FOCUSED STUDY ACTIVITY WORK PLAN

General Information

Work Plan Unique Identifier:	*D-1-1718*	
Focused Study Activity Title:	Standard Operating Procedures for Monitoring – Collating and Auditing	
Focused Study Category:	Monitoring Design and Method Improvement	
Geographic Location (*choose from drop-down menu. If Project Location is in more than one area choose from second drop-down***)**	Oil Sands Region	
Monitoring Site(s) Coordinates *(latitude and longitude)*		
Project Leader:	Long Fu, AEP	
Organization and contact information:	Alberta Environment and Parks Monitoring and Science Division, Government of Alberta 9888 Jasper Avenue, Edmonton, AB, T5J 5C6 Long.Fu@gov.ab.ca; Tel: 780-229-7280	
Date Study initiated:	Fiscal Year 2017-2018	
Monitoring Category: *(From OSM long-term plan; choose from drop-down menu)*	Standards, QA/QC, Data Mgt.	
Strategic Objective of Focused Study: *(From OSM long-term plan; choose from drop-down menu)*	Objective S1: Evaluate and update Standard Operating Procedures	
Hypotheses: *(Briefly outline the specific hypotheses that your focused study is aiming to address)*	Consistent and comparable monitoring SOPs are publically accessible and implemented for JOSM monitoring activities that generate data of sufficient quality and quantity to support environmental management decisions in Alberta's oil sands region.	
Deliverables: *What tangible goal (s) and/or product(s) will the monitoring produce and when?*	1. A recommended Quality Management Plan for Oil Sands Monitoring data that describes the system used to ensure decision makers can have confidence in the quality of the Oil Sands Monitoring data. 2. A recommended plan to provide Oil Sands Monitoring data quality assurance 3. A recommended plan to provide Oil Sands Monitoring data quality control	

	4. A recommended plan to provide online access to all Standard Operating Procedures (SOPs) used in Oil Sands Monitoring projects 5. A recommended plan to provide independent expert assurance that SOPs used in Oil Sands Monitoring projects are being implemented appropriately 6. A list of all known instances where different SOPs are being used in OSM for a common purpose, prioritized in order by which SOPs need to be rationalized and standardized 7. A recommendation for selecting the single, unique SOP that will be used in OSM, listing the criteria used to make the recommendation.

Detailed Study Plan

(Please provide detailed information on the specifics of your focused study including – (**keywords, hypothesis and the assumptions and constraints behind your hypothesis**)

Provide a maximum of 10 key words that describe this project. Use commas to separate them:

Standard Operating Procedures, oil sands region, quality assurance, data quality objectives, scientific rigor, scientific integrity.

Describe how you will test your hypothesis:

The implementation of the Joint Canada – Alberta Oil Sand Monitoring (JOSM) Plan was initiated in 2012 to provide enhanced monitoring in the oil sands area. Both governments have made commitments on using consistent scientific standards/protocols and ensuring data quality.

In their final report, the JOSM Scientific Integrity Review Panel called for a more rigorous approach to the Quality Assurance (QA) process, including full independent auditing, better QA documentation that includes an overall QA program plan, detailed standard operating procedures (SOPs) and a QA annual report that documents the implementation of the program plan and the completion of any QA audit.

In fulfilling the governments' commitment and responding to the panel's recommendation, this project will be delivered using the following approaches:

1. A recommended Quality Management Plan for Oil Sands Monitoring data that describes the system used to ensure decision makers can have confidence in the quality of the Oil Sands Monitoring data.

- A report will be completed by March 2018 that outlines the process that will be used to ensure that decision makers can have confidence in the quality of the Oil Sands Monitoring data design for a Quality Management Plan for Oil Sands Monitoring
- This will include the overarching conceptual design for the quality management plan and the means of ensuring data quality for the relevant parties.
- In its broadest sense, the support system required to ensure that decision makers can have confidence in data includes the entire life cycle including the following components: i) development of study

questions and study design, ii) sample collection and analysis, ii) data validation and proficiency testing, iv) reporting and v) independent external auditing.

- An effective Standards and Quality Program will be developed to address each of the main components to ensure that data are collected using recognised and robust methods and are thus comparable. For instance because oil sand programming is delivered by multiple organizations there are instances where different methods are used to collect samples and quantify the same variable(s). In these cases my team will compare methods to assess methodological comparability and evaluate the need for method standardization. In other cases, our team will also ensure that all study methods are deployed in standardized ways and accompanied with routine sample collection methods are accompanied with QA/QC protocols.
- For chemical analyses, a Quality Management Plan can be developed following the logic model as outlined in ISO17025. A Quality Management Plan for oil sands monitoring (OSM) would have to consider the goals and objectives of OSM and the complex working relationships among governments, service providers, internal policies regarding roles and responsibilities for quality assurance, and other information providers such as research organizations, universities, communities and citizen scientists.
- Considering the work load, a phased approach will be used to deliver the above mentioned Quality Management Plan. For 2017-2018, a report will be delivered by March 2018 that outlines a conceptual design for a Quality Management Plan for Oil Sands Monitoring data that includes a recommended plan for data quality assurance (deliverable 2) and a recommended plan for data quality control (deliverable 3).

2. A recommended plan to provide Oil Sands Monitoring data quality assurance

- To be delivered with #1 as mentioned above.

3. A recommended plan to provide Oil Sands Monitoring data quality control

- To be delivered with #1 as mentioned above.

4. A recommended plan to provide online access to all Standard Operating Procedures (SOPs) used in Oil Sands Monitoring projects

- The Standards, Quality and Innovation team will create (and populate) a file management structure system that houses all existing SOP's and a plan to identify those that are currently lacking and a process for them to be received and populated on-line
- The system will also include a process for new SOPs to be added and for redundant SOPs to be archived.
- Plus a report that documents the current practice for online access to all SOPs used in the Oil Sands Monitoring projects, and the proposed future updates of the online SOP inventories.
- The ability to provide online access to all Standard Operating Procedures (SOPs) will require marked support from principle investigators and research team members. In the past 3 year, PI's and research teams working on air monitoring projects have provide good support. By contrast, significant effort would be required from PI's and research teams working on water monitoring projects to meet the objective of open and transparent access to OSM SOPs.
- Support from senior management of the OS program will be required to ensure that PI's and research teams recognise the importance of supporting the development of a Quality and Standards program and that time needs to be invested to document SOP's and provide them to my team.

5. A recommended plan to provide independent expert assurance that SOPs used in Oil Sands Monitoring projects are being implemented appropriately

- A recommended tiered approach to be delivered by March 2018 to achieve independent expert assurance for air, water and land biodiversity monitoring SOP implementation. The goal is the establish proper checks and balance measures for data quality assurance.
- At the Tier One level, monitoring organizations and service providers will be required to receive external audit from independent experts and/or government authorities.
- The Tier Two effort will be directed towards government operations and the overall design and execution of the OSM quality assurance programs.
- Timelines for the completion of these will be identified in Q2 2017. Because of the work load and the availabilities of SOPs, the implementation of air SOPs will be examined in 2017-2018. The implementation of Biodiversity and Water SOPs will be reviewed in the following years.

6. A list of all known instances where different SOPs are being used in OSM for a common purpose, prioritized in order by which SOPs need to be rationalized and standardized

- Start a list of overlapping SOPs for air, water and biodiversity in Q2, 2017.
- The amount of effort to create these lists is currently unknown so my team will use a phased approach where we will start to create the list for air, and then move to other media of water and biodiversity/land.
- Based on available SOPs and resources, a list of overlapping continuous air monitoring SOPs used by various organizations will be delivered by March 2018, with recommended priorities for rationalization and standardization.
- Similar lists and recommended methods for rationalization and standardization will be created for water and biodiversity/land in 2018-2019 and beyond.

7. A recommendation for selecting the single, unique SOP that will be used in OSM, listing the criteria used to make the recommendation.

- The goal of the recommended approach is to resolve potential concerns on data comparability when multiple methods are used to quantify the same variable.
- The distributed delivery of oil sands programming has resulted in organizations using different methods to measure the same variable. This raises potential issues related to data comparability. In some cases the use of different methods does not compromise data comparability whereas in other cases it does.
- Data comparability is influenced by several factors including the robustness of field methods, sensitivity of using remote sensing methods, analytical methods (e.g., differences in analytical detection levels of compounds, inherent variability in reported values).
- My team will identify a process and related criteria that can be used to assess the extent that multiple methods will compromise data comparability.
- The amount of effort to identify processes and related criteria is currently unknown so my team will use a phased approach where we will focus initially on air monitoring programming, and then move to other media of water and biodiversity/land.
- The development of criteria will take consideration of the current Federal and Alberta processes: The performances of instruments are compared to the Federal Reference Method (FRM). Based on the comparison and validation study results, a list of instruments that meet the Federal Equivalent Methods (FEM) requirements will be identified.
- If it is desirable to develop a single, unique SOP for a specific method or instrument that will be used in OSM we will create criteria that PI's can use to select the most appropriate method.

References:

Joint Canada-Alberta Implementation Plan for Oil Sands Monitoring.

http://www.ec.gc.ca/scitech/D0AF1423-351C-4CBC-A990-4ADA543E7181/COM1519_Final%20OS%20Plan_02.pdf

JOSM Scientific Integrity Review Panel Report.

http://aemera.org/wp-content/uploads/2016/02/JOSM-3-Yr-Review-Full-Report-Feb-19-2016.pdf

SOP Inventories Website.

http://environmentalmonitoring.alberta.ca/resources/standards-and-protocols/

Data Management

If this work generates data please summarize your project-level data management plan.

Deliverables	Timeframe

Provide information on the anticipated reports / publications. (Insert additional rows if needed)

Expected Subject/Titles of Publications or Reports	Short Description of Publication or Report	Expected Year of Publication
SOPs Inventory	Standard Operating Procedures (SOPs) for air, water and biodiversity monitoring posted on internet	FY2017/18 Quarterly updates
An Overview of Standard Operating Procedures Priorities	Existing monitoring protocols and gap analysis	March 2018
Annual Data Quality Report (for 2016/2017)	Documentation of all relevant standards and quality assurance activities	September 2017

Technical / Professional Roles and Responsibilities

Identify members of the monitoring team/organization, their roles and responsibilities. Identify monitoring organization leads if different from overall monitoring activity lead. (Insert additional rows if needed)

Role	Responsibilities	Resource Name/Organization
AEP Lead	Management and oversight	Long Fu (AEP)
ECCC Lead	TBD	TBD
AEP Project Support	Environmental Statistician	Thompson Nunifu (AEP)
AEP Project Support	Analytical Chemist	Bonnie Leung (AEP)
AEP Project Support	Standards and Protocols Specialist	TBD (AEP)
AEP Project Support	Quality Assurance Co-ordinator	To be hired (AEP)
AEP Project Support	Co-op student	TBD (AEP)
AEP project support	Process support	TBD (AEP)

Deliverables **(Year 1)** If your Focus Study is longer than 1 year then complete **Appendix C** for multi-year deliverables breakdown

Provide a summary of tangible quarterly deliverables. Identify major project areas (deliverables) and results that can be identified as a tangible goal. This could include: field work, lab work/ analysis, evaluation, data, reports, publications, SOPs etc. Do not define process as your Deliverable e.g. 'fly to Ft. McMurray to conduct fieldwork' or 'seek Director approval for report'.

Deliverable(s) (please provide enough information to support status reporting)
Q1 – April to June

Publication of the ISO17025 summary requirements that the analytical labs will follow on the EMSD website; publication of the links to the CALA accreditation for laboratories providing service to EMSD.
Q2 – July to September
Progress report
Q3 – October to December
Consolidated air SOPs (1-2) for selected parameters ready for web posting (to be used by airsheds).
Q4 – January to March
Selected scientific publication on standards and quality (e.g., quality assessment study for air data collected during wild fire; below detection limit study – air data used for trend analysis, etc.)
Year-end report

Detailed Financial Breakdown – Year X of 3 (201X-202Y)

Also complete **Appendix B** for the multi-year financial breakdown

Budget requirements – List areas that require budget expenditures: (ADD OR DELETE BUDGET CATEGORIES AS REQUIRED)	OS Funding	External Funding (*outside JOSM*)
O&M - Operations and Maintenance:		
Materials	**$10,000**	**$**
Field Costs		**$**
Project Support		**$**
Process support (meetings, workshops)	**$5,000**	**$**
Publications and reports	**$5,000**	**$**
Sub-Total	**$20,000**	**$**
O&M - Travel		
Field Work		**$**
Conferences (*TBC*)	**$10,000**	**$**
Meetings	**$5,000**	**$**
Sub-Total	**$15,000**	**$**
O&M - External Contracts :		
Goods and Services Contract (*external audit and peer review*)	**$40,000**	**$**
External Lab Analysis		**$**
Sub-Total	**$40,000**	**$**
Salaries:		
Principal Investigator	**$50,000**	**$**
Technical / Professional Assistants	**$125,000**	**$**
Field Staff		**$**
Sub-Total	**$175,000**	**$**
Total Salaries	**$175,000**	**$**
Total O&M	**$75,000**	**$**
2017-2018 GRAND TOTAL*	**$250,000**	**$**

Appendix A - Approvals

Project Submitted by:		
Name: Long Fu		
Organization: AEP	Signature:	Date:

Project Approved by:		
Dr. Monique Dubé (AEP)		**Dr. Kevin Cash (ECCC)**
Signature 		Signature 
Date		Date

APPENDIX B – Detailed Multi-year Financial Breakdown (Complete the following detailed financial breakdown; add or delete categories as required)

Budget requirements	Year 1 (2017- 2018)		Year 2 (2018- 2019)		Year 3 (201X- 201Y)	
	Cash	In-kind	Cash	In-kind	Cash	In-kind
1) Salaries and benefits	$175,000		$310,000		$310,000	
a) Investigators	$50,000					
b) Technical/professional assistants	$125,000					
c) Field Staff						
d) Co-op student						
2) Operations and maintenance	$5,000		$50,000		$50,000	
a) Process support (meetings and workshop)	$5,000					
b) Equipment						
c) Lab analysis						
d) Data management						
e) Field work						
3) Consumable Materials and supplies	$10,000		$10,000		$10,000	
a) Materials and supplies	$10,000					
b)						
4) Travel	$15,000		$35,000		$35,000	
a) Conferences and meetings	$10,000					
b) Field work						
c) Project-related travel	$5,000					

5) Dissemination & Engagement	$5,000		$10,000		$10,000	
a) Publications/Reports	$5,000					
b) Translation (if required)						
c) Communications						
d) Stakeholder Engagement						
e) Indigenous Peoples Engagement						
6) External Contracts	$40,000		$50,000		$50,000	
a) Audits and peer reviews	$40,000					
Grand Total * (BEFORE OTHER RELATED COSTS)	$250,000		$465,000		$465,000	

APPENDIX C –Years 2 and 3 Deliverables (Complete the following detailed breakdown. Provide a summary of tangible quarterly deliverables and your anticipated expenditures. Identify major project areas (deliverables) and results that can be identified as a tangible goal.)

Year 2 (2018- 2019)
Deliverable(s) (please provide enough information to support status reporting)
Q1 – April to June
Update report on SOP inventories
Working with ECCC, update report on tracking of SOPs being developed
Cross reference review of oil sands monitoring methodologies based on approved JOSM project plans
Initiate SOP/QA priorities based on the needs of approved JOSM project plans
Q2 – July to September
2017/18 Certified reference material lab study report ready for posting.
Review of QAPPs and accreditation status for monitoring organizations and service providers.
Q3 – October to December
Preparation and execution of 2018/19 Certified Reference Material inter-lab study.
Update and post SOP inventories as appropriate.
The 2017-2018 annual data QA/QC report ready for web posting.
Q4 – January to March
Selected scientific publication on standards and quality (e.g., quality assessment study report, new SOPs or methodologies, scientific journal papers, etc.)
Year-end report

Appendix D.

11/03/2016 update for Overlapping Air SOPs among AEP, LICA and WBEA

Overlapping SOPs across Different Organizations			
Compounds	**AEMERA**	**LICA**	**WBEA**
H2S, SO2, TRS	SOP-001 for H2S and SO2 Converter	SOP-001 Hydrogen Sulphide	WBEA SOP-ANA-001-SO2 Procedures for Operating Continuous Sulphur Dioxide Analyzers
	SOP-010 for Hydrogen Sulphide (H2S) and Total Reduced Sulphur (TRS) detectors	SOP-003 Sulphur Dioxide	WBEA SOP-ANA-002-H2S/TRS Procedure for Operating Continuous Hydorgen Sulphide and Total Reduced Sulphur Analyzers
	SOP-021 for Measurement of SO2 by SO2 Fluorescence	SOP-008 Total Reduced Sulphur	
Methane/ Non-Methane	SOP-023 for Measurement of Methane/Non-Methane Hydrocarbons Using FID Detection	SOP-004 Methane and Non-Methane Hydrocarbons	WBEA SOP-ANA-008-NMHC Procedures for Operating Continuous Methan/Non-Methane Hydrocarbon Analyzers
Total Hydrocarbon	SOP-020 for Measurement of Total Hydrocarbon Using a Flame Ionization	SOP-002 Total Hydrocarbon	WBEA SOP-ANA-004-THC Procedures for Operating Continuous Total Hydrocarbon (THC) Analyzers
Ozone	SOP-022 for Measurement of Ozone in Ambient Air by Ultraviolet (UV) Photometry	SOP-005 Ozone	WBEA SOP-ANA-006-O3 Procedures for Operating Continuous Ozone (O3) Analyzers
PM 2.5	SOP-004 for the Tapered Element Oscillating Microbalance (TEOM)		WBEA SOP-PAR-001 Procedures for Operating Continuous R&P TEOM PM10 and PM2.5 Analyzers
	SOP-002 of ACCU System Particulate Matter sampler in Ambient Air in conjuntion with the		
	SOP-005 for Environmentally protected Beta Attenuation Monitor (E-BAM)		
	SOP-028 for Measurement of Particulate Matter in Ambient Air using the Partisol 2000H		
	SOP-014 for Measurement of Particulate Matter in Ambient Air by Orthogonal Light		
		SOP-006 Particulate Matter (TEOM-FDMS Method)	
			WBEA SOP-PAR-010 Procedures for Operating Continuous Thermo Scientific SHARP 5030 PM10 and PM2.5 Analyzers
Oxides of Nitrogen	SOP-037 for Measurement of Oxides of Nitrogen in by Chemiluminescence	SOP-007 Oxides of Nitrogen	WBEA SOP-ANA-003-NO2 Procedures for Operating Continuous Nitrogen Oxides (NOx/NO/NO2) Analyzers
NH3	SOP-008 for NH3 Analyzers		WBEA SOP-ANA-005-NH3 Procedure for Operating Continuous Ammonia (NH3) Analyzers
CO	SOP-024 for Measurement of CO in Ambient Air by Gas Filter Correlation (GFC)		WBEA SOP-ANA-007-CO Procedures for Operating Continuous Carbon Monoxide (CO) Analyzers

Appendix E.

11/3/2016 update SOPs tracking table for ECCC deposition studies in the Oil Sands region.

Project	Name/Activity	SOP available	SOP in development	No SOP	Comments
A2-1-4-1617	**Deposition and Effects (Tom Harner)**				
	Active monitoring of targeted multi-pollutants (PACs, metals, coarse (PM10-2.5) and fine PM2.5; PM2.5 speciation, VOCs, polar and sulphur-containing VOCs) in air (Charland) D1) Fully functional network of five enhanced deposition sites D2) Improved estimates of the atmospheric deposition of selected pollutants across the region D3) New information on the sources and spatial distribution of metals and PACs D4) Assessing the impact of petroleum coke dust on PACs and metals (vanadium) levels in the oil sand region D5) New information on characterization of PACs and their transformation to the corresponding quinones D6) New information on characterization of classical naphthenic acids in PM	Active monitoring of targeted multi-pollutants (PACs, metals, coarse (PM10-2.5) and fine PM2.5; PM2.5 speciation (awaiting document from ECCC) VOCs, polar and sulphur-containing VOCs) in air (awaiting document from ECCC)	Quinones and naphthenic acids methods to be published in peer-reviewed journals, no routine SOPs at this time.		
	Passive monitoring of PACs in air (Tom Harner) D1) Improved estimates of the atmospheric deposition of PACs across the region D2) Assessment of the performance of PAS-DD samplers against PUF disk samplers and evaluation of the contribution of petcoke dust to PAC levels in air D3) New information on the seasonality, spatial distribution, and in-vitro toxicity of PAC transformation products and passive air samples (PUF disk vs			SOPs not on EMSD website	Can we use the published papers as SOP in development?

	PAS-DD sampler) D4) Historical trends of PACs in air across the oil sands region based on the analysis of tree rings D5) Continued sample collection at 18 sites in 2017-18 (supported by WBEA). Samples from 5 sites will be processed while remaining 13 sites will be archived for possible future analysis. D6) Support ecosystem effects and biodiversity program through passive air sampling at pond study sites – link to E2-2-3-1718.				
	Mercury Measurements at WBEA Sites (Parsons/McLennan/Steffen) D1) QC/QA TGM data for Fort McMurray – Patricia McInnes station (AMS 6) through 2017 D2) QC/QA TGM data for Fort McKay South (AMS 13) through 2017 D3) QC/QA Speciated Hg data for Fort McKay South (AMS 13) through 2017 D4) Install 2 mercury wet deposition collector samplers to quantify the amount of mercury deposited to the ground and collected in the forest. QC/QA Hg in wet deposition data for Fort McKay South (AMS 13) through 2017			There are no SOPs for this project	Can we list the instrument SOP in the SOPs section?
	Enhanced Measurements of Nitrogen and Sulphur Species at Ecosystem/Transformation Sites (O'Brien) D1) Quantify the contribution of measured NO, NO_2, NO_y, and NH_3 to dry and total deposition of N; thus, providing the necessary estimation of the N deposition input at these Ecosystem sites D2) Quantify the contribution of long-range /transboundary transport of oil sands emissions		Operator SOP - Nitrogen and Sulphur Species Measurements Audit Procedure and Technician Checklist	Two SOPs currently at draft stage. Estimated to be ready for end of FY 2016-17	

	versus other emission sectors to N and S dry and total deposition in northwestern Canada and in particular over sensitive ecosystems located at long distances from the emission areas				
	Inferential modelling of atmospheric deposition (Zhang) D1) Concentration maps for PACs across the region D2) Total atmospheric deposition maps for PACs across the region D3) Estimated atmospheric dry deposition for trace metals at the three active sampling sites			There are no monitoring SOPs for this project, this is a modeling project	
A-FS-1-1718	**Atmospheric Deposition to Lakes and Snowpack (Kirk and Muir)**				
	1. Identification of major contributors (i.e., pet coke and road haul dust, bitumen ore) to atmospheric contaminant deposition within 125 km of the major OS developments (2018-2019). 2. Quantification of the relative contribution of snowpack contaminants loadings to water quality in tributaries of the Athabasca OS region. 3. Improved estimates of atmospheric contaminant deposition to the Athabasca OS region, including more accurate deposition maps. 4. Determination of the relative impacts of OS developments, climate change, and recent forest fires on PACs and metals deposition, lake primary productivity, and invertebrate and diatom community structure in lakes located within ~125 km of the major OS developments.	Snowpack sampling Cleaning of stainless steel snow corers (used for snowpack contaminant sampling)	SOPs need to be reformatted for posted, will be provided by ECCC in 2017.		

11/3/2016 update and tracking table for LICA and WBEA SOPs

Project	Name/Activity	SOP available	SOP in development	No SOP	Comments
A2-1-1-1617	Cold Lake soil acidification monitoring program (LTM)				
	Soil acidification field sampling (168 mineral soil and 24 leaf litter samples from 2 Whitney Lakes)	GOA sampling protocol (soil monitoring directive)			Confirm with LICA
	Soil acidification sampling laboratory analysis: sample prep, pH, total C, N, S, cation exchange, 96 mineral extractable ions	CALA accredited laboratory analyses			Confirm with LICA, which lab?
A2-1-2-1617	Operation of enhanced deposition sites (FS)				
	Deployment and collection of semi-continuous samples and continuous data at Bertha-Ganter, Buffalo Viewpoint, Wapasu, and Conklin Lookout analyzing the following parameters: 1. PACs (continuous) 2. Precipitation (continuous) 3. PM2.5 mass and trace metals (semi-continuous) 4. PM2.5 organic and elemental carbon (semi-continuous) 5. PM2.5 sulfate, nitrate and other ions (semi-continuous) 6. PM2.5 elements (semi-continuous) 7. PM coarse and fine (semi-continuous) 8. PACs (semi-continuous) 9. VOCs (semi-continuous) 10. Precipitation (semi-continuous)	2. WBEA SOP-MET-004 9. WBEA SOP-INT-004		1, 3-8,10 missing semi-continuous SOPs	Confirm with WBEA
A2-1-3-1617	Athabasca oil sands dry deposition				
	Passives with denuder systems on PM sampler to monitor NO3, NH4, So4 and PM2.5	WBEA-SOP-INT-008			Confirm with WBEA
	Laboratory data analysis	CALA			Check with

		accredited lab			WBEA which lab