Project Summary, Milestones, Payment Schedule and Quarterly Update Reports

Q4 2023

Project Summary

Project Title:	Controlled Methane Injection Pilot Demonstration of a Biocover Concept for Mitigating Leaking Oil and Gas Wells
Lead Investigator:	Millennium EMS Solutions Ltd
PTAC Managed Funds Award Amount $:	$200,000
PTAC Committee Sponsor	Wade Hartzell, CNRL
GL #:	AUPRF2022-000126
Other Funding Amounts and Sources:	$
Start Date:	July 2022
Completion Date:	September 2024
Final Report Due Date:	September 2024

Provide a brief description of the challenges this project aims to address and how industry and others will benefit including what the anticipated impact is. (i.e., cost reductions, improved environmental performance, impact on regulation, enhanced access to resources). (Maximum 150 words or less)

Well integrity failure is an expensive historic and ongoing issue associated with a subset of oil and gas wells. Failure manifests as surface casing vent flow (SCVF; inside casing leakage) and/or gas migration (GM; outside casing leakage) whereby natural gas (comprised primarily of methane) is potentially emitted to atmosphere causing greenhouse gas (GHG) emissions. Remediation of integrity failure is challenging and expensive. Currently, to attain a certificate of restoration, there is no practical alternative to full abandonment or re-abandonment for a well exhibiting integrity failure and emitting where GHG emissions may be minimal with full re-abandonment carrying a greater

potential risk to the environment and generating greater levels of GHG emissions. As a result, there is need for cost effective alternative options for mitigation of leaking oil and gas wells, particularly for marginal leakage, where emissions pose a low risk to the environment and are contributing only minimally to GHG emissions.

List key milestones with invoicing schedule.

	Milestone	Expenditures[1]	Quarter[2] (e.g., Q2 2021/22
1	**Literature Review**	$6,450	Q4 2022
2	**Biocover design, soil mixture testing, workplan**	$10,757	Q4 2022
3	**Preliminary modelling**	$10,750	Q1 2023
4	**Construction & instrumentation**	$57,979	Q2 2023
5	**Project management, meetings, H&S**	$4,064	Q2/Q3 2023
6	**Completion of construction & instrumentation**	$7,711	Q3 2023
7	**Update Reporting/Communication**	$5,970	Q3 2023
8	**Biocover Operation and Monitoring**	$56,969	Q3 2023 to Q2 2024
9	**Data Analysis & Modeling**	$14,560	Q2 2024
10	**Report, Presentation, Technical Paper**	$20,630	Q3 2024
11	**Project management/meetings**	$4,160	Q3 2024
	Total	$200,000	

Quarterly Update: e.g., Q3 2022/23

Exception Highlight for the Quarter:

1. Costs of materials/contractors have exceeded original projections (inflation) but this was considered in year 2 budget
2. Due to delays caused by supply chain issues only baseline data was collected by end of quarter

Update on scope, key questions, gap analysis and work performed this quarter (include any requests for assistance to PTAC or the committees)

[1] All expenditures in Canadian dollars and must include GST and other applicable taxes
[2] Quarters are based on fiscal calendar e.g., Q3 2021/22 is Oct-Dec 2021

Biocell construction was completed along with baseline testing/analysis.

Budget Summary Update

Revenues and Expenditures	Total Budget	Budget to date	Project charges this quarter	Project charges to date	Variance of budget to actuals to date	Forecasted Total Project (no. of quarters of actual plus	Variance of total budget to forecast
Funds received And from whom	$200,000	$141,000	$39,000	$141,000	-	$200,000	-
Expenses							

Variance analysis (includes changes to invoicing schedule)
1. Some delays in biocell construction due to supply chain/subcontractors and delays securing location; construction is underway and project getting back on schedule.
2. Cost of materials/contractors has increased since original estimate; this was considered in year 2 budget
Etc….