis report. Then select one that best represents the system performance.

Note: *Isobutane will determine the minimum area reject level for Channel A. (PLOT) Octane will determine the minimum area reject level for Channel B (BPI).*

(f) Divide respective area counts to **10** and enter this value into the Report Format of TURBOCHROM as the minimum area reject level for peak identifications and quantification.

(g) When evaluating the monthly check values against the current program value (area reject level) being used in the report Form Format, if these values differ by more than ± 10%, replace old values with new values.

(h) Carefully review analysis report for calibration curve stability, compound retention time and peak identification and quantification. Compare values with certificate of analysis.

(i) If corrective action is warranted based on unsatisfactory results, determine cause for error, make necessary adjustment, and if necessary, depending on corrective action, recalibrate the system.

- EPA Round Robin Sample

This "check sample" is supplies by the US EPA Region 1 Lab, Chelmsford, MA. It is an actual ambient air sample taken at a location within the Boston Metropolitan area that represents an air mass that is primarily impacted by vehicular emissions.

This single sample is initially analyzed by the EPA Region 1 lab and is then sent to each of the PAMS sites within Region 1. After all agencies have analyzed the sample and submitted their test results to EPA, a composite test report is generated and sent back to the representative states for evaluation.

(a) This is a one-time test and is conducted sometime during the monitoring season.

(b) Sample introduction is to through the sample port.

(c) One but no more than three sample runs of the standard (due to pressure and volume limitations of the "check sample") are to be made.

(d) A final zero check is to be run to ensure that the analytical system meets the background criteria. This may require several runs to ensure that the system has been flushed out and any "sticky: compounds have been eliminated or reduced to acceptable levels.

(e) Upon completion of this test sequence, verify that the Channel A and B chromatograms are acceptable (peak, symmetry, separation, resolution and area counts). Perform peak identification and quantification for each channel against current channel calibration curve. Print a report.

(f) Carefully review each analysis report. Then select one that best represents the system performance.

(g) Send completed data report to EPA Region 1 or to designated data coordinator for this project.

8. Control Limits for Zero Span

For continuous ambient monitors, detailed procedures and data forms may be found in Maine's QAPP for SLAM, NAMS, SPM, and PMS Networks for Ambient Measurement Systems.

9. Calibration and Zero/Span Checks for Multiple Range Analyzers

For continuous ambient monitors, detailed procedures and data forms may be found in Maine's QAPP for SLAM, NAMS, SPM, and PMS Networks for Ambient Measurement Systems.

10. Preventative and Remedial Maintenance

(A) Pre-season

- GC/Sample Concentrator – Perkin Elmer ATD 400/Auto GC

(1) Clean equipment cooling fan and dust filters.

(2) Check circuit boards for dust. Level up and, if needed blow or brush clean.

(3) Check Teflon filter discs in cold trap. If gray or black in color, replace.

(4) Verify mass flow controller sample flow rate.

(5) Replace inline sintered stainless steel filter in sample line.

(6) Check all gas flows for correct settings.

(7) Check, clean, replace parts as needed on Flame Ionization Detector.

- Zero Air Generator

(1) After 12 months of continuous operation, replace the two pre-filter, Grade DX and Grade BX, located on the rear of the unit.

(2) After 24 months of continuous operation, replace this single final filter Grade GS located on the rear of the unit.

- Inline Gas Purifiers

(1) Replace any indicating gas purifiers whose color change indicates a reduced capacity.

11. Recording and Validating Data

Description of activities may be found in Group D of the PAMS QAPP.

12. Data Quality Assessment – Precision Accuracy

- Precision

On an every-6th-day sampling schedule, a one-hour ambient sample is collected in an evacuated and cleaned 6 liter SUMMA polished canister. This is taken concurrently with the auto GC for comparative purposed on data analysis.

Upon completion of the one-hour sample period, and prior to the canister from Cape Elizabeth or Acadia National Park being shipped to the US EPA regional lab, the site operator will analyze this sample a single time.

When the site operator receives the official EPA precision sample analysis report, the two data sets are entered into an EXCEL spreadsheet for comparative purposes. If acceptance criteria for any peak is not met for more than one consecutive run (peak ID or quantitation), then corrective action is taken to investigate the cause and adjustments made to the system calibration curve. This may be in the form of re-calibrating the GC or re-identifying a misidentified peak. Acceptance criteria are listed below.

Table 1 EPA Acceptance Criteria for PAMS QA Precision Cans		
Cor. Action:	#1	if EPA > 1.0, State should be > .5 (if not, it is false negative) if EPA is < .5, State should be < 1.0 (if not, is false positive)
	#2	if compound is reported to be < 5.0, must be $\pm$ 30%
Warning Level:	#1	if EPA is > 3.0 and < 5.0, must be $\pm$ 50%
	#2	if EPA > 1.0 and < 3.0, must be $\pm$ 75%

- Accuracy

  Performance audits are conducted 3 times during the course of the monitoring season. Upon receipt of the certified audit results, an evaluation of the data set is made for peak identification, and how well the analytical system met the acceptance criteria.

  If acceptance criteria are not met, then an evaluation of the system performance is made using support services from the US EPA Region 1 lab in the way of additional gas standards to verify system performance and corrective action, i.e. re-calibration.

13. Documentation of Quality Control Information

Precision and accuracy data reports will be compiled and bound in a data summary notebook for each monitoring season. This data will also be part of the weekly reports to management.