DOT PHMSA Public Quarterly Report

Date of Report: 2nd Quarterly Report Ending March 31, 2023
Contract Number: 693JK32210004POTA
Prepared for: USDOT PHMSA
Project Title: Advancing Hydrogen Leak Detection and Quantification Technologies Compatible with Hydrogen Blends
Prepared by: GTI Energy
Contact Information: Chris Moore, 847-768-0688, cmoore@gti.energy
For quarterly period ending: March 31, 2023

1: Items Completed During this Quarterly Period:

Table 1. Payable Milestones Completed This Quarter

Technical and Deliverable Milestone Schedule						
Item #	Task #	Activity/Deliverable	Title	Federal Cost	Cost Share	Total
1	1	Kickoff and Establish Technical Advisory Panel (TAP)	Conduct kick-off Team meeting and form Technical Advisory Panel (TAP)	27,075.00	16,493.00	43,568.00
2	8	1st Quarterly Status Report	Submit 1st Quarterly Report	2,554.00	3,320.00	5,874.00
		First Payable Milestone	**SUBTOTAL**	**29,629.00**	**19,813.00**	**49,442.00**
3	2	Complete Review of Existing Literature	Develop technical requirements documentation	65,175.00	52,790.00	117,965.00
4	8	2nd Quarterly Status Report	Submit 2nd Quarterly Report	2,299.00	3,065.00	5,364.00
		Second Payable Milestone	**SUBTOTAL**	**67,474.00**	**55,855.00**	**123,329.00**

Table 1 was populated with Items from Attachment #3, Technical and Deliverable Payable Milestone Schedule (in the contract) from the first and second payable milestones. These items were completed during this reporting period and are the corresponding items included on our next invoice.

2: Items Not Completed During this Quarterly Period:

This project is currently on schedule.

3: Project Financial Tracking During this Quarterly Period:
The nature of the contract for this research effort is fixed price, with clearly defined milestone/deliverable payments. Figure 1 below outlines projected invoicing on a quarterly schedule.

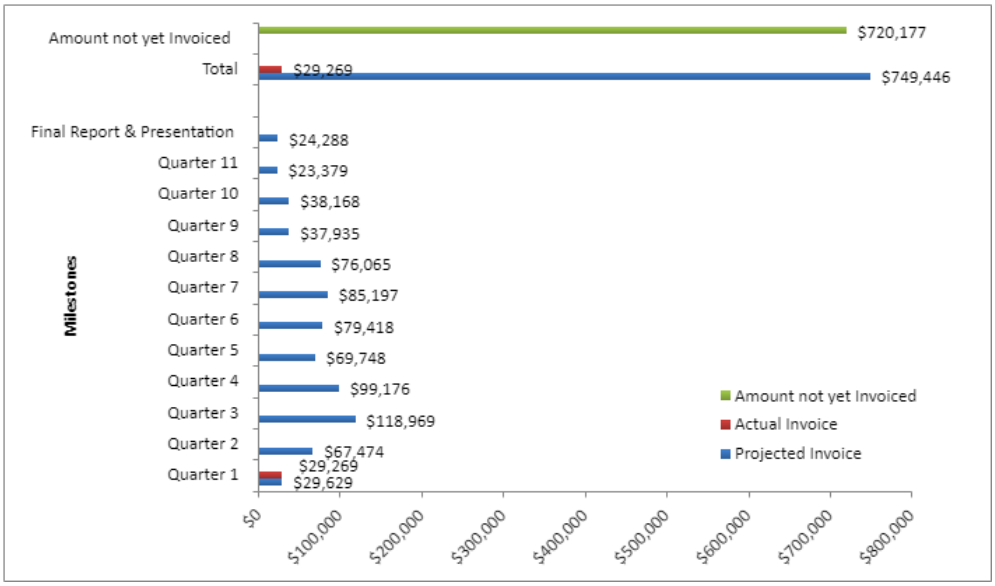

Figure 1. Quarterly Payable Milestones/Invoices (Federal Costs)

4: Project Technical Status:

ACTIVITY: PROJECT KICKOFF FOR PHMSA AND TECHNICAL ADVISORY PANEL (TAP)

Item Title: Conduct kickoff meeting and form Technical Advisory Panel (TAP)
Item Number: 1
Task Number: 1

The project kickoff meeting was held with GTI Energy, SENSIT Technologies, and DOT/PHMSA on February 8th. 2023. This satisfies the first project deliverable that was due 3 months from the beginning of the project contract. Participants in this initial meeting were Chris Moore, Chris Ziolkowski, Nikolay Stepin, Jarrod Bullen, Jim Rutherford, May Kwan, and James Taff-Clay from GTI Energy with additional help from Jacob Melby and Jason Gu from SENSIT Technologies. In addition to the project kickoff meeting, the members of the TAP were finalized and the initial TAP meeting was held on March 10th, 2023.

Table 2. List of Selected TAP Members

Member	Organization
Robert Smith	US DOT PHMSA /Project Representative
Mary McDaniel	US DOT PHMSA/Technical

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	Task Inspector
Sonal Patni	OTD/Sponsor
Mark Piazza	API/Member
Paul Ohodnicki	Univ. of Pittsburgh/Academic Reviewer
Ruishu Wright	NETL/Member
Tim Harris	Entrust Solution Group/Member
Jo Ellen Scott	Entrust Solution Group/Member
Danielle Mark	PG&E/Member
Ryan Weber	Northwest Natural/Member
Kevin Woo	SoCal Gas/Member
Vineet Aggarwal	Heath Consultants/Member

There were few comments or questions from TAP members or PHSMA representatives during the call though there were continued discussion offline about prospective testing locations and the maturity level of existing hydrogen-sensing technologies. One such call was held with Paul Ohodnicki on March 9th with selected project team members concerning his laboratory's capabilities in regards to different interrogation methods for hydrogen sensing, future discussions are expected to specify details of testing.

ACTIVITY: PROJECT KICKOFF WITH OTD COST SHARE PARTNERS

Item Title: Conduct kickoff meeting and form Technical Advisory Panel (TAP)
Item Number: 1
Task Number: 1

The project kickoff meeting for OTD members took place on February 17th, 2023 for all 17 utilities and member organizations that are providing cost share to the project. The participants included GTI Energy, OTD, Atmos, Avista, ConEd, Dominion, DTE, Duke/Piedmont, Enbridge, Liberty, National Grid, Nicor, NW Natural, NYSEG, Peoples, Socal, SW Gas, TECO, and WGL.

ACTIVITY: FIRST QUARTERLY STATUS REPORT

Item Title: Submit First Quarterly Status Report
Item Number: 2
Task Number: 8

Both the public and internal versions of the first quarterly status report were submitted on February 17th, 2023.

ACTIVITY: COMPLETE REVIEW OF EXISTING LITERATURE

Item Title: Develop technical requirements documentation
Item Number: 3
Task Number: 2

The project team was able to complete the technical requirements documentation. The full document will be submitted to the project page in PHMSA's PRIMIS server under "Technical Reports and Documents", but some highlights from the document have been contained here. The purpose of the report is to 1) provide initial technical specifications and requirements for evaluation that will be used to drive exploration of technologies conducted throughout the rest of the project and 2) summarize the literature review completed to date. The literature review was divided into three separate review areas: Leakage Dynamics of an H2/NG blend, Existing Leak Detection Methodologies an Equipment, and Sensing Technologies.

Contained within the third literature review area, Sensing Technologies, expansive summaries of numerous sensor technologies are included in table form. Covered among them are catalytic bead/combustion, electrochemical, chemiresistive (semiconductor and palladium), chemFET, surface acoustic, chemichromic, optical fiber, thermal conductivity, open path, TDLAS, and ionization sensor technologies.

The initial technical specifications and requirements for evaluation shown in the report were established based on the literature findings. These initial technical specifications will drive the technology exploration and evaluation through the rest of the project. They are not meant to be the final specifications but instead viewed as a hypothesis for what the project team thinks the ideal technical specifications should be. The testing and evaluations performed during the project will provide information to update the specifications, parameters, and requirements as needed.

ACTIVITY: SECOND QUARTERLY STATUS REPORT

Item Title: Submit First Quarterly Status Report
Item Number: 4
Task Number: 8

The second quarterly status report (this report) will be completed and submitted on schedule (on or before March 31st, 2023)

ACTIVITY: PROJECT MANAGEMENT

Item Title: N/A
Item Number: N/A
Task Number: 9

During this quarter, GTI conducted contracting, project scheduling, budgeting, establishment of data management strategies, preparation of reports, and organization of required meetings. Subcontracting with SENSIT Technologies is almost complete.

5: Project Schedule:

The project schedule is shown below in Table 3, with the submittal time of this quarterly report outlined.

Table 3. Project Schedule

Task	Description	1 - Q4 2022	2 - Q1 2023	3 - Q2 2023	4 - Q3 2023	5 - Q4 2023	6 - Q1 2024	7 - Q2 2024	8 - Q3 2024	9 - Q4 2024	10 - Q1 2025	11 - Q2 2025	12 - Q3 2025
1	Project Scoping and TAP												
2	Literature Review												
3	Develop Evaluation Framework												
4	Laboratory Tests												
5	Develop New Hydrogen Sensing Schemes												
6	Field Tests												
7	Statistical Analysis and Final Report												
8	Project Management												