QUALITY ASSURANCE PROJECT PLAN (QAPjP) and QA Report for Pacific 2001

Prepared by: Robert McLaren
Date: June 22, 2001

Table of Contents

1. **Principal Investigator**
   Robert McLaren (Associate Prof)
   Center for Atmospheric Chemistry
   York University
   4700 Keele St,
   Toronto, Ontario M3J 1P3

2. **Team Members**
   Heng Yao

3. **Measurement Program**
   SPME/GC-MS measurements of gaseous monoterpenes and oxygenated hydrocarbons.

4. **Measurement Species and Units**
   Gas: VOC's in ppbv

5. **Representative Size Range (if PM)**
   N/A

6. **Measurement Platform (surface, airborne)**
   Teflon Line – sampled from manifold on site.

7. **Measurement Sites (surface only)**
   Sumas Mountain

8. **Measurement Objective(s)**
9. **Measurement Details**
   - **9.1. Field Measurements**
     - **9.1.1. Measurement Principle**
       Sampling by non-equilibrium solid phase microextraction (SPME) in constant temperature air stream. Fibers analyzed by GC/MS in SIM.
     - **9.1.2. Instrumentation (Manufacturer/Model)**
       Carboxen/PDMS fibers (Supelco)
       HP5890 II/ 5972 MSD
     - **9.1.3. Flow System**
       Flow through on site manifold will be sampled through short length teflon tubing at ca. 1 L/min through constant temperature bath. Air passes through custom flow cell that maintains face velocity > 30cm/sec at point where fiber sampling is done.
     - **9.1.4. Inlet Height Above Ground (if surface)**
       Height of on site manifold, to be determined.

9.1.5. Nominal Flow Rate
1 L/min.

9.1.6. Flow Measurement/Control
Flow is not critical since this is not a complete capture method.

9.1.7. Flow Temperature and Pressure
25 degrees C and 1 atmosphere

9.1.8. Sampling Times/Period/Frequency
~ Either 1 or 2, ½ hour integrated samples, will be taken per day under routine conditions. Times to be determined, likely a day and evening sample.

9.1.9. Sampling Methods
Solid Phase Microextraction

9.1.10. Filter Type/Coating Type/Reagent Type
Carboxen/PDMS fiber (85 m thick film)

9.1.11. Planned Changes to Instruments or Methods During Study

9.2. Laboratory Measurements (If Applicable)
9.2.1. Laboratory Name and Address
Robert McLaren's laboratory, Dept of Chemistry, York University.

9.2.2. Analytical Method(s)

9.2.3. Sample Extraction or Work-up

9.2.4. Analytical Detection Limits
~10 ppt detection limits for a-pinene and b-pinene.

10. Quality Assurance/Quality Control
10.1. Field Quality Assurance/Quality Control
10.1.1. Traceability
Calibrations for VOC's are traced to standard pure liquid samples of the VOC's that are used to generate dynamic gas samples in situ, sampled in identical manner on site to the real samples.

10.1.2. Calibration
Calibration system uses Harvard Syringe pump to deliver small volumes of pure liquid mixtures into an air stream. The air stream is diluted with zero air flowing through mass flow controllers at fixed rates (double dilution). Air stream is also humidified to humidity of air sampled on that day +/- 10%. In the field, 2 point calibration per day is performed.

10.1.3. Zeros and spans

10.1.4. Blanks
Fiber blanks are a routine part of the analysis to assess the fiber cleanliness.

10.1.5. Field Quality Control procedures
Custom QC procedures for the method are used.

10.1.6. Precision determination
Precision to be determined using replicate analyses of dynamically generated standard gas mixture of the monoterpenes, ~ 2ppbv.

10.1.7. Comparison with other measurements
no comparison will be possible to our knowledge.

10.1.8. Inspections and Audits
Not planned

10.2. Laboratory Quality Assurance/Quality Control

10.2.1. Traceability

10.2.2. Calibration procedures

10.2.3. Blanks

10.2.4. Other lab QC

10.2.5. Precision determination

10.2.6. Comparison with other methods

10.2.7. Audits

11. Data Management and Quality Control

11.1. Raw Data Recording
flow control is monitored manuallly by. Flow is not critical for this type of sampling since method is diffusion controlled.

11.2. Final Data Reporting
½ hour integrated sample.

11.3. Data Quality Control and Validation
All reported data will be flagged as valid or invalid. Flows will be checked, all instrumental parameters must be functioning normally, data

will be blank corrected if necessary using blank determined that day, species will be identified by retention time and multiple selected ions.

11.4. Validity Flags

VO, V1

11.5. Below Method Detection Limit Values

MDL will be identified using standard analytical definition, 3 sigma of blank/slope. Standard deviation of blank is determined by integrating appropriate sections of chromatogram baseline for blank samples multiple times an for multiple samples. Values below detection limits will be reported as less than the detection limit, e.g., < 10 ppt.

11.6. Derived Parameters

11.7. Explanation of Zero or Negative Data

12. Data Quality Objectives (Pre-Study)

12.1. Accuracy

The accuracy objective is +/- 30% for each individual monoterpene when it is above the limit of quantification (3.3 x detection limit.)

12.2. Precision

The precision objective is +/- 10% for each individual carbonyl species when it is above the limit of quantification. This will be determined in advance using dynamic gas standards.

12.3. Comparability

12.4. Representativeness

Depending on conditions, the measurements at this Sumas site can be representative of processed urban air masses with influence from primary and secondary biogenic sources. The measurements can also be representative of direct biogenic emissions as the site is in the heart of a mixed forest on Sumas forest at 300m elevation. Daytime measurements will likely be representive of the boundary layer, while nightime measurements will likely be decoupled from the velley floor due to the elevation of this site (300m asl).

12.5. Completeness

Carbonyl completeness objective = 80%, where 100% = 2 valid samples per day.

12.6. Other Quality Information

End of Pre-Study QAPjP

Start of Post-Study QA Report

13. Significant Changes to Site, Instruments or Methods During Study

14. Post-study Data Quality Indicators (DQIs)

    14.1.1. Accuracy

    14.1.2. Precision

    14.1.3. Comparability

    14.1.4. Representativeness

    14.1.5. Completeness

    14.2. Blank correction (describe whether done and method used):

    14.3. Other Quality Information

15. References: