

DOT PHMSA Public Quarterly Report

Date of Report: 3rd *Quarter 2020 Report - September 30, 2020*

Contract Number: 693JK31910001POTA

Prepared for: USDOT – Pipeline and Hazardous Materials Safety Administration (PHMSA)

Project Title: *Review the Intent and Safety Impact of Hoop Stress and Percentage of Specified Minimum Yield Stress Boundaries on Natural Gas Transmission and Distribution Pipelines*

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For quarterly period ending: *September 30, 2020 (Project Q4)*

1: Items Completed During this Quarterly Period:

<u>Item No.</u>	<u>Task No.</u>	<u>Activity/Deliverable</u>	<u>Payable Milestone</u>	<u>Federal Payment</u>	<u>Resource-Share</u>
9	8	Sensitivity Study of Pipeline Features/Parameters	Task 5 Interim Report: Sensitivity Study of Pipeline Features/Parameters	\$59,224	\$15,872
10	8	Safety Considerations for Segment Classifications	Task 6 Interim Report: Safety Considerations for Segment Classifications	\$73,742	\$10,762
13	8	4th Quarterly Status Report	Submit 4th quarterly report	\$7,182	\$3,137
		Fourth Payable Milestone	SUBTOTAL	\$140,148	\$29,771

2: Items Not-Completed During this Quarterly Period:

- None

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 outlines projected invoicing, as well pending invoices to be submitted for the fourth quarter payable milestones delivered during this report period.

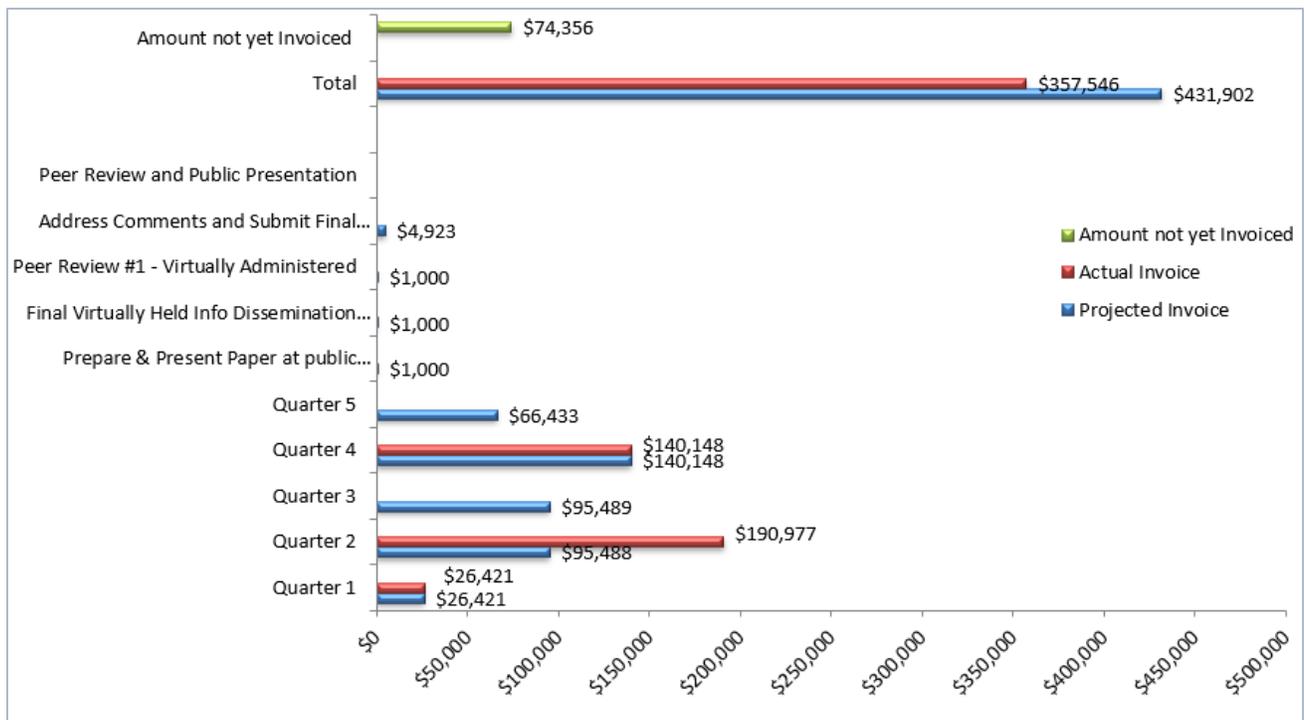


Figure 1. Quarterly Payable Milestones/Invoices (Federal Costs)

4: Project Technical Status

Project Summary

Task #	Activity	Milestone / Deliverable	Cost
1	Kickoff, Contracting, and TAP	Task 1 Interim Report: Kickoff Meeting Minutes, TAP Scope Review and confirmation, Subcontract statement of Work (SOW) in place.	Completed
<i>This task was completed and invoiced for in a prior project quarter.</i>			
2	Regulatory Definition Review	Task 2 Interim Report: Regulatory Definition Review	Completed
<i>This task was completed and invoiced for in a prior project quarter (2020 Q1).</i>			
3	In-Depth Literature Search	Task 3 Interim Report: In-Depth Literature Search (with Draft Knowledge Database Summary)	Completed
<i>This task was completed and invoiced for in a prior project quarter (2020 Q1).</i>			
4	In-Service and Incident History Analysis	Task 4 Interim Report: In-service/Incident History Analysis (with Draft Pipeline Information Database Summary)	Completed

<i>This task was completed and invoiced for in a prior project quarter (2020 Q1).</i>			
5	Sensitivity Study of Pipeline Features/Parameters	Task 5 Interim Report: Sensitivity Study of Pipeline Features/Parameters	<i>Completed</i>
<i>This task was completed this quarter and will be invoiced for work done this quarter.</i>			
6	Safety Considerations for Segment Classifications	Task 6 Interim Report: Safety Considerations for Segment Classifications	<i>Completed</i>
<i>This task was completed this quarter and will be invoiced for work done this quarter.</i>			
7	Summary Report	Task 7 Draft Final Report (with Final Task 3 and 4 Databases)	
The output of Tasks 1-6 has been written up in draft form as chapters that will be incorporated into the final summary report.			
8	Project Management	Ongoing: Monthly Updates, Quarterly Reports, Peer Review, Virtual Final Meeting, Public Presentation/Paper, Final Revision of Task 7 Summary Report	
Project is on schedule, scope, and budget. A peer review is scheduled in Oct. 2020 for this project. A topic to present a summary of project findings was submitted for consideration for the 2021 AGA Operations Conference, Orlando, FL.			

Technical Details

Items completed this quarter:

1. Took the Task 5 results and developed an associated likelihood of failure (safety margin) and failure energy set of measures (Impact Radius and Ignition Likelihood) based on a function of pressure and diameter.
2. Combined these three core elements: failure mode (stable leak vs. ductile rupture), failure energy (impact radius), and failure likelihood for wall loss and/or cracks (akin to inverse safety margin) to establish the tiered, three level integrity management operational boundaries. This incorporates the elements of risk minus the consequence receptor which is beyond the project scope and not purely technically based.
3. Collapsed the three failure modes and wall loss vs. crack situations into a single IMP category plot by establishing an adjusted diameter of failure for leaks equivalent to a rupture of the same size.
4. Developed a flowchart for the process to guide an operator on how to input pipeline attributes, establish failure mode, establish failure pressure ratios, establish impact radius, and establish ignition ratio; all leading to a coherent integrity management level.
5. Ran a randomized set of the entire 200,000 point DOE through the flow chart process and broke out the resulting solution by leak and ruptures and within both these categories by 0-20, 20-30, 30-40, 40-60, and 60-80 %SMYS for comparative purposes. This DOE and the associated solution clouds

incorporate/overlap the range of operational combinations and the incidents in the DOT/PHMSA database.

6. Established how to incorporate the threat matrix from Task 2 and 3 with the derating factors by vintage into the IMP category solution to ensure conservatism when there are different levels of uncertainty or known vintage-based threats.
7. Worked on the interim Task 5 and Task 6 reports and will turn them in the week of Oct. 5th having obtained approval from DOT and OTD for the extra time to wrap up the two reports and review them appropriately.
8. Submitted a topic for the 2021 AGA Spring Operations Conference to present a high level summary of the project.

Planned Effort Next Quarter:

1. Fold in P&M measure particularly focused on hydrotesting and ILI activities that could limit permissible defect lengths and/or depths for cracks and/or wall loss (two of six of the independent input variables along with diameter, thickness, yield strength, and toughness).
2. Include discussion of the ramifications of direct assessment and other technology assessment for completeness.
3. Perform a gap analysis from the metallurgical and physics based solutions of the project and the current code requirements.
4. Complete the requested PowerPoint slides and conduct the 2020 Peer Review in the month of October.
5. Work on the draft final report.

5: Project Schedule

Project Task	Start	Finish	% Complete	2019		2020															
				J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
				Q3	Q4	Q1	Q2	Q3	Q4												
1 - Kickoff, Contracting, and TAP	10/1/2019	12/31/2019	100%		█																
2 - Regulatory Definition Review	11/1/2019	6/30/2020	95%		█	█	█	█													
3 - In-Depth Literature Search	11/1/2019	6/30/2020	90%		█	█	█	█													
4 - In-service and Incident History Analysis	10/1/2019	6/30/2020	90%		█	█	█	█													
5 - Sensitivity Study of Pipeline Features/Parameters	1/1/2020	9/30/2020	90%				█	█	█	█	█										
6- Safety Considerations for Segment Classifications	1/1/2020	9/30/2020	75%				█	█	█	█	█										
7 - Summary Report	4/1/2020	12/31/2020	40%											█	█	█	█	█	█	█	
8 - Project Management	10/1/2019	12/31/2020	65%		█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	

The project is on schedule.

End of Report