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

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1. **Principal Investigator**
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2. **Team Members**
   Marie Rosati, Technician
   Julia Jia, Graduate Student

3. **Measurement Program**
   PM_{10} measurements of PAH, nitro-PAH and oxy-PAH

4. **Measurement Species and Units**
   PAH, nitro-PAH and oxy-PAH in ng/m^3 and pg/m^3

5. **Representative Size Range (if PM)**
   Hi-vol: <10 µm (PM_{10})

6. **Measurement Platform (surface, airborne)**
   Hi-vol: 1.5 m above ground level; standard sampler

7. **Measurement Sites (surface only)**
   Hi-vol: Slocan, Langley and Sumas.

8. **Measurement Objective(s)**
   Hi-vol: To measure a range of PAH, selected nitro-PAH and selected oxy-PAH at all three sampling sites using a diurnal sampling approach. One purpose is to determine whether 2-nitrofluoranthene concentrations change during the day as would be predicted due the photochemical formation of this compound from fluoranthene in urban atmospheres.

9. **Measurement Details**
   9.1. Field Measurements
   9.1.1. Measurement Principle
   Atmospheric particulate material <10µm or <2.5 µm in diameter collected using a size selective sampling head fitted to a high volume sampler.

   9.1.2. Instrumentation (Manufacturer/Model)
   Anderson PM_{10} samplers will be used along with Pallflex Teflon-coated glass fibre filters.

9.1.3. Flow System
Each sampler is equipped with its own flow controller that will be checked periodically and recalibrated on a regular basis to a flow volume of 40 ft^3/min.

9.1.4. Inlet Height Above Ground (if surface)
Hi-vol: Sampler located at ground level with inlet about 1.3 m above the ground.

9.1.5. Nominal Flow Rate
40 ft^3/min. or 1680 m^3/24h or 70 m^3/h

9.1.6. Flow Measurement/Control
Mass flow controller

9.1.7. Flow Temperature and Pressure
Ambient temperature and pressure; no measurement device in sampler.

9.1.8. Sampling Times/Period/Frequency
Two samples to be collected each day; one in the day and one at night. It is probable that these collections will be 12 h samples.

9.1.9. Sampling Methods

9.1.10. Filter Type/Coating Type/Reagent Type
Pallflex Teflon-coated glass fibre filters (8 x 10 in).

9.1.11. Planned Changes to Instruments or Methods During Study
No changes planned or foreseen.

9.2. Laboratory Measurements (If Applicable)
PAH and PAH derivatives will be determined by extraction and GC-MS analysis of the extracts.

9.2.1. Laboratory Name and Address
Brian McCarry's research laboratory at McMaster University.

9.2.2. Analytical Method(s)
Hi-vol:	PAH	GC-MS (EI^+)
	Nitro-PAH	GC-MS (NICI)
	Oxy-PAH	GC-MS (NICI)

9.2.3. Sample Extraction or Work-up
Hi-vol: PAH, nitro-PAH, oxy-PAH solvent extraction (DCM, 24h, Soxhlet)

9.2.4. Analytical Detection Limits

PAH: 0.1-1.5 pg/m^3
Nitro-PAH, oxy-PAH: 0.05-0.5 pg/m^3

10. Quality Assurance/Quality Control

10.1. Field Quality Assurance/Quality Control

10.1.1. Traceability

Flow rate measurements and adjustments will be made on a weekly basis or as needed.

10.1.2. Calibration

Flow rate measurements and adjustments will be made on a weekly basis or as needed and will be recorded.

10.1.3. Zeros and spans

N/A

10.1.4. Blanks

Field blanks will collected at least once per week at each sampling site as per S.O.P.

10.1.5. Field Quality Control procedures

10.1.6. Precision determination

Adjustments of the flow controllers are usually rather small once the samplers have been calibrated and drift from the predetermined values tend to be small except in the event of a motor failure. Otherwise, precision is good.

10.1.7. Comparison with other measurements

The particulate loadings will be determined from the real-time particulate monitoring data at each site. Many other measurements will also be made at each site that will be integrated into the data analysis.

10.1.8. Inspections and Audits

Staff on-site will manage these aspects.

10.2. Laboratory Quality Assurance/Quality Control

10.2.1. Traceability

All samples are uniquely labeled.

10.2.2. Calibration procedures

PAH standard contains 50 PAH and PAH derivatives; nitro-PAH standard contains 15 nitro-PAH and dinitro-PAH while oxy-PAH standard contains

10 oxy-PAH. We perform chromatographic performance checks each day and detection limit determinations routinely.

10.2.3. Blanks

Blanks are processed and cleaned up using exactly the same procedures as the regular samples. Blanks are interspersed among the real samples in the extraction, clean-up and analysis methods.

10.2.4. Other lab QC

We routinely analyze NIST SRM 1649 (Urban Dust) as one of the samples in the mix and compare our data with reference values from NIST.

10.2.5. Precision determination

We routinely analyze NIST SRM 1649 (Urban Dust) as one of the samples in the mix and compare our data with reference values from NIST.

10.2.6. Comparison with other methods

The NIST SRM samples were analyzed by methods slightly different from our methods; we have shown our procedures routinely give high quality data compared to the reference values.

10.2.7. Audits

N/A

11. Data Management and Quality Control

11.1. Raw Data Recording

GC-MS analytical data is recorded in the selected ion monitoring mode in either the EI^+ mode for PAH or the NICI mode for nitro-PAH and oxy-PAH. Five internal standards are added to each sample prior to analysis for quantitation purposes.

11.2. Final Data Reporting

Data will reported in ng/m^3 for PAH and in pg/m^3 for nitro-PAH and oxy-PAH.

11.3. Data Quality Control and Validation

The combination of NIST SRM analyses and routine calibration curve determinations with standards of known concentrations will serve to provide adequate quality control on the data.

11.4. Validity Flags

The validity flags listed in the Data Management Guide will be used where appropriate.

11.5. Below Method Detection Limit Values

Values below detection limits will be reported as less than the detection limit, e.g., "<xx pg/m^3".

11.6. Derived Parameters

N/A

11.7. Explanation of Zero or Negative Data

Values below detection limits will be reported as less than the detection limit, e.g., "<xx pg/m^3". There is no negative data reported in this type of work.

12. Data Quality Objectives (Pre-Study)

12.1. Accuracy

12.2. Precision

12.3. Comparability

12.4. Representativeness

12.5. Completeness

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: