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

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2. **Team Members**
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3. **Measurement Program**
   Hivol measurements of long chain ketones, n-alkanes and fatty acids.

4. **Measurement Species and Units**
   Ketones, n-alkanes and fatty acids in PM, pg m^{-3} at room temperature and normal atmosphere pressure

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

6. **Measurement Platform (surface, airborne)**
   Hivol: 2m above ground level

7. **Measurement Sites (surface only)**
   Slocan Park, Langley, Sumas Mountain, Cassiar Tunnel, Golden Ears Park

8. **Measurement Objective(s)**
   Hivol: to analyzing selected organic species concentrations and distribution patterns in PM 2.5 and Coarse aerosols collected from different sources and may find some source identifications.

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 of the hivol is nominally 40 cfm and changes (somewhat) as the filter loading increases. 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. Flow rate is recorded on a Dickson Model 3-B-L Circular chart recorder , Chart no 106.

9.1.6. Flow Measurement/Control
Pressure drop across filter and converted to flow rate

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
ROME Lab, 4905 Dufferin Street, Toronto, Ontario M3H 5T4

9.2.2. Analytical Method(s)
ketones: GC/FID and GC/MS
n-alkanes: GC/FID and GC/MS
fatty acids: GC/MS

9.2.3. Sample Extraction or Work-up
Hivol filters: solvent extraction

9.2.4. Analytical Detection Limits
GC/FID detection limit for ketones: <1 ng
GC/FID detection limit for n-alkanes: ~0.5 ng
GC/MS detection limits for fatty acids: 10 to 40 ng

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
N/A

10.1.8. Inspections and Audits
N/A

10.2. Laboratory Quality Assurance/Quality Control
10.2.1. Traceability
No reference materials 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
Analyzing the samples blanks and solvent blank to control analysis procedures. Using the external and internal standard compounds to control the quantitative procedures.
Matrix spike recoveries will be done before the start of the analyses.

10.2.5. Precision determination
Analytical precision is ± 5% RSD of multiple standard analyses.

10.2.6. Comparison with other methods
None

10.2.7. Audits
None

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
Will follow NARSTO flags

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
20% at the analytical detection limit on the basis of method recovery tests

12.2. Precision
10% at the analytical detection limit based on multiple standard analyses

12.3. Comparability
Compounds are verified with NIST pure chemical compounds

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

A >90% completeness in the sampling and >80% in analysis are expected.

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: