

2018-19 Work Plan Template

All fields with an * are mandatory

Project Description Summary			Co-Chair Decision (March 8, 2018)
Date *	Project/Work Plan Identifier (if applicable)	Program Type and Strategic Alignment *	<p>* Decision Pool A: Workplan approved.</p> <p>* Approved at \$850,025</p> <p>* Coordination between AEP and ECCC must occur in advance and while undertaking flights</p> <p>* It is a requirement of funding that this project coordinate and discuss with COSIA in advance of flights, while undertaking flights, and following flights.</p> <p>* When publishing and reporting of results, this team must demonstrate how they have consulted with COSIA and regulators to explore how these and the 2013 results inform regulatory and management decisions</p> <p>* 2018-19 is the end of the field component of this aircraft campaign; subsequent funding requests will be evaluated as required and any further focus studies will be informed by or dependent upon the outcomes of this work.</p> <p>*Funding expectations: as a minimum a final report is required by March 31, 2019. All publications or products resulting from this work requires acknowledgement of funding from the Oil Sands Monitoring Program and are to be provided to the Oil Sands Monitoring Secretariat for tracking and any programmatic communications purposes. Work funded through the Oil Sands Program will be available for public dissemination.</p>
19/01/2018	A-RC-44-1819	OSM - Focus Study	
Program Category *	Status *	Dept. ID	
Air/Atmosphere/Climate	Existing Project		
Project Leadership / Contact information			
Project Title *	Key Words (max 10) *		
Airborne GHG Emission Measurements (NOAA-AEP)	Green House Gases (GHG), top-down emission measurement, oil sands facilities, component level		
Surname *	Given Name *	Title *	
Huda	Quamrul	Air Monitoring Scientist	
Organization *	Department	Division	
Alberta Provincial	Environment and Parks	Environmental Monitoring and Science	
Branch *	Section/Unit (if applicable)	Phone *	
Science	Airshed Sciences	7802297281	
Email *	Mailing Address	City	
quamrul.huda@gov.ab.ca	10th Floor, 9888 Jasper Avenue	Edmonton	
Postal Code	EMSD Executive Owner (If Applicable)		
T5J 5C6	Bill Donahue		
Project Information			
Project Objective(s) (Bullet Form) *	<ul style="list-style-type: none"> Quantify greenhouse gas (GHG) emissions from industrial facilities and compare them with the Alberta GHG emissions inventory. Quantify and characterize the major sources (e.g. tailings ponds, mine faces, stacks) of emissions from large facilities. Estimate temporal and seasonal variations of GHG emissions. Quantify annual emissions through time-distributed multiple aircraft measurements as opposed to scaling up from single measurements. 		
Plain Language Overview (100 words) *	<p>Aircraft based top down approaches of emission estimates are suitable for capturing integrated emissions from large industrial facilities. A virtual box is formed around the area of interest with closed-loop aircraft flights starting from the lowest safe altitude typically up to the top of the atmospheric (or planetary) boundary layer. Total area emissions are calculated from concentration profiles and ambient parameters (e.g. wind, temperature) using Gauss's theorem. Logistics and weather conditions allowed limited number of NOAA flights over the oil sands region in 2017. In 2018, distributed flights are planned over spring to fall to study seasonal effects on component and facility scales, and estimate accurate annual emissions. In 2018, there is a unique opportunity to coordinate aircraft flights operated through NOAA with aircraft flights operated by ECCC (see project called "Atmospheric Process Study – OS Air Pollution Emissions, Transformation and Fate") to measure emissions of air pollutants and GHGs in the oil sands region. Both programs will provide complementary data and subsequent emissions information.</p>		
Project Duration *	Project Original Start Date *	Estimated Completion Date *	
Multi-Year	1/4/2018	31/03/2020	
Specify Objectives This Project Will Address in 2018/2019. *	<ul style="list-style-type: none"> Quantify greenhouse gas (GHG) emissions from industry facilities and compare them with the Alberta GHG emissions inventory. Quantify and characterize the major sources (e.g. tailings ponds, mine faces, stacks) of emissions from large facilities. 		
Specify Objectives This Project Will Address Beyond 2018/19 (if multi-year). *	<ul style="list-style-type: none"> Estimation of temporal and seasonal variations of emissions. Quantification of yearly emissions through time-distributed multiple aircraft measurements as opposed to scaling up from single measurements. 		
List Key Questions/Hypotheses Related to Each Objective Stated Above. *	<ul style="list-style-type: none"> Top-down approaches of greenhouse gas (GHG) measurements through airborne studies will help determine the accuracy of present GHG emissions inventory reported by industry. Component level (e.g. tailings pond, mine face, plant) measurement flights, especially on open pit mining facilities, will provide information on large-area fugitive emission characteristics and the inter-relation among different sources of emissions. Multiple flights at selected locations during different months of the year will provide information on seasonal and temporal variations of GHG emissions. Better estimation of annual emissions can be achieved through knowledge of seasonal and temporal variations on facility and component levels. 		

Main Assumptions, Constraints, Dependencies. *	Weather conditions support flights to be conducted. The aircrafts and the pilot team deliver as expected. Sufficeint funding is approved.	
Partner Categories (select all that apply) * A partner is an individual, group, agency, community etc. that is an active participant in the project and in achieving the project deliverables.	Knowledge System *	Location (select all that apply) *
<input checked="" type="checkbox"/> Federal Government <input type="checkbox"/> Another AEP Division <input type="checkbox"/> Another GoA Department <input type="checkbox"/> University/Academic Institution <input type="checkbox"/> Solely delivered by GoA <input type="checkbox"/> Citizen Science <input type="checkbox"/> Indigenous Community or Organization <input type="checkbox"/> ENGO <input checked="" type="checkbox"/> Other	Classical Science	<input type="checkbox"/> Office or Laboratory <input type="checkbox"/> Sub-regional <input type="checkbox"/> Transboundary (provincial/territorial) <input checked="" type="checkbox"/> Lower Peace Region <input type="checkbox"/> Upper Peace Region <input checked="" type="checkbox"/> North Saskatchewan Region <input type="checkbox"/> Red Deer Region <input checked="" type="checkbox"/> Lower Athabasca Region <input type="checkbox"/> Upper Athabasca Region
AEP ONLY: Strategic Alignment to EMSD Outcomes		
AEP ONLY: Strategic Alignment to EMSD Science Plan, select 1-2 areas that apply (if Applicable)		
Climate Variability and Change Ecosystems and Predicting Change		
AEP ONLY: Strategic Alignment to AEP Departmental Outcomes		
AEP ONLY: Environmental and Ecosystem Health and Integrity	AEP ONLY: Sustainable Economic Diversity	AEP ONLY: Social Well-Being
Air/Climate Change	No	No
AEP ONLY: Protected Public Health and Safety from Environmental		
Yes		
AEP ONLY: IMAG/IMSC Information Needs, Please Specify Which Need(s) is Being Addressed. File location M:\EMSD\Common\Portfolio Mgmt System Shared Docs	Info Need 12 (Ecosystem Services), Info Need 17 (Current and historical status of Alberta's air quality) and Info Need 30 (Environmental Health Risk in Alberta): Climate change may have impacts on air quality through an increase in extreme events such as wildfires leading to poor air quality. Accurate measurements of GHG emissions will assist the GoA and industry in implementing the best strategies to reduce GHG emissions.	
AEP ONLY: How This Project Will Address Each Strategic Theme Selected Above.	<p>Environmental and Ecosystem Health and Integrity: The project will quantify GHG emissions from oil sands industrial facilities and help determine potential gaps in the emissions inventory. This is in alignment of the government's Climate Leadership Plan initiatives on- i) implementing carbon levy, ii) implementing oil sand emission limits, and iii) employing a methane emission reduction plan. (Key strategy 1.1)</p> <p>Protected Public Health and Safety from Environmental Conditions and Events: The project is related to the department's strategic outcome of protecting public health from climate change and catastrophic events (e.g. forest fire, drought). Estimation of CO₂ and CH₄ budget in the province will help understanding the climate change effects and prepare appropriate mitigation plans.</p>	
Project Methodology		
List the Key Project Phases and Provide Bullets for Each Major Task Under Each Project Phase. *	<p>I. Measurements of CH₄, CO₂, and selected VOCs over mining and in-situ facilities in the oil sands regions</p> <ul style="list-style-type: none"> • Measurements on facility perimeter • Measurements on component levels • Raster scan on selected facilities • Include selected facilities in Athabasca, Cold Lake, and Peace River region 	
Describe How Changes in Environmental Condition Will Be Assessed. *	Flights will be conducted from spring to early fall to study effects of seasonal changes.	
Are There Benchmarks (e.g., objectives, tiers, triggers, limits, reference conditions, thresholds, etc.) Being Used to Assess Changes in Environmental Condition? If So, Please Describe, If Not, State "NONE". *	NONE	

<p>Provide a Brief Description of the Methods By Project Phase. *</p>	<p>I. Continuous measurements of CH₄, CO₂, and ambient parameters will be conducted through on-board analyzers. Selected VOCs will be measured through flask sampling. NOAA aircraft flights will be conducted over in-situ and open pit mining facilities in Athabasca, Cold Lake and Peace River Oil Sands region. Specifically designed short-leg flights will be used for component level emission characterization. Perimeter flights will be conducted for estimation of facility level emissions. Raster flights will be used on selected facilities for sources of emissions, venting and leaks. Multiple flights will be planned at different months of the year for estimation of seasonal variations and quantification of annual emissions.</p> <p>II. Airborne measurements will be analyzed for facility scale emissions. In addition, component level emissions from mining facilities will be characterized. Profiling of plume from large-area fugitive sources (e.g. tailings ponds, mine faces) and stack emissions will address known gaps in emission estimations that originate from the regions below the safe-level flight altitude. This phase of work will include the data collected from 2017 flights and will be conducted in parallel to phase I. Results will inform flight plans and data validation for phase I.</p> <p>III. Ground level ambient CO₂ and CH₄ concentrations at the locations of aircraft measurements are of importance for extrapolation of pollutant concentrations below the safe flying altitude. Ambient concentrations of both of these GHGs vary spatially and also diurnally (for CO₂). This phase of work will analyze and predict ground level GHGs at flight locations based on available datasets in the oil sands region. Findings in this phase will inform the emission estimates analysis in phase II.</p>
<p>List the Key Indicators Measured. *</p>	<p>CH₄ and CO₂ (C₂H₆, O₃, H₂O are also measured)</p>
<p>Describe Sample Handling Procedures, If Not Applicable, State N/A. *</p>	<p>N/A</p>
<p>List SOPs that Will Be Used, If Not Applicable, State N/A.*</p>	<p>NOAA standard operating procedures for airborne measurements and validation will be used.</p>
<p>Describe the QA/QC Plan, If Not Applicable, State N/A. *</p>	<p>Data QA/QC will be conducted as per NOAA standards.</p>
<p>Describe How Indigenous Communities are Involved in the Project Design, Data Collection, and Analysis (Knowledge Co-creation) and How is their Consent Sought. If Not Applicable, State N/A.*</p>	<p>N/A</p>
<p>Components Delivered by Others</p>	
<p>List by Project or Project Phase Each Component That Will Be Delivered by An External Party (including analytical laboratories) and Name the Party. State None if Not Required. *</p>	<p>Phase I (airborne measurements) will be delivered by NOAA as per agreements. Phase II (data processing and analysis) will be conducted jointly by NOAA and AEP. Phase III (ground level GHG estimation) will be conducted by AEP.</p>
<p>Will These Components be Delivered Under Grant or Contract or Both? Please Describe and Name the Associate Work Plan/Grant/Contract for These Services if Not Included Within This Work Plan. *</p>	<p>Contract (MOU GMD-AEP-2017) signed between AEP and NOAA</p>
<p>Monitoring Site Locations and Coordinates (for all sites, please add them to the Monitoring Site Location tab - a separate excel sheet)</p>	
<p>Attach Map of Locations. Distinguish Indicators by Station if Necessary. Distinguish Sampling Frequency by Station if Necessary.</p>	
<p>Project Schedule</p>	

<p>FOR OIL SANDS MONITORING PROJECTS ONLY: A coordinated field monitoring schedule for the OSM Program is required. Please complete the attached document named "OSM Program Field Monitoring Schedule" in addition to this work plan. Fill as much as you can recognizing that scheduling changes will occur and the scheduling document will be updated regularly. Please note the scheduling document will be shared with stakeholders.</p>	<p>See "OSM Sampling Schedule" tab.</p>	
<p>FOR OIL SANDS MONITORING PROJECTS ONLY: Have You Coordinated With Other Project Leads On Field Logistics? If So, Please Specify. *</p>	<p>The project is coordinated with A-MD-4-1819 (Atmospheric Process Study – OS Air Pollution Emissions, Transformation and Fate) which involves airborne studies on oil-sands facilities. Overlapping of field operations of the two projects during the period of April-July, 2018 is expected. Flight operations during this period will be coordinated through common pre-flight briefings. There are also coordination between the two projects in terms of selection of industry sites and scheduling of aircraft flights.</p>	
Other		
<p>Additional Details.</p>	<p>Project Linkage: I. The project is linked to A-MD-4-1718 (Atmospheric Process Study – OS Air Pollution Emissions, Transformation and Fate), which will study deposition, transport, transformation, and quantification of a broader suite of pollutants through airborne measurements over the period of April to early July, 2018. This project will inform the analysis phase of A-MD-4-1718 in two aspects: <ul style="list-style-type: none"> • Aircrafts used in this project will be suitable for lower altitude and lower radius flight-paths. This will allow characterization (e.g. plume profile, distribution) of component level emissions. There will be additional work towards estimation of ground level ambient concentrations. These findings will be useful in accurate extrapolation of pollutant concentrations from the lowest flight altitude to the ground level. Pollutant concentration extrapolation to ground level at present is known to be a major area of uncertainty. • Flights will be conducted from spring to late fall to capture seasonal effects on emissions both from component and facility levels. These data will inform A-MD-4-1718 analysis phase for more accurate estimation of yearly emission. II. The project will be informed from A-MD-7-1718 (Develop Methods to Measure Tailings Pond Emissions) under which ground based measurements on a tailings pond were done during August-September, 2017. Multiple flights will be conducted over the specific tailings pond within the same time window to correlate ground based observations with aircraft measurements in similar weather conditions.</p>	
<p>Will Capacity Building and Training be a Component of the Project and If So, Explain How. If Not, State N/A.*</p>	<p>The project will build AEP's capacity in data processing and analyzing airborne measurements and quantifying facility and component level emissions.</p>	
<p>Environmental Impact and Considerations.</p>		
Data Management and Digital Assets		
<p>Will Data be Produced as a Result Of This Project? *</p>	<p>Type of Quantitative Data Variables</p>	<p>Frequency Of Collection</p>
<p>Yes</p>	<p>Continuous</p>	<p>Real time</p>
<p>Data Collection Period: Date - End Date</p>	<p>Start Start Date - End Date</p>	<p>Timeline For Upload Period: Start Date - End Date</p>
<p>01/04/2018-31/10/2018</p>	<p>01/01/2019-31/03/2019</p>	
<p>Is There a Data Sharing Agreement? (Yes or No).</p>	<p>No</p>	
<p>Will the Data Include Traditional Knowledge as Defined by and Provided by an Indigenous Representative, Community or Organization (Yes / No).</p>	<p>No</p>	
<p>Platform/Location of Data Storage.</p>	<p>Network Drive</p>	
Project Deliverables		
Proposed 2018-19 Deliverable Type (for each deliverable outline document, presentation, meeting, etc.)		
<p><input type="checkbox"/> Peer-reviewed Journal Publication</p>	<p><input type="checkbox"/> Peer-reviewed Conference Proceeding</p>	<p><input type="checkbox"/> Non-peer reviewed Conference Proceeding</p>
<p>Q1 - Deliverable, Comments</p>	<p>Q1 - Deliverable, Comments</p>	<p>Q1 - Deliverable, Comments</p>

Q2 - Deliverable, Comments	Q2 - Deliverable, Comments	Q2 - Deliverable, Comments
Q3 - Deliverable, Comments	Q3 - Deliverable, Comments	Q3 - Deliverable, Comments
Q4 - Deliverable, Comments	Q4 - Deliverable, Comments	Q4 - Deliverable, Comments
<input checked="" type="checkbox"/> Technical Report	<input type="checkbox"/> Book Chapter	<input type="checkbox"/> Public Dissemination Document
Q1 - Deliverable, Comments	Q1 - Deliverable, Comments	Q1 - Deliverable, Comments
Q2 - Deliverable, Comments	Q2 - Deliverable, Comments	Q2 - Deliverable, Comments
Q3 - Deliverable, Comments	Q3 - Deliverable, Comments	Q3 - Deliverable, Comments
Q4 - Deliverable, Comments	Q4 - Deliverable, Comments	Q4 - Deliverable, Comments
Report titled "2018 AEP-NOAA airborne GHG measurements over the oil sands region"		
<input type="checkbox"/> Conference Presentation(s)	<input type="checkbox"/> Stakeholder Presentation	<input type="checkbox"/> Key Engagement/Participation Meeting *
Q1 - Deliverable, Comments	Q1 - Deliverable, Comments	Q1 - Deliverable, Comments
Choose one	Choose one	Name of Meeting, Year, Location, Dates, Participant Groups and Number of Participants.
Q2 - Deliverable, Comments	Q2 - Deliverable, Comments	Q2 - Deliverable, Comments
Choose one	Choose one	Name of Meeting, Year, Location, Dates, Participant Groups and Number of Participants.
Q3 - Deliverable, Comments	Q3 - Deliverable, Comments	Q3 - Deliverable, Comments
Choose one	Choose one	Name of Meeting, Year, Location, Dates, Participant Groups and Number of Participants.

Q4 - Deliverable, Comments	Q4 - Deliverable, Comments	Q4 - Deliverable, Comments
Choose one	Choose one	Name of Meeting, Year, Location, Dates, Participant Groups and Number of Participants.
<input type="checkbox"/> EMSD Strategic & Operational Publication	<input type="checkbox"/> Other Documents	
Q1 - Deliverable, Comments	Q1 - Deliverable, Comments	
Q2 - Deliverable, Comments	Q2 - Deliverable, Comments	
Q3 - Deliverable, Comments	Q3 - Deliverable, Comments	
Q4 - Deliverable, Comments	Q4 - Deliverable, Comments	
Proposed Deliverables After 2018/2019 for the project funds received in 2018/2019		
<input checked="" type="checkbox"/> Peer-reviewed Journal Publication	<input type="checkbox"/> Peer-reviewed Conference Proceeding	<input type="checkbox"/> Non-peer reviewed Conference Proceeding
Q1 - Deliverable, Comments	Q1 - Deliverable, Comments	Q1 - Deliverable, Comments
Q2 - Deliverable, Comments	Q2 - Deliverable, Comments	Q2 - Deliverable, Comments
Q3 - Deliverable, Comments	Q3 - Deliverable, Comments	Q3 - Deliverable, Comments
Q4 - Deliverable, Comments	Q4 - Deliverable, Comments	Q4 - Deliverable, Comments
Tentative Titles: I. "Comparison of CH ₄ emissions inventory with top-down airborne measurements for in-situ facilities in the oil sands region" II. "Characteristics of GHG emissions from large-area sources in oil sands mining facilities" III. "Estimation of annual emissions of GHG from oil sands facilities by top-down approach based on seasonal airborne measurements"		
<input type="checkbox"/> Technical Report	<input type="checkbox"/> Book Chapter	<input type="checkbox"/> Public Dissemination Document
Q1 - Deliverable, Comments	Q1 - Deliverable, Comments	Q1 - Deliverable, Comments

Q2 - Deliverable, Comments	Q2 - Deliverable, Comments	Q2 - Deliverable, Comments
Q3 - Deliverable, Comments	Q3 - Deliverable, Comments	Q3 - Deliverable, Comments
Q4 - Deliverable, Comments	Q4 - Deliverable, Comments	Q4 - Deliverable, Comments
<input type="checkbox"/> Conference Presentation(s)	<input type="checkbox"/> Stakeholder Presentation	<input type="checkbox"/> Key Engagement/Participation Meeting *
Q1 - Deliverable, Comments	Q1 - Deliverable, Comments	Q1 - Deliverable, Comments
Choose one	Choose one	Name of Meeting, Year, Location, Dates, Participant Groups and Number of Participants.
Q2 - Deliverable, Comments	Q2 - Deliverable, Comments	Q2 - Deliverable, Comments
Choose one	Choose one	Name of Meeting, Year, Location, Dates, Participant Groups and Number of Participants.
Q3 - Deliverable, Comments	Q3 - Deliverable, Comments	Q3 - Deliverable, Comments
Choose one	Choose one	Name of Meeting, Year, Location, Dates, Participant Groups and Number of Participants.
Q4 - Deliverable, Comments	Q4 - Deliverable, Comments	Q4 - Deliverable, Comments
Choose one	Choose one	Name of Meeting, Year, Location, Dates, Participant Groups and Number of Participants.
<input type="checkbox"/> EMSD Strategic & Operational Publication	<input type="checkbox"/> Other Documents	
Q1 - Deliverable, Comments	Q1 - Deliverable, Comments	
Q2 - Deliverable, Comments	Q2 - Deliverable, Comments	
Q3 - Deliverable, Comments	Q3 - Deliverable, Comments	
Q4 - Deliverable, Comments	Q4 - Deliverable, Comments	

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All Completed Products if a multi-year project, specify all completed products to date (consistent format for the fields below). Add rows as required.

Journal Paper

Required Format: Author (follow APA citation format), Year, Title, Journal, Volume, Page Numbers, Open or Closed and Document Location

Example: Jacoby, W. G. (1994). Public Attitudes Toward Government Spending. *American Journal of Political Science*, 38(2), 336-361.

1) Fearon, J. D., & Laitin, D. D. (2003). Ethnicity, Insurgency, and Civil War. *American Political Science Review*, 97(01), 75. doi: 10.1017/S0003055403000534

2) Johnson, M.R., Tyner, D.R., Conley, S., Schwietzke, S., Zavala-Araiza, D. (2017). Comparisons of Airborne Measurements and Inventory Estimates of Methane Emissions in the Alberta Upstream Oil and Gas Sector. *Environ. Sci. Technol.* 51(21), 13008-13017.

3)

4)

5)

Technical Report

Required Format: Author, Year, Title, Publisher Location, Name of Publisher, Publisher, Document Location

Example: Author, F.M. (Publication Year). Title of Report (Report No. XXX). Publisher City, State: Publisher

1)

2)

3)

4)

5)

Book Chapter

Required Format: Author, Year, Title of Paper, Editors, Title of Book, Page Numbers, Location of Publisher, Name of Publisher, Document Location

Example: Hemingway, E. (1999). The Killers. In J. Updike & K. Kenison (Eds.), *The Best American Short Stories of the Century* (pp.78-80). Boston, MA: Houghton Mifflin)

1)

2)

3)

4)

5)

Conference Proceeding

Required Format: Author, Year, Title of Paper, Editors, Title of Proceedings, Name of Conference Location of Conference, Publisher Location, Name of

Example: Author of Paper, A., & Author of Paper, B. (Year, Month date). Title of Paper. In A. Editor, B. Editor, & C. Editor. Title of Published Proceedings. Paper Presented at Title of Conference: Subtitle of Conference, Location (inclusive page numbers). Place of Publication: Publisher.)

1)

2)

3)

4)

5)

Public Dissemination Document

Required Format: Author, Year, Title, Journal / Report, Volume, Publisher, Page Number, Number of Pages, Document Location

1)

2)

3)

4)

5)

AEP ONLY: EMSD Strategic and Operational Publication

Required Format: Author, Year, Title, Publisher Location, Name of Publisher, Publisher, Document Location

1)

2)

3)

4)

5)

Other Documents

Detailed Information of Other Documents

1) 1) Technical report titled "Airborne GHG Emission Measurements (NASA-NOAA)" authored by Quamrul Huda, Lucas Zhang, Bob Myrick and Bill Donahue; March 2018

2)
3)
4)
5)

Conference Presentation

Required Format: Presenter, Date, Location, Title, Platform or Poster, Conference Name

1) Quamrul Huda, Lucas Zhang, Bob Myrick, Bill Donahue, Stephen Conley, Gabrielle Petron, Stefan Schwietzke, Russell Schnell, May 27-31, 2018, Edmonton, "Characterizing Green House Gas Emissions from Alberta Oil Sands Mining Facilities through Airborne Study," 101st Canadian Chemistry

2)
3)
4)
5)

Stakeholder Presentation

Required Format: Presenter, Date, Location, Title, Platform or Poster, Name of Meeting

1)
2)
3)
4)
5)

Key Engagement/Participation Meeting

Required Format: Meeting Host, Date, Location

1)
2)
3)
4)
5)

Human Resources / Staffing Plan (roles and responsibilities)

Name & Role	Organization	Responsibilities
Bob Myrick	EMSD, AEP	Project Coordination
Quamrul Huda	EMSD, AEP	Project Lead, Planning, data processing, analysis and report/manuscript preparation
Lucas Zhang	EMSD, AEP	Planning, data processing, analysis and
Russ Schnell	NOAA	NOAA Project Lead
Stephen Conley	Scientific Aviation	Flight coordination and project scientist
Stefan Schwietzke	NOAA	Planning, data processing, analysis and report/manuscript preparation
Gabrielle Patron	NOAA	Planning, data processing, analysis and
Sonja Wolter	NOAA	Planning, data processing, analysis and
Brogan Erland	University of Alberta	Statistical model development for assessing

AEP ONLY: Additional Human Resources Required from EMSD

Name & Role	Branch - Section	Estimated time (% of annual FTE)
Quamrul Huda	Science	50
Lucas Zhang	Science	30

Financial Details and Budget Request

Source of Funding Requested Year 1 - 2018/19

	AEP ONLY: EMSD	OSM
Salaries and Benefits - AEP Chargeback		96000
Salaries and Benefits - New OSM Staff		0
Operations and Maintenance		
Consumable materials and supplies		
Conferences and meetings travel		
Field work travel		
Project-related travel		
Engagement		
Reporting		
External Contracts - Organization/Vendor/Suppliers		709025
Overhead		
Grants		45000
Capital		
Total budget request for the year	0	850025
Total budget approved		

Source of Funding Requested Year 2 - 2019/20		
	AEP ONLY: EMSD	OSM
Salaries and Benefits - AEP Chargeback		30000
Salaries and Benefits - New OSM Staff		0
Operations and Maintenance		
Consumable materials and supplies		
Conferences and meetings travel		
Field work travel		
Project-related travel		
Engagement		
Reporting		
External Contracts - Organization/Vendor/Suppliers		113750
Overhead		
Grants		45000
Capital		
Total budget request for the year	0	188750
Total budget approved		

Source of Funding Requested Year 3 - 2020/21		
	AEP ONLY: EMSD	OSM
Salaries and Benefits - AEP Chargeback		15000
Salaries and Benefits - New OSM Staff		0
Operations and Maintenance		
Consumable materials and supplies		
Conferences and meetings travel		
Field work travel		
Project-related travel		
Engagement		
Reporting		
External Contracts - Organization/Vendor/Suppliers		63750
Overhead		
Grants		45000
Capital		
Total budget request for the year	0	123750
Total budget approved		

Source of Funding Requested Year 4 - 2021/22		
	AEP ONLY: EMSD	OSM
Salaries and Benefits - AEP Chargeback		
Salaries and Benefits - New OSM Staff		
Operations and Maintenance		
Consumable materials and supplies		
Conferences and meetings travel		
Field work travel		
Project-related travel		
Engagement		
Reporting		
External Contracts - Organization/Vendor/Suppliers		
Overhead		
Grants		
Capital		
Total budget request for the year	0	0
Total budget approved		

Budget Request for the Entire Project	0	1,162,525
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Project Approval(s)

Proposal Submitted by		
Surname	Given Name	Organization
Myrick	Bob	AEP
Signature	Date	

Proposal for OSM Reviewed by		
	Signature	Date
Bob Myrick Director, Airshed Sciences		

AEP Administrator/Coordinator - Review	Signature	Date
	for Bill Donahue Executive Director, Science	

ECCC Administrator/Coordinator - Review	Signature	Date

OSM Project Approved by		
AEP Co-Lead for OSM	Signature	Date

ECCC Co-Lead for OSM	Signature	Date
AEP ONLY: Proposal for EMSD Reviewed by		
EMSD Director	Signature	Date
AEP ONLY: EMSD Project Approved by		
EMSD Executive Director	Signature	Date
EMSD Chief Scientist	Signature	Date
OSM / EMSD Project Has Not Been Approved		
Project Status	Date Notified	Date Required
The project is conditionally approved. The following conditions are required before approval is granted.		
List the Condition(s)		
Condition(s) Addressed / Approval Granted		
Choose one		
OSM / EMSD Approval Post Removal of Condition(s)		
Name & Title	Signature	Date

Activity	Description	USD		
		2018-19	2019-20	2020-21
1. Aircraft Research Flight Hours:	"See Aircraft Budget" tab	\$ 398,620	\$ -	\$ -
2. Flask Analysis:	100 flasks x \$250	\$ 25,000	\$ -	\$ -
3. Planning, Field Operations, Data Processing, Analyses:	Gabrielle Petron 2 x \$16,000	\$ 32,000	\$ 32,000	\$ 16,000
	Stefan Schwietzke 3 x \$13,000	\$ 39,000	\$ 26,000	\$ 13,000
	Sonja Wolter 2 x \$11,000	\$ 22,000	\$ 22,000	\$ 11,000
4. Scientific Publications and Alberta Briefings:	3 months x \$10,000	\$ 30,000	\$ -	\$ -
5. Publication Journal Fees	2 x \$3000	\$ 6,000	\$ 6,000	\$ 6,000
6. Travel and Per Diem: Boulder-Edmonton return	6 person trips @ \$1600/trip	\$ 9,600	\$ -	\$ -
7. NOAA Contract Administration Fee (new NOAA requirement)		\$ 5,000	\$ 5,000	\$ 5,000
		\$ 567,220	\$ 91,000	\$ 51,000
Total in Canadian Dollars	Assuming 1.25 exchange rate	\$ 709,025	\$ 113,750	\$ 63,750

Alberta Oil Sands Study 2018	
Budget	
A. FLIGHTS	
1. Total Flight Hours	300
2. Hourly Rate	\$850
3. Total Flight Cost	\$255,000
Total FIGHT COST	\$255,000
B. ANALYSIS	
1. PhD Scientist (Mackenzie, monthly)	13,750.0
2. # Months	6
3. Total Analysis Cost	\$82,500
B. TRAVEL COST	
1. Alberta Lodging (2-people, 80 nights)	80
a. Lodging @ \$210/night GSA (2 people)	\$33,600
b. Per Diem @ \$92/night GSA (2 people)	\$14,720
c. Rental Car @ \$60/day	\$4,800
d. Hangar @ \$100/day	\$8,000
e. Airfare (not required)	\$0
TOTAL REIMBURSEMENT	\$61,120
TOTAL SCIENTIFIC AVIATION BUDGET	\$398,620

Transit to and from Alberta (3*16 hours)	48
36 Sampling Flights@7hrs/Flight	252
Total Flight Hours	300

TOTAL PROJECT COST	\$398,620
MOBILE LAB OPTION (including FLIR+PICARRO)	\$106,000
TOTAL PROJECT COST WITH MOBILE LAB (GROUND)	\$504,620

Oil Sands Monitoring Program - Field Sampling Schedule

Last updated: 02/01/2018
 Project Workplan Identifier Number: A-RC-44-1718
 Project Lead and Contact Information: Bill Donohue
 Completed by: Quamrul Huda

A coordinated field program schedule is needed to better support our interactions with stakeholders including industry. This schedule will be

Region	Station Name and Description	Station Code	OSM Site name (if applicable)	Latitude	Longitude	On First Nation Reserve or Métis Settlement?
Athabasca	CNRIL Horizon, Suncor Firebag			57.84100278	-111.8141667 N	
Athabasca	CNRIL Horizon, Shell Albian			57.23618611	-111.4547222 N	
Athabasca	Suncor Millennium			56.97449722	-111.3569444 N	
Athabasca	Suncor Millennium, Syncrude Mildred Lake			56.97449722	-111.3569444 N	
Athabasca	CNRIL Horizon, Suncor Millennium			56.97449722	-111.3569444 N	
Cold Lake	Lloydminster			53.98263889	-110.4297222 N	
Cold Lake	Shell Scoford, Imperial Cold Lake			53.79923333	-113.0975 N	
Peace River	Seal Lake, Three Creek			56.113025	-116.2113889 N	

