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

Prepared by: Pierrette Blanchard

Date:

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1. **Principal Investigator**
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2. **Team Members**
   Patricia Brazal, Meteorological Service of Canada, 4905 Dufferin Street, Toronto, Ontario, M3H 5T4

3. **Measurement Program**
   Hivol measurements of acids, di-acids in $PM_{2.5}$

4. **Measurement Species and Units**
   Hivol acids and di-acids ng m^{-3} at 0oC and 1 atm.

5. **Representative Size Range (if PM)**
   Hivol <2.5 um

6. **Measurement Platform (surface, airborne)**
   ground on platform

7. **Measurement Sites (surface only)**
   Hivol: Slocan Park, Langley, sumas Mountain, Cassiar Tunnel

8. **Measurement Objective(s)**
   Hivol: to measure acids and di-acids concentrations in PM2.5 in a suburban location

9. **Measurement Details**
   - **9.1. Field Measurements**
     - **9.1.1. Measurement Principle**
       Filter collection using a Hi-volume sampler
     - **9.1.2. Instrumentation (Manufacturer/Model)**
       Hivol sampler: General Metal Works Model 2000H.
     - **9.1.3. Flow System**
       Hivol system: The flow inlet is nominally 40 cfm and changes as the filter loading increases (not expected to be an issue in this study) the motor outlet is connected to a 20 feet hose that exhausts downwind of the sampler.
     - **9.1.4. Inlet Height Above Ground (if surface)**
       Hivol: 2 m above ground level on top of platform.

9.1.5. Nominal Flow Rate
40 cfm

9.1.6. Flow Measurement/Control
Flow rate is recorded on a Dickson Model 3-B-L Circular chart recorder, chart no 106.

9.1.7. Flow Temperature and Pressure
Ambient temperature and pressure.

9.1.8. Sampling Times/Period/Frequency
Hivol: Samples will be collected twice daily: morning (between 8 and 10) and night (between 6 and 8).

9.1.9. Sampling Methods
See attached SOP.

9.1.10. Filter Type/Coating Type/Reagent Type
Quartz Filters

9.1.11. Planned Changes to Instruments or Methods During Study
None

9.2. Laboratory Measurements (If Applicable)

9.2.1. Laboratory Name and Address
Meteorological Service of Canada
4905 Dufferin Street
Room 1I121, Downsview, Ontario, M3H 5T4

9.2.2. Analytical Method(s)

Hivol filters	Acids	GC/MSD

9.2.3. Sample Extraction or Work-up

Hivol Filters	Acids	solvent extraction

9.2.4. Analytical Detection Limits
Analytical Detection Limit
Acids: 0.1 ng/µL, 3σ of blank derivatization.

10. Quality Assurance/Quality Control

10.1. Field Quality Assurance/Quality Control

10.1.1. Traceability
N/A

10.1.2. Calibration
Flow recorder is calibrated using a Kruz Model 330C Type U.O. Adjustable orifice calibrator.

10.1.3. Zeros and spans
N/A

10.1.4. Blanks
Field blank to be collected once per week as per SOP.

10.1.5. Field Quality Control procedures
A descriptive SOP has been produced which will help in preventing contamination of the filter samples.

10.1.6. Precision determination
Several hivols will be running simultaneously.

10.1.7. Comparison with other measurements

10.1.8. Inspections and Audits

10.2. Laboratory Quality Assurance/Quality Control

10.2.1. Traceability
No SRMs available.

10.2.2. Calibration procedures
Five calibration standards (0.15 to 3.5 ng/µL) are used for complete calibration bi-weekly. One standard injection twice per week. Standards from Polyscience…

10.2.3. Blanks
Unused filter blanks done with each extraction. Reagent blanks done with each calibration curve.

10.2.4. Other lab QC
Matrix spike recoveries will be done before the start of the analyses.

10.2.5. Precision determination
Analytical precision is ± 10% RSD of duplicate samples analyses.

10.2.6. Comparison with other methods
Dicarboxylic acids will be analyzed by two other groups. York University (Rudolph) will use esterification and ETC-Ottawa (Dabek) will use capillary electrophoresis.

10.2.7. Audits
No.

11. Data Management and Quality Control

11.1. Raw Data Recording
Hivol flow recorded at beginning and end of sampling periods, chart recorder used for backup.

11.2. Final Data Reporting
About twelve hour integrated. Samples taken twice per day.

11.3. Data Quality Control and Validation
All data flagged as V or I. For flow data, any data outside of 10% will be investigated.

11.4. Validity Flags
NARSTO flags will be adopted.

11.5. Below Method Detection Limit Values
ng/µL, average of blank filters + 3σ.
Below MDL values retained and V1 flag.

11.6. Derived Parameters
N/A

11.7. Explanation of Zero or Negative Data
N/A

12. Data Quality Objectives (Pre-Study)

12.1. Accuracy
Based on surrogate and matrix recoveries, accuracy is expected between 60-120%.

12.2. Precision
Analytical precision will be 20-40% RSD of replicate (10) extractions/derivatizations/injections.

12.3. Comparability
Given the experimental nature of the determinations, a percent comparability will result from the study but has not been determined before.

12.4. Representativeness
- The measurements at the Cassiar Tunnel will be representative of the emission from light duty traffic.

- The measurements at the Golden Ears Park will be representative of the conditions under which biogenic emissions are dominant and the biogenic particles are generated with limited anthropogenic pollutants.
- The measurements at the Slocan Park site will be representative of the typical urban/suburban pollution mix that is not processed photochemically.
- The measurements at the Langley site will be representative of processed air pollution in which secondary pollutants, such as ozone and secondary particulate matter, will have formed.
- The measurements at the Sumas Mountain site will be representative of processed air pollution with significant influence from biogenic and ammonia sources. They will also be representative of the free boundary layer air and thus representative of the processes affecting the evolution of pollutants throughout the diurnal cycle. They will also capture the visibility reduction at the eastern end of the Lower Fraser Valley

12.5. Completeness

Overall completeness is expected to be >80%.

12.6. Other Quality Information

Organic compounds in aerosols measurements are heavily dependent on adherence to a strict protocol (SOP) for handling the filter samples. Unexpected conditions during the study might impair this SOP and result in large blanks or contaminated samples.

End of Pre-Study QAPjP