

FOCUSED STUDY ACTIVITY WORK PLAN

General Information

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| Work Plan Unique Identifier: | A-IC-1-1718 |
| Focused Study Activity Title: | Ambient Air Quality Surveillance: Beaver River Valley |
| Focused Study Category: | Investigation of Cause or Potential Ecological Impact |
| Geographic Location (<i>choose from drop-down menu. If Project Location is in more than one area choose from second drop-down</i>) | Cold Lake Oil Sands Deposit |
| Monitoring Site(s) Coordinates (<i>latitude and longitude</i>) | Beaver River Valley (coordinates not available) |
| Project Leader: | Michael Bisaga |
| Organization and contact information: | Lakeland Industry and Community Association |
| Date Study initiated: | January 1, 2017 |
| Monitoring Category: <i>(From OSM long-term plan; choose from drop-down menu)</i> | Atmospheric Monitoring |
| Strategic Objective of Focused Study: (<i>From OSM long-term plan; choose from drop-down menu</i>) | Objective A1: Detect and report concentration levels and trends of atmospheric substances that are likely to cause adverse human and/or environmental health effects. |
| Hypotheses: <i>(Briefly outline the specific hypotheses that your focused study is aiming to address)</i> | Air emissions from cold heavy oil production with sand (CHOPS) facilities are degrading air quality in the Beaver River Valley via transport associated with river valley flow drainage. |
| Deliverables: <i>What tangible goal (s) and/or product(s) will the monitoring produce and when?</i> | Data will be available monthly from this project (within 60 days of data collection). Interim annual reports will be produced October 31 summarizing the data collected from the previous year. |

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:

Air quality, Beaver River Valley, PM_{2.5}, O₃, NO₂, SO₂, Cold Heavy Oil Production with Sand (CHOPS), River Valley Flow

Describe how you will test your hypothesis:

The rationale for this study is anecdotal evidence from community members that air emissions from CHOPS facilities are degrading air quality in the Beaver River Valley. Hence, LICA stakeholders would like to investigate the potential for poor air quality in the Beaver River valley. There is concern that atmospheric emissions from CHOPS facilities may be draining into the valley, accumulating, and then flowing down-valley.

The hypothesis will be tested in two phases:

Phase 1 – Determine the frequency and conditions under which air from the CHOPS facilities could be transported into and along the Beaver River Valley (Jan 2017 – Dec 2018 campaign). Standard meteorological equipment will be deployed at a site in the valley by January 1, 2017 for at least one year to measure hourly averages of various meteorological parameters (e.g. wind speed, wind direction, air temperature). This data will be used to assess the frequency of drainage flows occurring from the area of the CHOPS facilities.

Phase 2 – If river valley flow drainage is occurring regularly, then an air quality assessment component will be added (Jan 2018 – Dec 2018 campaign). Standard air quality monitors for SO₂, O₃, NO₂ and PM_{2.5} mass would be deployed alongside the meteorological equipment for at least an additional year.

The goal of this hypothesis is to investigate the cause(s) of poor air quality reported in the Beaver River Valley. One full year of ambient air monitoring data (as outlined in Phases 1 and 2) would be sufficient to answer this hypothesis.

Assumptions and Constraints behind the hypothesis and the testing method:

The Portable Air Monitoring Lab (PAML), or an equivalent shelter, will be available to house air monitoring equipment for two years until at least December 2018. Sufficient power at the site to run the air sampling and meteorological equipment. The availability of funds to deploy/maintain equipment as well as qualified staff to interpret data and write annual reports.

References:

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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 : 2017-06-01 End: 2018-12-31 |
| Data Analysis Period: <i>Laboratory analysis and QA/QC of data</i> | Start : 2017-03-01 End: 2019-03-01 |
| 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> | 2017-04-01 |

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 |
|---|---|------------------------------|
| Meteorology Associated with Valley Flow Drainage in the Beaver River Valley | Report: analysis of phase 1 (meteorology data only) and determining the frequency and conditions which generate valley flow drainage | 2018 |
| The Influence of CHOPS Emissions on SO ₂ , O ₃ , NO ₂ and PM _{2.5} in the Beaver River Valley | Report: analysis of phase 2 (meteorology and air pollutant data) and determining if CHOPS emissions and river valley drainage flow cause poor air quality | 2019 (if necessary) |

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 |
|-----------------------|---|---|
| Program Co-ordination | <ol style="list-style-type: none"> 1) Provides overall technical project management of LICA ambient air monitoring programs. 2) Provides data management, quality assurance/control, and reporting support. 3) Provides overall administrative support for all LICA monitoring and non-monitoring programs | <ol style="list-style-type: none"> 1) Michael Bisaga (LICA) 2) Data and Reporting Specialist (LICA, to be determined) 3) Administrative Support (to be determined) |
| Program Support | <ol style="list-style-type: none"> 1) Provides program management on behalf of AEP 2) Provides technical expertise for data interpretation and writing of the technical reports | <ol style="list-style-type: none"> 1) Bob Myrick (AEP) 2) Greg Wentworth (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’.



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| Deliverable(s) (please provide enough information to support status reporting) |
| Q1 – April to June |
| -Meteorological instrumentation will already be calibrated and running (sampling start date: January 2017) |
| -Collect meteorological data |
| -QA/QC data and produce monthly data summaries |
| Q2 – July to September |
| -Collect meteorological data |
| -QA/QC data and produce monthly data summaries |
| -Identify equipment needs for air quality monitoring |
| Q3 – October to December |
| -Collect meteorological data |
| -QA/QC data and produce monthly data summaries |
| -Set up and calibrate air quality monitoring instrumentation (for Phase 2) |
| Q4 – January to March |
| -Collect meteorological data |
| -QA/QC data and produce monthly data summaries |
| -Complete report on the frequency and meteorology associated with valley flow drainage |
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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: | | |
| Helicopter Costs | \$ | \$ |
| Field Costs | \$ | \$ |
| Data Management | \$ | \$ |
| Internal Lab Analysis | \$ | \$ |
| Consumable Materials & Supplies | \$ | \$ |
| Sub-Total | \$0 | \$ |
| O&M - Travel | | |
| Field Work | \$ | \$ |
| Conferences (<i>identify conference</i>) | \$ | \$ |
| Meeting (<i>identify meeting</i>) | \$ | \$ |
| | | |
| Sub-Total | \$0 | \$ |
| O&M - External Contracts : | | |
| Goods and Services Contract (<i>LICA Airshed</i>) | \$66,500 | \$ |
| External Lab Analysis | \$0 | \$ |
| Sub-Total | \$66,500 | \$ |
| Salaries: | | |
| Principal Investigator | 0.005 FTE (\$500) | \$ |
| Technical / Professional Assistants | 0.01 FTE (\$1000) | \$ |
| Field Staff | \$0 | \$ |
| Sub-Total | 0.015 FTE (\$1500) | \$ |
| | | |
| Total Salaries | 0.15 FTE (\$1500) | \$ |
| Total O&M | \$66,500 | \$ |
| 2017-2018 GRAND TOTAL* | \$68,000 | \$ |

Appendix A - Approvals

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|--|------------|---|
| Project Submitted by: | | |
| Name: | | |
| Organization: | 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 (2019- 2020) | |
|--------------------------------------|---------------------|---------|---------------------|---------|---------------------|---------|
| | Cash | In-kind | Cash | In-kind | Cash | In-kind |
| 1) Salaries and benefits | | | | | | |
| a) Investigators | 0.005 FTE (\$500) | | 0.005 FTE (\$500) | | 0.01 FTE (\$1000) | |
| b) Technical/professional assistants | 0.01 FTE (\$1000) | | 0.01 FTE (\$1000) | | 0.05 FTE (\$5000) | |
| c) Field Staff | | | | | | |
| d) | | | | | | |
| 2) Operations and maintenance | | | | | | |
| a) Facilities | | | | | | |
| b) Equipment | | | | | | |
| c) Lab analysis | | | | | | |
| d) Data management | | | | | | |
| e) Field work | | | | | | |
| 3) Consumable Materials and supplies | | | | | | |
| a) | | | | | | |
| b) | | | | | | |
| 4) Travel | | | | | | |
| a) Conferences and meetings | | | | | | |

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|----------------------------------|--------------------|--|---------------------|--|-------------------|--|
| b) Field work | | | | | | |
| c) Project-related travel | | | | | | |
| 5) Dissemination & Engagement | | | | | | |
| a) Publications/Reports | | | | | | |
| b) Translation (if required) | | | | | | |
| c) Communications | | | | | | |
| d) Stakeholder Engagement | | | | | | |
| e) Indigenous Peoples Engagement | | | | | | |
| 6) External Contracts | | | | | | |
| a) | \$66,500 (Phase 1) | | \$100,000 (Phase 2) | | | |
| Grand Total | \$68,000 | | \$101,500 | | 0.06 FTE (\$6000) | |

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) | Budget |
| Q1 – April to June | |
| -Collect meteorological and air pollutant data | |
| -QA/QC data and produce monthly data summaries | |
| -Complete report on the frequency and meteorology associated with valley flow drainage | |
| | |
| Q2 – July to September | |
| -Collect meteorological and air pollutant data | |
| -QA/QC data and produce monthly data summaries | |
| -Deploy air quality monitoring equipment (calibrate and start-up) | |
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| Q3 – October to December | |
| -Collect meteorological and air quality data | |
| -QA/QC data and produce monthly data summaries | |
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| Q4 – January to March | |
| -Complete sample collection | |
| -Upload 100% of the QA/QC'ed data to the LICA and/or AEP website | |
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| Total Annual Budget | |

| Year 3 (2019- 2020) | |
|--|--------|
| Deliverable(s) (please provide enough information to support status reporting) | Budget |
| Q1 – April to June | |
| -Draft report on the impact of CHOPS facilities on air quality in the Beaver River Valley | |
| -Assess future requirements of continuous and/or passive monitoring in the Beaver River Valley | |
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| Q2 – July to September | |
| -Finalize report on the impact of CHOPS facilities on air quality in the Beaver River Valley | |
| -Assess future requirements of continuous and/or passive monitoring in the Beaver River Valley | |
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| Q3 – October to December | |
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| Q4 – January to March | |
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| Total Annual Budget | |