Public Quarterly Report

Date of Report: 5th Quarterly Report – December 18, 2023

Contract Number: 693JK32210006POTA

Prepared for: The U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (DOT-PHMSA)

Project Title: Accelerating Pipeline Leak Detection Quantification Solutions Through Transparent and Rigorous Scientific Validation

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For quarterly period ending: December 31, 2023.

1: Items Completed During this Quarterly Period:

Item #	***Task #***	***Activity/Deliverable***	***Title***	***Federal Cost***	***Cost Share***
9	4.1	Controlled tests at METEC in diverse conditions.	Data collected at METEC	29,593	
		Deliverable #4	*Comprehensive experimental data sets from METEC test site*		
10	4.2	*Comprehensive experimental data sets from Leak Field test sites.*			
	xx	4th Quarterly Status Report		2,000	
		4th Payable Milestone		**31,593**	
		Report on understanding of the probability of detection under diverse conditions.			
		Deliverable #5	Report on understanding of the probability of detection under diverse conditions.	118,373	
	xx	5th Quarterly Status Report		2,000	
		5th Payable Milestone		**120,373**	**12,019**
		Total		**$151,966**	**$12,019**

2: Items Not Completed During this Quarterly Period: N/A

3: Project Technical Status:

In this quarter, progress related to the completion of experimental analysis of data from the USAFA and CSU Mountain Campus experiments was completed (Activity 10 Task 4.2). During this quarter, Deliverable 4 “Comprehensive experimental data sets from METEC test sites" was modified to provide additional clarification on methods related to experiments that were conducted at METEC. Additionally, Deliverable 5 “Comprehensive experimental data sets from leak field test sites” was completed. Preliminary work on the probability of detection under diverse conditions with initial guidance is still in progress by the group (Activity 11, Task 4.3). Lastly, experiments were completed at METEC from October 23 – 27, 2023 based on input received from the technical advisory board (Activity 12, Task 4.4).

Follow on efforts during the next quarter will focus on: (1) follow on experiments at METEC looking at the impact of snow conditions under the protocol developed by the group during Activity 8, Task 3.2; (2) continue preparation for initial guidance comparing probability of detection under diverse conditions and probability of detection of diverse conditions (Activity 11, Task 4.3). The group will also schedule a meeting with the technical advisory board to review results from probability of detection analysis to gain feedback to support ongoing work.

The following sections outline the progress that was made during this quarter.

Presentations and Conferences

J. Lo*, K.M. Smits, Y. Cho, J. Duggan, S. Riddick, Quantifying Non-steady State Natural Gas Leakage from the Pipelines Using an Innovative Sensor Network and Model for Subsurface Emissions, American Geophysical Union Fall Meeting, Dec 2023 (poster).

Activity 10, Task 4.2 - Controlled tests leak field site in diverse conditions.

Experimental analysis of controlled tests at leak field sites at the Colorado State University (CSU) Mountain Campus and the United States Air Force Academy (USAFA) was completed looking at the impacts of complex urban conditions and slope/topography. The probability of detection analysis in accordance with protocol developed by the group in Activity 8 Task 3.2 is underway.

Deliverable 4 & 5 – Comprehensive experimental data sets from METEC test site and *Comprehensive experimental data sets from Leak Field test sites* can be found in Appendix 1.

Additional information is provided in *Deliverable 4 & 5* to support methods and objectives specific to *Deliverable 4* - Comprehensive experimental data sets from METEC test site supporting Activity 9, Task 4.1.

Activity 11, Task 4.3 Initial guidance draft comparing PD under diverse conditions.

Analysis of Probability of detection across all diverse conditions is still underway and in progress. The task is still on-going.

Activity 12, Task 4.4 Follow-up experiments in additional conditions as coordinated with TAP

Experiments were completed the week of October 23rd at Methane Emission Technology Evaluation Center (METEC). Experiments supported data collected during Activity 9, Task 4.1. Details of these experiments is available in Appendix 1 Deliverable 4 & 5.

Additional Experiments

Controlled experiments at METEC are currently being planned for January 8-12, 2023. Experiments will investigate diverse conditions focused on identifying the impact of snow surface covers on POD.

Activity 16, Task 5.1 – Field trial planning.

Initial field trial locations are currently being investigated and are being planned for 2024.

4. Project Schedule

The project is progressing as scheduled with a few amendments to the deliverable schedule. This is due to a reorganization of the personnel on the team as well as variations in the workload that were discussed in the project technical status sections above. The amended team project activities that are in line with the actual project are in Attachment 1 below:

Attachment #1: TEAM PROJECT ACTIVITIES

Activity	Task	Task Name	Duration	Start	Finish
1	1.1	Kick-off meeting	1 day	9/30/22	9/30/22 complete
2	1.2	Team formation	4 wks	9/30/22	10/30/22 complete
3	1.3	Establish a collaborative structure	4 wks	9/30/22	10/30/22 complete
4	2.1	Survey existing and emerging LDAQ protocols	8 wks	9/30/22	11/30/22 complete
5	2.2	Draft guidance document on leak detection method applicability in adverse conditions	12 wks	11/30/22	3/30/23 complete
6	2.3	Guidance document on leak detection method applicability in adverse conditions	12 wks	3/30/23	6/30/23 complete
7	3.1	Draft testing protocols for controlled and field testing for TAP review/ comment	8 wks	5/9/23	7/3/23 complete
8	3.2	Finalize testing protocols for controlled and field testing	8 wks	7/4/23	8/28/23 complete
9	4.1	Controlled tests at METEC in adverse conditions	24 wks	9/27/22	9/31/23 Complete
10	4.2	Controlled tests leak field sites in adverse conditions	12 wks	3/14/23	12/30/23 On-going
11	4.3	Initial guidance draft comparing PD under diverse conditions	8 wks	6/6/23	12/31/23 On-going
12	4.4	Follow-up experiments in additional conditions as coordinated with TAP	12 wks	8/1/23	12/31/23 On-going

Activity	Task	Task Name	Duration	Start	Finish
13	4.5	Extend results via PD analysis	12 wks	10/24/23	3/31/24 On-going
14	4.6	Guidance revision	8 wks	1/16/24	6/31/24
15	4.7	Document testing LD solutions in project reports/ journal article	8 wks	3/12/24	9/1/24 On-going
16	**5.1**	**Field trial planning**	**24 wks**	**9/27/22**	**3/13/23**
17	**5.2**	**Real world field trials**	**8 wks**	**3/24**	**5/24**
18	**5.3**	**PD analysis of real-world field trials**	**8 wks**	**5/24**	**7/24**
19	**5.4**	**Follow on testing of additional conditions as coordinated with TAP**	**8 wks**	**6/24**	**8/24**
20	**5.5**	**Document testing under diverse conditions in journal publication**	**8 wks**	**5/24**	**7/24**
21	6.1	Draft guidance on recommended advancements to remote methane leak detection technologies	8 wks	5/30/24	7/30/24
22	6.2	*Guidance revision*	8 wks	7/30/24	9/30/24
23	6.3	Final guidance doc – wrap up reporting for the project, including journal publications	8 wks	6/30/24	8/30/24
24	7.1	Final reporting	16 wks	Tue 4/9/24	9/29/24
25		Quarterly team meetings	As scheduled		On-going
26		Prepare and submit quarterly status reports	As scheduled		On-going
27		Final team meeting	1 day	7/31/24	9/31/24

*Start and Finish Dates were amended to reflect the effective date of the Agreement (9/30/2022)

Appendix A

Deliverable 4 & 5 – Comprehensive experimental data sets from METEC test site and Comprehensive experimental data sets from leak field test sites. (*redacted for public report*).