

Project Summary, Milestones, Payment Schedule and Quarterly Update Reports

Report Date (Q3 October 1 – December 31, 2023)

Project Summary

Project Title:	Investigate the potential for surface casing vent flow/groundwater migration issues
Lead Investigator:	Dr. Cathryn Ryan
AUPRF Managed Funds Award Amount:	\$200,000
PTAC Technical Champion:	Tannis Such
GL #:	
Project Total Cost (all years)	\$ 684.3K (direct)
Leveraged Cash Funding (all years)	\$352,000 NSERC CRD \$100,000 CFREF Scholarship to PhD candidate Tiago A. Morais \$32,300 Scholarships to MSc candidate Neil Fleming (John Galloway, AB Graduate Excellence, Society Petroleum Engineers, Redevelop)
Leveraged In-Kind Funding (all years)	\$ n/a
Start Date:	December 1, 2015
Completion Date:	August 31, 2024 (although PTAC funds are effectively spent out now)
Final Report Due Date:	August 31, 2024 (for NSERC funds)

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)

Challenges: Leaky wells are a liability that is very challenging for the industry to manage, particularly for wells that are 'low-leakers', which are difficult to repair.

This research seeks to i) increase knowledge about how gas moves in the subsurface, and ii) to develop best practices to monitor and guide remediation attempts around leaky wells.

The following phases are COMPLETE:

Phase 1: Comparison of gas migration testing approaches across several O&G wells. Provided insights into the most effective approaches to detect the presence of fugitive migration around leaky wells.

Phase 2.1: Detailed characterization of fugitive emissions around a leaky O&G well. Provided a better understanding of the key factors that should be considered when measuring emissions.

Phase 2.2: Monitoring of the occurrence of FPG in gas-charged groundwater wells. Provided insights into alternative approaches to detect the presence of FPG in shallow groundwater.

Phase 3: Groundwater sampling campaigns combined with electrical conductivity and CH₄ profiling. Provided additional information regarding the transport of fugitive gases in the shallow (< 5 m below ground surface) groundwater zone around leaky wells.

The phase that was active in the last reporting period was:

Phase 4: Drilling, coring, and installation of groundwater monitoring network followed by long-term monitoring. This phase will provide insights into the transport mechanism and fate of fugitive gases in shallow aquifers around leaky O&G wells.

The drilling was completed in June 2023, with three multilevel piezometer installations completed. Piezometer development was initiated in July 2023, and groundwater monitoring started in August 2023 and has been conducted monthly since then.

As requested, we have spent the PTAC funds down preferentially. They are very nearly spent out (<\$5K remaining). When the a final project report is submitted (after August 31, 2024), PTAC will be invoiced for the 'holdback'. Current operations are mainly being paid from the NSERC CRD funds.

List key milestones with invoicing schedule. Include quarterly estimates.

Milestone	Expenditures ¹	Fiscal Quarter ²
1 Drilling and installation of three multilevel monitoring wells.	drilling and completion materials from Solinst.com \$24.1K to drilling company (via contract	Q3

¹ All expenditures in Canadian dollars and must exclude GST and other applicable taxes. Note these expenditures are mainly on the NSERC CRD project since PTAC funds are spent out.

² Quarters are based on fiscal calendar e.g., Q1 Apr 1 – Jun 30, Q2 Jul 1 – Sept 30, Q3 Oct 1 – Dec 31, Q4 Jan 1 – Mar 31.

	with Industry partner who was Prime Contractor during drilling)	
2 Completion materials and direct expenses for technical personnel from University of Guelph partners (under supervision of Dr. Beth Parker, co-PI on NSERC CRD)	\$33.5K fund transfer under agreement to the U of Guelph for direct expenses (travel and accommodation for personnel S. Chapman (Senior Research Engineer and Hydrogeologist) and B. Chapman (Hydrogeology Intern))	Q3
3 Monitoring well development	Travel and per diem costs	Q3
4 Year-long groundwater sampling program, field and analytical data collation and interpretation	Travel and per diem costs, sample analyses	Q3 – Q4
5 Abandonment of groundwater monitoring wells	Pending discussion with industry partner	Before August 31, 2024
6 Final report and manuscript preparation and submission.	n/a	Q4-Q5
Total		

Quarterly Update

Exception Highlight for the Quarter:

(any exceptions to the original project scope, timelines, payment schedule OR early significant findings)
– this can be left blank if no changes are needed, and do not include exceptions already reported

1.
2.
3.

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

Key activities:

The three multi-level wells were installed (one upgradient and two downgradient of the oil and gas wellhead were successfully developed and four sampling campaigns were successfully completed during Q3. Field parameters, groundwater level, major ions, metals, and dissolved gas composition were measured during each sampling campaign, although all analyses are not yet available to us. Additionally, pressure transducers, temperature and EC loggers were deployed in three monitoring wells to assess their seasonal variations. Dissolved gas pressure loggers were installed afterwards.

All the soil gas and shallow groundwater monitoring equipment has been removed from the site. We will need to initiate a conversation with the industry partner soon about whether they would like the wells appropriately abandoned before the end of the research project (August 31, 2024). After we have some groundwater monitoring results to share, it could be useful for PTAC to ask the industry partner if they thought this conversation could be informed by the discussion within the Well Abandonment committee.

We are pleased to inform the committee that our most recent manuscript entitle “Field Investigation of the Transport and Attenuation of Fugitive Methane in Shallow Groundwater Around an Oil and Gas Well with Gas Migration” is available [online here](#).

Dr. Tiago Morais is still active on this project. However, Dr. Rafael Terada is now responsible for the final stage of this project (data acquisition, data interpretation, and final reporting). We anticipate recruiting an undergraduate summer student to assist with preparation and execution of field work, data management and some interpretation.

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	Note: substantial in-kind contributions have been received from our industry partner. We will request a summary of these for the final report.						
Expenses							

Variance analysis (includes changes to invoicing schedule):

1. Only the 'holdback' amount (\$20K) remains for invoicing. The PTAC project has been formally extended to August 2024 to match NSERC's extension (required by our administration). We will invoice for this amount after the final report is submitted to PTAC.

TOTAL PROJECT VALUE \$800K

(Value equals the total funds committed to date for all years)

REMAINING Funding \$

Confirmed Funders:					
NRCan	\$	AEP	\$	CanERIC	\$
NSERC	\$ 206K*	ADOE	\$	ERA	\$
TIER	\$	CRIN	\$	AUPRF	\$ < 5K (currently 'overspent' by \$15K including \$20K holdback)
MITAC	\$	AMEP	\$	Other	\$