

**APPROVAL OF THE 2018 – 2019
AMBIENT ENVIRONMENT MONITORING PLAN for OIL SANDS DEVELOPMENT**

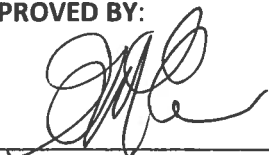
George Enei, representing the Environment and Climate Change Canada (ECCC), and
Fred Wrona, representing the Alberta Environment and Parks (AEP),

Hereby approve the attached 2018-19 Ambient Environment Monitoring Plan for Oil Sands
Development.

CONDITIONS

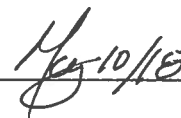
1. Approved funding envelopes will be fully released upon receipt and final co-Chair approval of the updated work plans.
2. Budgets are to be managed to ensure approved activities are delivered efficiently without unnecessary spending or exceeding allocated amounts.
3. Any potential major change requests to approved activities and budgets are to be identified as early as possible and communicated to co-Chairs for approval.
4. Final total expenditures will not exceed **\$60,438,642 million**.
5. All data and information generated will be made publicly available and accessible as soon as possible following its collection and verification through quality assurance and quality control procedures, and will be accompanied by the appropriate context about the significance of the results.
6. Any data or information that has immediate and significant impact on human or ecosystem health will be provided to the responsible agencies and potentially affected groups.
7. Alberta Environment and Parks, and Environment and Climate Change Canada will work collaboratively on any communication arising from this work.

APPROVED BY:



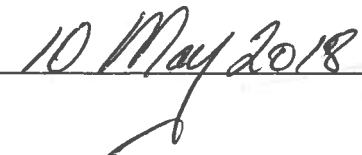
George Enei
Assistant Deputy Minister Science and Technology,
Environment and Climate Change Canada (ECCC)
Government of Canada

Date: _____



Fred Wrona
Chief Scientist, Alberta Environment and Parks,
Assistant Deputy Minister
Environmental Monitoring and Science Division,
Alberta Environment and Parks (AEP)
Government of Alberta

Date: _____



2018 – 2019 AMBIENT ENVIRONMENT MONITORING PLAN for OIL SANDS DEVELOPMENT

Activity Identifier	Activity Name	ECCC	AEP	Undetermined Third Party	WBEA	ABMI	LICA	PRAMP	University of Alberta	University of Calgary	Ducks Unlimited	Approved 2018-19 Budget
	Atmospheric Monitoring (Core)											
A-LTM-S-1-1819	Atmospheric Pollutant Active Monitoring Network		\$12,000		\$7,465,003		\$712,516	\$1,013,389				\$9,202,908
	Total for Atmospheric Monitoring (Core)	\$0	\$12,000	\$0	\$7,465,003	\$0	\$712,516	\$1,013,389	\$0	\$0	\$0	\$9,202,908
	Atmospheric Monitoring (FS)											
A-MD-1-1819	Method Comparison of Wet Precipitation (NADP vs AB)		\$24,000		\$20,092							\$44,092
A-PD-3-1819	Ambient Air Monitoring Network Optimization	\$108,700	\$72,000									\$180,700
A-PD-4-1719	Atmospheric Process Study - OS Air Pollution, Emissions, Transformation and Fate	\$4,454,901										\$4,454,901
A-RC-44-1819	Airborne GHG Emission Measurements (NASA-NOAA)		\$96,000	\$754,025								\$850,025
A-PD-5-1819	Atmospheric Process Study - Enhanced Ground-Based Monitoring - Oski-otin Monitoring site	\$1,197,990										\$1,197,990
A-MD-7-1819	Develop Methods to Measure Tailings Ponds Emissions	\$150,000	\$50,000									\$200,000
A-IC-1-1819	Ambient Air Quality Surveillance: Beaver River Valley		\$24,000				\$11,250					\$35,250
	Total for Atmospheric Monitoring (FS)	\$5,911,591	\$266,000	\$754,025	\$20,092	\$0	\$11,250	\$0	\$0	\$0	\$0	\$6,962,958
	Deposition Monitoring											
A-LTM-S-2-1819	Atmospheric Pollutant Passive Monitoring Network		\$24,000				\$143,768	\$39,000				\$206,768
A-LTM-S-3-1819	Atmospheric Pollutant Deposition Monitoring Network - to Forest Ecosystems		\$60,000		\$1,425,347							\$1,485,347
A-LTM-S-4-1819	Meteorological Network		\$12,000		\$226,067							\$238,067
B-PD-12-1819	Forest Health Monitoring Program Design Review		\$12,000		\$1,400,000							\$1,412,000
A-LTM-S-9-1819	Atmospheric Pollutant Deposition Monitoring - Lakes and Snowpack											\$0
A-LTM-E-8-1819	Acid Sensitive Lakes Monitoring											\$0
A-IC-4-1819	Atmospheric Deposition - Identification of Sources of Contaminants in Snowpack and Lake Sediments											\$0
A-MD-2-1819	Atmospheric Process Study - Deposition and Effects											\$0

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New Project 4	Cold Lake Soil Acidification Monitoring Program											\$0
New Project 5	Assessing the impact of nutrient and alkaline dust emissions on jack pine forests in the AOSR											\$0
New Project 6	Are Lakes and Tailings Ponds Sources of Atmospheric Ammonia?											\$0
A-IC-2-1819	Development of an integrated study on mercury in the oil sands region	\$148,739										\$148,739
Total for Deposition Monitoring		\$148,739	\$108,000	\$0	\$3,051,414	\$0	\$143,768	\$39,000	\$0	\$0	\$0	\$3,490,921
Water Monitoring (Core)												
W-LTM-S-1-1819	Surface Water Quantity Monitoring - Water Levels and Flows	\$2,030,000	\$750,000									\$2,780,000
W-LTM-S-2-1819	Surface Water Quality Monitoring	\$2,156,771	\$3,728,796						\$0			\$5,885,567
Total for Water Monitoring (Core)		\$4,186,771	\$4,478,796	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$8,665,567
Water Monitoring (FS)												
W-MD-1-1819	Develop an Accredited Standard Method for Quantitative Analysis of Naphthenic Acids Concentrations	\$189,246										\$189,246
W-MD-2-1819	Develop Quantitative Methods to Monitor Tailings Pond Seepage											\$0
W-MD-7-1819	Representative Sub-Basin Studies - Ells and Steepbank Rivers (REPs)									\$240,250		\$240,250
W-IC-22-1819	Correlation of Anthropogenic Stressors with Changes in Water Quality (Tributary Systems)	\$178,000										\$178,000
W-RC-1-1819	Enhanced monitoring of the Lower Athabasca - OSPW		\$250,000									\$250,000
New Project 10	Naphthenic Acid Sample Holding Time Study											\$0
New Project 12	SOP development for continuously recording data sondes											\$0
W-MD-2-1819	Real-time Water Quality Monitoring - Lake Athabasca	\$219,883										\$219,883
Total for Water Monitoring (FS)		\$587,129	\$250,000	\$0	\$0	\$0	\$0	\$0	\$0	\$240,250	\$0	\$1,077,379
Groundwater Monitoring												
GW-LTM-S-3-1819	Groundwater Monitoring		\$500,000									\$500,000

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GW-MD-3-1819	Assessment of GW Monitoring - Towards a Comprehensive GW Monitoring Strategy/Design											\$0
GW-PD-1-1819	A Monitoring, Evaluation and Reporting Plan for Groundwater in Alberta's Athabasca Oil Sands Area		\$183,200									\$183,200
New Project 2	Oil Sands Area Groundwater Well Maintenance Program											\$0
GW-MD-1-1819	Groundwater Surface-Water Interactions	\$46,845										\$46,845
Total for Groundwater Monitoring		\$46,845	\$683,200	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$730,045
Biodiversity Monitoring (Core)												
B-LTM-S-1-1819	Regional Terrestrial/Aquatic Monitoring - Status and Trends					\$5,610,000						\$5,610,000
B-LTM-S-2-1819	Regional Habitat Disruption Monitoring - Status and Trends of Footprint											
B-LTM-E-2-1819	Quantifying Risk from Oil Sands Mining to Endangered Whooping Cranes	\$130,219										\$130,219
B-LTM-E-3-1819	Biotic Response to Habitat Disturbance of Focal Wildlife	\$90,000										\$90,000
B-LTM-E-5-1819	Biodiversity Monitoring of Benthic Macro Invertebrates	\$1,410,925	\$83,000									\$1,493,925
B-LTM-E-6-1819	Biotic Response of Ungulates to Oil Sands Activity		\$400,250									\$400,250
B-LTM-E-8-1819	Fish Health Monitoring	\$1,374,110										\$1,374,110
Total for Biodiversity Monitoring (Core)		\$3,005,254	\$483,250	\$0	\$0	\$5,610,000	\$0	\$0	\$0	\$0	\$0	\$9,098,504
Biodiversity Monitoring (FS)												
B-MD-1-1819	Boreal Caribou Census Through DNA Estimates		\$326,250									\$326,250
B-IC-1-1819	Monitoring Benthic-Macro Invertebrates: Investigation of Cause of Nutrients Signatures in the Athabasca River	\$89,518										\$89,518
B-IC-9-1819	Wildlife Contaminants and Toxicology: Investigation of Pathophysiological Effects	\$494,000										\$494,000
B-IC-8-1819	Colonial Waterbirds Monitoring: Temporal and Spatial Patterns in Mercury Levels in Gull and Tern Eggs and Possible Underlying Factors											\$0
B-RC-11-1819	Monitoring Fish Communities		\$159,500	\$14,000								\$173,500

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B-RC-9-1819	Evaluation of Study and Sampling Design for Establishing Reference Condition of Benthic Biodiversity in Peace and Cold Lake Oil Sands Areas	\$523,613	\$69,000									\$592,613
New Project 11	Response of large mammals to oil sands development: Development and application of a Multiple Evidence Based approach											\$0
New Project 20	OSM Biotic Response Monitoring Plan											\$0
Total for Biodiversity Monitoring (FS)		\$1,107,131	\$554,750	\$14,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,675,881
Wetlands Monitoring (FS)												
WL-PD-10-1819	NEW Wetland Ecosystem Monitoring		\$836,305	\$844,680	\$106,200							\$1,787,185
WL-PD-5-1819	Design of Deltaic Wetland Ecosystem Health Monitoring Program	\$400,000										\$400,000
WL-MD-6-1819	Remote Sensing Wetland Ecosystem Change Detection Method Development											\$0
WL-IC-11-1819	Amphibian and Wetland Health: Investigation of Wetland Ecosystem Health	\$424,000										\$424,000
New Project 15	Acquisition of Aerial High-Resolution Digital Ground Terrain Information in the Peace Athabasca Delta for Wetland Monitoring											\$0
Total for Wetlands Projects		\$824,000	\$836,305	\$844,680	\$106,200	\$0	\$0	\$0	\$0	\$0	\$0	\$2,611,185
Community Based Monitoring												
A-CM-1-1819	Strengthen Community Reporting of Odours - Ambient Air Odour Study		\$24,000		\$305,000							\$329,000
A-CM-8-1819	Acute Odour Monitoring Network Pilot Study		\$12,000		\$37,547							\$49,547
B-CM-1-1819	Community-Based Fish Monitoring Pilot Project		\$213,950	\$280,500								\$494,450
B-CM-3-1819	Community Led Berry Contamination Study - Expansion		\$129,000		\$319,210							\$448,210
	Community Led Berry Contamination Study (Fort McKay)				\$158,868							\$158,868
WL-CM-2-1819	Culturally Important Wetland Plants		\$158,000	\$319,000								\$477,000
F-CM-1-1819	Oil Sands Monitoring CBM Fund		\$500,000									\$500,000
B-CM-5-1819	Focal Plants Monitoring			\$167,000								\$167,000

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B-CM-6-1819	Where are the Freshwater Clams? An Exploration Using Community-Based Methodologies Linking TEK and Western Science Knowledge Systems to Land Use Decision-Making - Year 2		\$114,863	\$210,130								\$324,993
Total for CBM Projects		\$0	\$1,151,813	\$976,630	\$820,625	\$0	\$0	\$0	\$0	\$0	\$0	\$2,949,068
Cross Cutting												
D-1-1819	Standard Operating Procedures for Monitoring - Collating and Auditing		\$180,000									\$180,000
D-2-1819	OSM Data Management System & Portal		\$660,000	\$1,750,000								\$2,410,000
D-4-1819	OSM Asset Management System		\$23,000									\$23,000
D-5-1819	AEP Data Management Program											\$0
D-6-1819	OSM Data Publishing and Improvements to Standardization, Storage and Master Data Management	\$385,000										\$385,000
E-5-1819	Develop Environmental Predictions Framework		\$350,000									\$350,000
R-1-1819	Reporting Ambient Monitoring Results - Air Evaluation Integration Synthesis and Reporting - Technical Audience	\$180,000										\$180,000
R-5-1819	Integration & Evaluation - Ecosystem Health/ Biotic Synthesis Wildlife Contaminants Component											\$0
D-3-1819	GIS Data Management Environment		\$332,000									\$332,000
D-7-1819	Primary website to provide all information and data access for the OSM Program for Integrated Reporting of Environmental Condition		\$34,750	\$20,000								\$54,750
E-6-1819	Integrated Analytics and Reporting on Environmental Condition in the Oil Sands Region		\$2,429,000									\$2,429,000
Total for Cross Cutting Projects		\$565,000	\$4,008,750	\$1,770,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$6,343,750
Total for Oil Sands Monitoring Program Activities		\$16,382,460	\$12,832,864	\$4,359,335	\$11,463,334	\$5,610,000	\$867,534	\$1,052,389	\$0	\$240,250	\$0	\$52,808,166

Oil Sands Program Office												
ADM-1-1819	Secretariat Support – ECCC & AEP	\$315,876	\$850,000									\$1,165,876
	OSM External Collaboration System (Box and Innotas)		\$49,600									\$49,600
	OSM Program Reporting		\$75,000									\$75,000
			\$75,000									\$75,000
	Work Planning for 2019/20 - Multi-Stakeholder Workshops		\$350,000									\$350,000
	OS Science Symposium and Multi-stakeholder meetings		\$415,000									\$415,000
	Capital Purchase		\$0									\$0
	Indigenous Participation - Program		\$1,000,000									\$1,000,000
	Indigenous Participation - CBM		\$1,000,000									\$1,000,000
	Tentative - OSM Space in Ft. McMurray		\$300,000									\$300,000
Placeholder: OSM Program Office Setup		\$3,200,000									\$3,200,000	
Total for Oil Sands Program Office		\$315,876	\$7,314,600	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$7,630,476
GRAND TOTAL FOR 2018-19 OIL SANDS MONITORING PROGRAM		\$16,698,336	\$19,909,714	\$4,359,335	\$11,463,334	\$5,610,000	\$867,534	\$1,052,389	\$0	\$240,250	\$0	\$60,438,642

Note: Some joint projects were approved at amounts lower than the original request; work plans associated with those projects will be revised to reflect final budget approval. This table will be updated to reflect changes where required.

Summary of 2018-19 OSM Funding by Organisation and Themes

Thematic Areas	Government		Monitoring Organisations						Academic Institutions		Total Allocation
	ECCC	AEP	Undetermined Third Party	WBEA	ABMI	LICA	PRAMP	Ducks Unlimited	University of Alberta	University of Calgary	
Total for Atmospheric Monitoring (Core)	\$0	\$12,000	\$0	\$7,465,003	\$0	\$712,516	\$1,013,389	\$0	\$0	\$0	\$9,202,908
Total for Atmospheric Monitoring (FS)	\$5,911,591	\$266,000	\$754,025	\$20,092	\$0	\$11,250	\$0	\$0	\$0	\$0	\$6,962,958
Total for Deposition Monitoring	\$148,739	\$108,000	\$0	\$3,051,414	\$0	\$143,768	\$39,000	\$0	\$0	\$0	\$3,490,921
Total for Water Monitoring (Core)	\$4,186,771	\$4,478,796	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$8,665,567
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Total for Groundwater Monitoring	\$46,845	\$683,200	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$730,045
Total for Biodiversity Monitoring (Core)	\$3,005,254	\$483,250	\$0	\$0	\$5,610,000	\$0	\$0	\$0	\$0	\$0	\$9,098,504
Total for Biodiversity Monitoring (FS)	\$1,107,131	\$554,750	\$14,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$1,675,881
Total for Wetlands Projects	\$824,000	\$836,305	\$844,680	\$106,200	\$0	\$0	\$0	\$0	\$0	\$0	\$2,611,185
Total for CBM Projects	\$0	\$1,151,813	\$976,630	\$820,625	\$0	\$0	\$0	\$0	\$0	\$0	\$2,949,068
Total for Cross Cutting Projects	\$565,000	\$4,008,750	\$1,770,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$6,343,750
Total for Existing and New Projects	\$16,382,460	\$12,832,864	\$4,359,335	\$11,463,334	\$5,610,000	\$867,534	\$1,052,389	\$0	\$240,250	\$0	\$52,808,166
Total for Oil Sands Program Office	\$315,876	\$7,314,600	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$7,630,476
Grand Total	\$16,698,336	\$20,147,464	\$4,359,335	\$11,463,334	\$5,610,000	\$867,534	\$1,052,389	\$0	\$240,250	\$0	\$60,438,642

Glossary

- Long-term Monitoring - Surveillance (LTM-S): refers to the routine monitoring of status and trends of physical/chemical/biological parameters related to oils sands development activities to detect and evaluate changes in the environment over a period of time, typically >5 years.
- Long-term Monitoring - Effects (LTM-E): refers to the monitoring and assessment of the effects of oils sands development activities on biological endpoints (individual, population and community). This monitoring is implemented over a period, typically >5 years.
- Focused Study (FS): A class of purposeful, requested projects with definite start- and end-dates (typically 3 years), according to the characteristics described below.
- Method Development (MD): refers to a study carried out to address limitation or deficiency identified in current monitoring design and/or protocols that may impair the effective monitoring of residual risk.
- This study requires a statement describing how the deficiency will be mitigated.
- Effects Confirmation (EC): refers to a study carried out to confirm or quantify an initial observation of significant effect.
- Investigation of Cause (IC): refers to hypothesis-driven studies designed to characterize the potential cause of an observed adverse effect. This study is launched only when a specific observation or monitoring result warrants mitigation.
- Establishing Reference Conditions (RC): refers to the monitoring and assessment of existing conditions to characterize an anthropogenically undisturbed or minimally disturbed environmental state as distinct from a disturbed state relative a particular stressor. This study requires a statement of the expected outcome.
- Community Based Monitoring (CBM): refers to collaboration between concerned citizens, government agencies, industry, academia, community groups, and local institutions to monitor issues of common concern.

ACRONYMS

- ECCC: Environment and Climate Change Canada
- AEP: Alberta Environment and Parks
- WBEA: Wood Buffalo Environmental Association
- LICA: Lakeland Industry & Community Association
- PRAMP: Peace River Area Monitoring Program
- DUC: Ducks Unlimited Canada
- U of A: University of Alberta
- U of C: University of Calgary
- ABMI: Alberta Biodiversity Monitoring Institute