

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>	Watershed Monitoring
Strategic Monitoring Objective: <i>(From OSM long-term plan; choose from drop-down menu)</i>	Objective: Detect and report concentration levels and trends of chemical substances of concern in the aquatic environment that are likely to cause adverse human and/or environmental health effects.
Work Plan Unique Identifier:	A-LTM-E-8-1718
Monitoring Activity Title:	Acid-Sensitive Lakes Monitoring
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>	
Monitoring Organization and Responsible Manager:	Peace River Area Monitoring Program Colin Cooke
Date Monitoring initiated:	1997
Specific Monitoring Objective: <i>(State the monitoring objective addressed through this monitoring)</i>	This study addresses a requirement under existing oil sands approval clauses to conduct monitoring of regional lake waters to assess the potential for acidifying emissions to lead to measureable declines in lake water pH in the region surrounding oil sands mining and processing operations.
Deliverables (Annual): <i>What Data Reports will be produced and when?</i>	Deliverables will include the generation of a peer-reviewed publication that provides: <ul style="list-style-type: none"> • an overview of the program and its objective; • a review of the emissions history of the region; • a presentation of the geological, climactic and hydrological

	<p>context for ASL lakes;</p> <ul style="list-style-type: none"> • a statistical summary/presentation of the 16 years of data; and • an assessment of whether acidification has occurred and why (or why not).
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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. Provide a maximum of 10 key words that describe this project. Use commas to separate them:*

Lakes, acid emissions, water chemistry, geology, deposition, pH, buffering

Describe how you will test your hypothesis:

A network of 50 lakes will be sampled once annually (in the fall) by AEP monitoring staff. This activity has been occurring for the past 15 years, and a long-term dataset has accumulated on the limnology of lakes within the Athabasca oil sands region; however, little effort has been directed at evaluating and reporting on these data. This is despite clear evidence for geographic heterogeneity in lake water chemistry, an improved understanding of acid emissions, transport and fate in the region, and clear evidence that climate change is impacting some of these lake systems. This latter point is important because the impacts of climate change can complicate detecting and attributing changes in lake water chemistry to oil sands mining and processing operations. Thus, the focus this year will be on continued sample collection from the network of 50 lakes, and on evaluation and reporting activities initiated during the 2016-17 fiscal year.

- Assumptions and Constraints behind the hypothesis and the testing method:

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>

Data Management

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

Deliverables	Timeframe
Data Collection Period: <i>Field work</i>	Start : 2017-08-01 End: 2017-09-30
Data Analysis Period: <i>Laboratory analysis and QA/QC of data</i>	Start : 2017-04-01 End: 2018-03-31
Data Release Date: <i>Metadata and data consistent, complete and meet basic standard format for publication in Open Data; on or linked to JOSM portal</i>	2018-03-31

Reporting and Publications

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
Regional drivers of lake water chemistry in the Athabasca oil sands region (Alberta, Canada)	A report that summarizes some of the key spatial and temporal patterns observed to date, and relates these key spatial and temporal patterns to ecological, climatological, and geological drivers.	2018
Lack of acidification in lakes of northeastern Alberta despite decades of acidifying emissions	A paper/report presenting evidence for, and explaining the causes of, a lack of acidification in lakes within the region.	2018

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
Monitoring of lakes	Sample collection in the fall	Monitoring staff out of McIntyre building in Edmonton / AEP EMSD
Evaluation and reporting	Collaborate on papers and reports regarding the acid sensitive lake network	Colin Cooke / AEP EMSD
Evaluation and reporting	Collaborate on papers and reports regarding the acid sensitive lake network	Daniel Andrews / Contractor

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
Evaluation of existing data
Q2 – July to September
Field work in the Athabasca oil sands region
Evaluation of existing data
Q3 – October to December
Evaluation of existing data
Q4 – January to March
Evaluation and reporting of existing data

Appendix 4 - Approvals

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