

5- YEAR LONG-TERM MONITORING OR OPERATIONAL ACTIVITY WORK PLAN

Changes to this Work Plan are only accepted via an Approved Addendum.

General Information		
Monitoring Category: <i>(From OSM long-term plan; choose from drop-down menu)</i>	Atmospheric Monitoring	
Strategic Monitoring Objective: <i>(From OSM long-term plan; choose from drop-down menu)</i>	Objective: Detect and report levels and trends of oil sands related chemical substances being deposited from the atmosphere	
Work Plan Unique Identifier:	A-LTM-S-2-1718	
Monitoring Activity Title:	Atmospheric Pollutant Passive Monitoring Network	
Geographic Location <i>(choose from drop-down menu, if Project Location is in more than one area choose from second drop-down)</i>	Athabasca Oil Sands Region	
Monitoring Site(s) Coordinates <i>(latitude and longitude)</i>	See Appendix I	
Monitoring Organization and Responsible Manager:	Lakeland Industry and Community Association and Peace River Area Monitoring Program	Bob Myrick
Date Monitoring initiated:	2012	
Specific Monitoring Objective: <i>(State the monitoring objective addressed through this monitoring)</i>	The main monitoring objective of passive air monitoring in the Cold Lake and Peace oil sands region is to determine long-term trends and spatial variability in air quality.	
Deliverables (Annual): <i>What Data Reports will be produced and when?</i>	<ol style="list-style-type: none"> (1) Datasets are available on request from the Airshed organizations (LICA and PRAMP). In the future there will be a requirement through the Air Monitoring Directive to provide data electronically to the Alberta Air Data Warehouse. (2) Data is summarized in annual reports provided to the regulator by March 31st for the previous year of data collection. (3) LICA also produces annual interpretive data reports that are publicly available. (4) Passive air quality data should be included in future annual reports on environmental condition for air quality – this is not currently done. (5) All passive data can be uploaded to the joint oil sands portal if 	

	necessary.
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Monitoring Plan Summary: *Please summarize the monitoring including relevant information such as background, objectives, monitoring area, methods/monitoring design, assumptions, outcomes, and references. These should align with the information provided in Appendix 1: Annual Monitoring Schedule.*

Background

The Passive Ambient Air Monitoring Program includes long-term monitoring using passive samplers in and around the Cold Lake and Peace River oil sands deposits. The monitoring programs are operated by the Lakeland Industry and Community Association (LICA) and the Peace River Area Monitoring Program (PRAMP) Committee, respectively.

The Athabasca oil sands passive monitoring program was previously included in this work plan but has been integrated with focused studies A1-1-6-1617 (Remote Ozone Monitoring) and A2-1-3-1617 (Athabasca Oil Sands Dry Deposition) under a new long-term program (“Atmospheric Deposition to Forest Ecosystems”) to explicitly assess the impact of atmospheric dry deposition on forest health monitoring.

The Cold Lake 27 passive stations are sampled every two months and follow a 3 x 3 township grid pattern (more densely around oil sands facilities). This passive sampling frequency was changed from monthly to bi-monthly in 2015-16 in order to find budget efficiencies. The network has been in operation since 2003 and measures ozone (O₃), nitrogen dioxide (NO₂), sulphur dioxide (SO₂) and hydrogen sulphide (H₂S). Data generated by the passive monitoring program are used for understanding regional (or spatial) patterns in air quality, long term trend analyses, and informing potential future locations for continuous monitoring stations.

The Peace River passive monitoring includes 13 passive samplers that are required by the Shell Peace River Complex Operating Approval. These passive monitors collect ambient concentrations of SO₂ and H₂S. Since this was originally intended to be a ‘regulatory’ monitoring network, the utility of the existing network will need to be evaluated and a determination will be made on redistribution or expansion of this network to the remainder of the Peace River oil sands region. The passive monitoring network has been in place for approximately five years.

Note that the passive networks in the Cold Lake and Peace River oil sands regions use the same laboratory and the same analytical protocols for the analysis of standard passive samples (e.g. SO₂, NO₂, O₃ and H₂S).

Figures 1 and 2 show the passive air monitoring stations operated by LICA and the PRAMP Committee, respectively, that are funded by the oil sands monitoring program. Note that there is additional passive air monitoring in the oil sands region conducted by industry that are not part of the existing Airshed organizations and therefore not funded through the oil sands monitoring program.

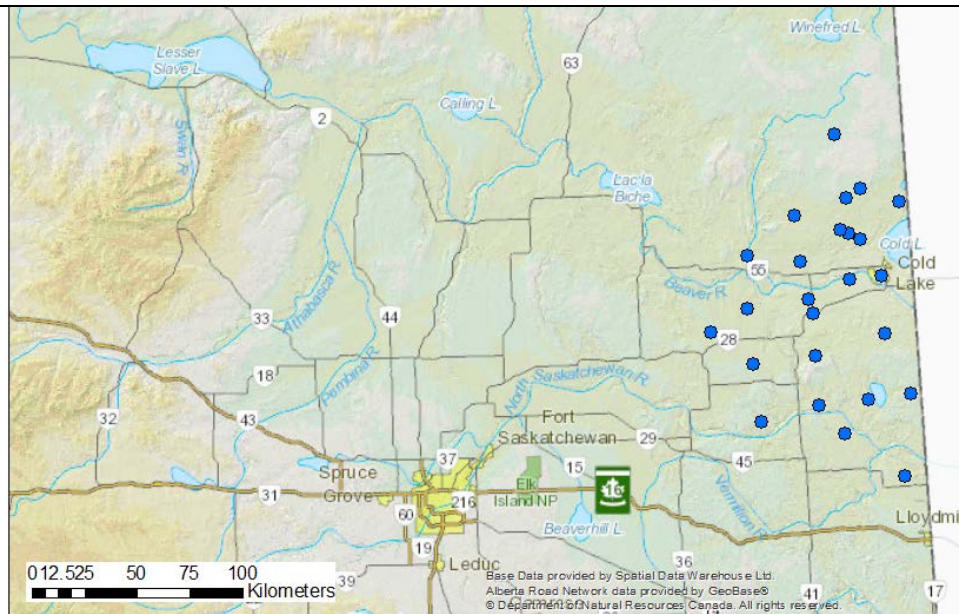


Figure 1 Long-term passive ambient air quality monitoring network in the Cold Lake oil sands region. Blue symbols indicate locations of passive sampling stations.

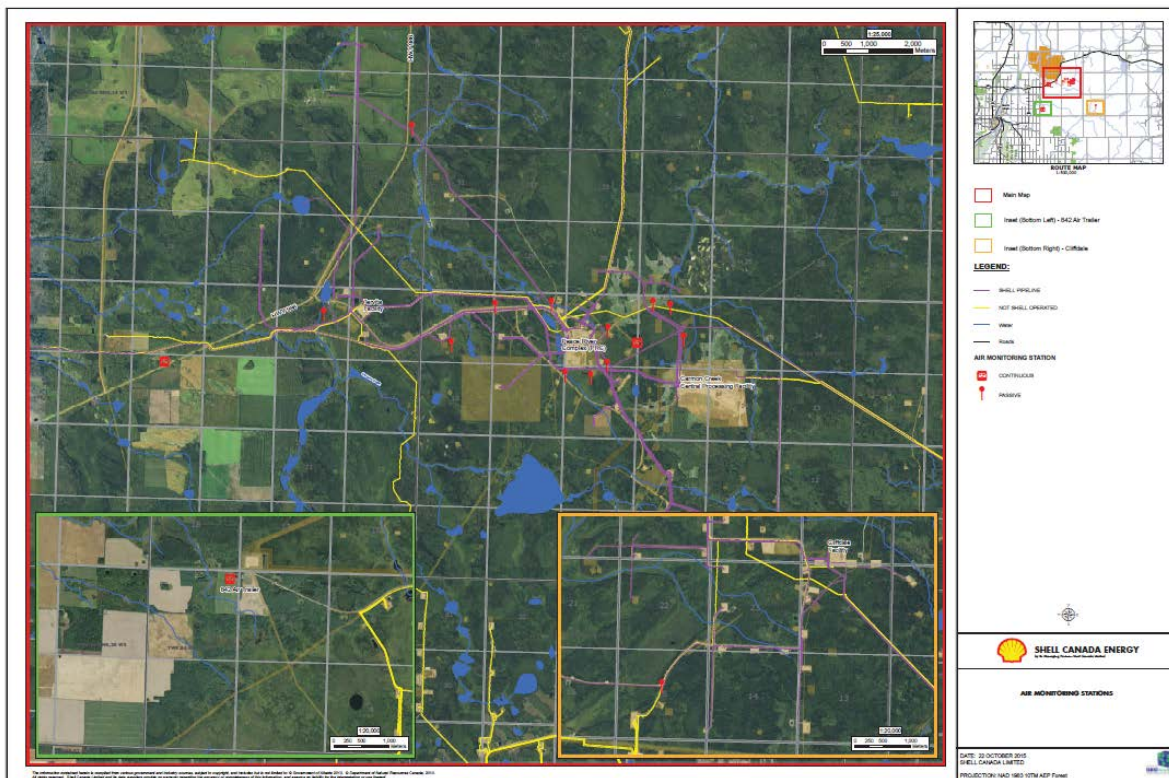


Figure 2 Long-term passive ambient air quality monitoring network in the Peace River oil sands region. Red symbols indicate locations of passive sampling stations.

Monitoring Objectives

The monitoring objectives of the passive monitoring systems implemented in the oil sands monitoring plan are to:

- (1) Understand the spatial variation of air quality across the Cold Lake and Peace River oil sands region;
- (2) Determine long-term trends in air pollutants over a large geographical area;
- (3) Address gaps in air quality monitoring for the Cold Lake and Peace River oil sands region;
- (4) Understand seasonal variations of specific air quality parameters over a large geographical area; and
- (5) Determine background air quality levels.

Monitoring Area

The areal extent of the active air monitoring program includes the Cold Lake oil sands deposit and the Three Creeks area within the Peace River oil sands deposit. The extent of the monitoring is concentrated within close proximity of each oil sands deposit and monitoring gaps may exist in the areas between each oil sands deposit and also upwind and downwind of the oil sands deposits.

Methods/Monitoring Design

Passive sampling methods involve installation of a sampler that contains a sorbent that is specifically formulated to adsorb the pollutant of interest (e.g. SO₂, NO₂, O₃, H₂S). The samplers have no moving parts and require no power. Concentrations of pollutants are calculated based on the sampling rate of the chemical of interest onto the sorbent, which is calculated using meteorological conditions (wind speed, ambient temperature and relative humidity). Samplers are implemented in the field for one to two month time periods depending on the Airshed and the season. Operation and use of passive sampling systems are consistent with the requirements of the Air Monitoring Directive (Alberta Environment and Parks, 2016).

Assumptions

The passive monitoring networks in the Cold Lake and Peace River oil sands regions are independent in their original design and purpose.

The Cold Lake oil sands passive air monitoring network was designed to provide a spatial distribution of ambient air quality in the region for specific air pollutants (NO₂, O₃, SO₂ and H₂S) that can affect human health and/or produce odours. These data are used to fill spatial gaps in the region and understand long-term trends. This network should be evaluated against its monitoring objectives in 2017-18. Changes to the pollutants monitored, station density and monitoring frequency will likely be considered.

The Peace River oil sands passive monitoring network consists of 13 passive sampling sites that were implemented near the Peace River Complex as part of an operating approval. Consideration will be given to either eliminating this program or expanding it to meet similar objectives as the Cold Lake passive monitoring program. The monitoring objectives for the Cold Lake and Peace River passive monitoring programs should be harmonized.

The five-year budget indicated in this project plan does not reflect current thinking regarding future changes to passive monitoring for the oil sands region.

The future long-term passive air monitoring programs are expected to change notionally as follows:

- The sampling frequency may be increased back to monthly for the Cold Lake area passive monitoring network.

- The Peace River and Cold Lake passive monitoring networks should have harmonized monitoring protocols since they have the same monitoring objectives.
- The Peace River network may be expanded to cover the entire Peace River oil sands deposit.
- All of the above assumptions are subject to a scientific assessment prior to making a recommendation.
- It is assumed that most long-term ambient air monitoring will still be contracted to airsheds.

The above changes, if implemented, should result in cost saving over the next five years.

Outcomes

- (1) The appropriate ambient air quality data will be available to assess spatial and long-term temporal air quality trends for H₂S and SO₂ (Cold Lake and Peace River) as well as O₃ and NO₂ (currently only Peace River).
- (2) The appropriate long-term air quality data sets will be available for human health assessments.

References

Alberta Environment and Parks. 2016. <http://aep.alberta.ca/air/legislation/air-monitoring-directive/>.

Appendix 1 – Annual Monitoring Schedule

(Please provide detailed information on the specifics of your monitoring schedule including – **locations, schedule, methods, SOPs, QA/QC data release, references**)

<u>Sampling Locations/Sites</u>	<u>Sampling Schedule (timing/frequency)</u>	<u>Compounds to be Analyzed</u>	<u>SOPs to be Consulted</u> <i>(hyperlinks accepted)</i>	<u>QA/QC Complete & Date Data to be Released</u>
LICA Passive Sampling Sites - Sand River, Therien, Flat Lake, Lake Eliza, Telegraph Creek, Muriel-Kehewin, Dupre, La Corey, Wolf Lake, Foster Creek, Primrose, Maskwa, Ardmore, Frog Lake, Clear Range, Fishing Lake, Beaverdam, Cold Lake South, Medley-Martineau, Fort George, Burnt Lake, Mahikan, Hilda Lake, Town of Bonnyville, Cold Lake South Co-located, St. Lina, Bonnyville (PAMS)	Bi-monthly	O ₃ , NO ₂ , SO ₂ , and H ₂ S	Need to be developed by the airsheds and implemented by July 2017 (as per the Air Monitoring Directive)	By March 31 st for the previous year
PRAMP Passive Sampling Sites (current locations not available)	Monthly	SO ₂ and H ₂ S	Need to be developed by the airsheds and implemented by July 2017 (as per the Air Monitoring Directive)	By March 31 st for the previous year

Appendix 2 – Detailed Multi-Year Financial Breakdown: if changes are to be made then an Addendum must be Complete and Approved.

(Complete the following detailed financial breakdown; add or delete categories as required)

Budget requirements	Year 1 (2017- 2018)		Year 2 (2018- 2019)		Year 3 (2019- 2020)		Year 4 (2020- 2021)		Year 5 (2021- 2022)	
	OSM Funding	External Funding	OSM Funding	External Funding	OSM Funding	External Funding	OSM Funding	External Funding	OSM Funding	External Funding
1) Salaries and benefits										
a) Appendix 3 – Totals	AEP - 0.15 FTE (\$15000)		0.15 FTE (\$15000)		0.06 FTE (\$6000)		0.06 FTE (\$6000)		0.06 FTE (\$6000)	
2) Operations and Maintenance										
a) Vehicles and Transportation										
b) Helicopter										
c) Lab analysis										
d) Data management										
e) Field work										
3) Consumable Materials and supplies										
a) <i>(Describe Consumable Supply)</i>										
4) Travel										
a) Conferences and meetings <i>(identify conference/meeting)</i>										

b) Field work – travel										
c) Project-related travel										
5) External Contracts										
a) LICA (See Appendix 4) b) PRAMP	LICA - \$119,000 PRAMP - \$48,000		LICA - \$120,000 PRAMP - \$50,000		LICA - \$120,000 PRAMP - \$75,000		LICA - \$122,500 PRAMP - \$100,000		LICA - \$125,000 PRAMP - \$105,000	
Grand Total	\$182,000	\$0	\$185,000	\$0	\$201,000	\$0	\$228,500	\$0	\$236,000	\$0

Appendix 3 – Staffing Plan

(Complete the following detailed staffing plan; add or delete categories as required)

Responsible Role	Year 1 – Budget Allocation		Year 2 – Budget Allocation		Year 3 – Budget Allocation		Year 4 – Budget Allocation		Year 5 – Budget Allocation	
	OSM Funding	External Funding	OSM Funding	External Funding	OSM Funding	External Funding	OSM Funding	External Funding	OSM Funding	External Funding
Science Expertise	0.1 FTE (\$10,000)		0.1 FTE (\$10,000)		0.01 FTE (\$1000)		0.01 FTE (\$1000)		0.01 FTE (\$1000)	
Technical/Field Staff	0.05 FTE (\$5000)		0.05 FTE (\$5000)		0.05 FTE (\$5000)		0.05 FTE (\$5000)		0.05 FTE (\$5000)	
Administrative and Program Coordination										
Grand Total <i>(inserted into Appendix 2)</i>	0.15 FTE (\$15,000)	\$	0.15 FTE (\$15,000)	\$	0.06 FTE (\$6,000)	\$	0.06 FTE (\$6,000)	\$	0.06 FTE (\$6,000)	\$



Appendix 4 – Detailed Budget for External Contractor (LICA)

Year 1 (2017- 2018)	
Activity	Cost
Lab Analysis	
Sample analysis	\$31,000
Data Management	
Reporting and data upload	\$10,000
Data System Licensing	\$805
Quality System Maintenance and Auditing	\$697
Data Specialist	5,900
Field Work	
Sample collection and deployment	\$40,000
Administration Costs	
Program Management, Salary, Expenses, Payroll	\$23,555
Meeting Costs, Food, Stipend	\$2,142
Insurance	\$1,583
Utilities	\$483
Maintenance, Rent, Taxes	\$1,786
Office Supplies, Xerox, Postage, Capital Purchases	\$1,049
Total	\$119,000

Appendix 5 – Detailed Budget for External Contractor (PRAMP)

Year 1 (2017- 2018)	
Activity	Cost
Lab Analysis	
Sample analysis	\$9,054
Sample collection and deployment	\$12,864
Office Supplies, Xerox, Postage	\$2,082
Capital equipment (to be purchased by AEP)	\$24,000
Total	\$48,000

Appendix 6 - Approvals

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