



## **10<sup>TH</sup> QUARTERLY REPORT - PUBLIC**

DOT Project Number: 729 (GTI 22428)

DOT Contract Number: 693JK31810003

OTD Project Number: 4.14.c.2 (GTI 22429)

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# **Validating Non-Destructive Tools for Surface to Bulk Correlations of Yield Strength, Toughness, and Chemistry**

### **Reporting Period**

November 1, 2020 through January 31, 2021

### **Report Issued**

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### **Prepared For**

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# PROJECT OBJECTIVES AND REPORT SUMMARY

## Project Objectives

The deliverables of this project will facilitate the use of non-destructive surface testing: micro-indentation, micro-machining, in situ chemistry, and replicate microscopy analysis as accurate, efficient, and cost-effective tools for material property confirmation.

This work will provide benefits to pipeline safety, energy continuity, and integrity assessment programs since the developed techniques and models and validated testing technology will not require a line to be taken out of service or destructively cut out samples from the in-service pipeline.

The results of this project will also be applicable to pending DOT/PHMSA regulations that require operators to backfill their material property records for grandfathered pipeline segments and/or those that do not have adequate material records.

## Report Summary

During the tenth project quarter the following items were completed (see the **Technical Status** section for greater detail):

### Task 3 - Develop and Execute Testing Matrix

#### NDE Toughness Testing of 30 Pipe Samples

- All NDE tests were completed on the pipe coupon samples this quarter. The data will be reviewed and incorporated into the project final report next quarter.

### Task 4 - Data Analysis and Model Development and Optimization

- Completed the Milestone **M17** - ASU completed the Summary of Data Analysis and Model Generation and Optimization.
- The final modeling analysis will be combined with ASU findings in the final report due next quarter.
- All R-code (open source) for the ASU models and input variable tables have been completed and will be uploaded with the final report next quarter after quality checking is completed.

### Task 5 - Final Report and Implementation Guide

- Commenced Task 5 this quarter and work continues on assembling draft final report.

### Task 6 - Project Management

- Submitted Milestone **M17** - S Summary of Data Analysis and Model Generation and Optimization on 1/31/2021.
- Submitted Milestone **M18** - 10<sup>th</sup> Quarter status report on 1/31/2021.

## **Risks**

- All project tasks are on schedule after aggressive efforts by GTI and ASU to keep these on track. There are no budget or scope issues. Task 5 (Final Report) will continue next quarter. The draft final report and final data sets will be submitted at the end of next quarter.

# BUSINESS AND MILESTONE STATUS

## (Project Quarter #10: 11/1/2020 to 1/31/2021)

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### Tasks Scheduled in this Reporting Period

Table 1 shows the project tasks performed in this reporting period. Task 1, Task 2, and Task 3 were completed in prior quarters. All tasks are on schedule.

**Table 1: Lists of Tasks in this Reporting Period**

Task	Scheduled Start	Scheduled Completion	Completion Status
<b>Task 4</b> - Data Analysis and Model Development and Optimization	8/1/2019	1/31/2021	<b>Completed</b>
<b>Task 5</b> - Final Report and Implementation Guide	11/1/2020	4/30/2021	<b>Ongoing</b>
<b>Task 6</b> - Project Management	8/1/2018	4/30/2021	<b>Ongoing</b>

### Milestones for Activities/Deliverables Completed

Table 2 shows the project milestones for activities/deliverables/tasks **completed** in this reporting period. All Milestones/Deliverables are on schedule.

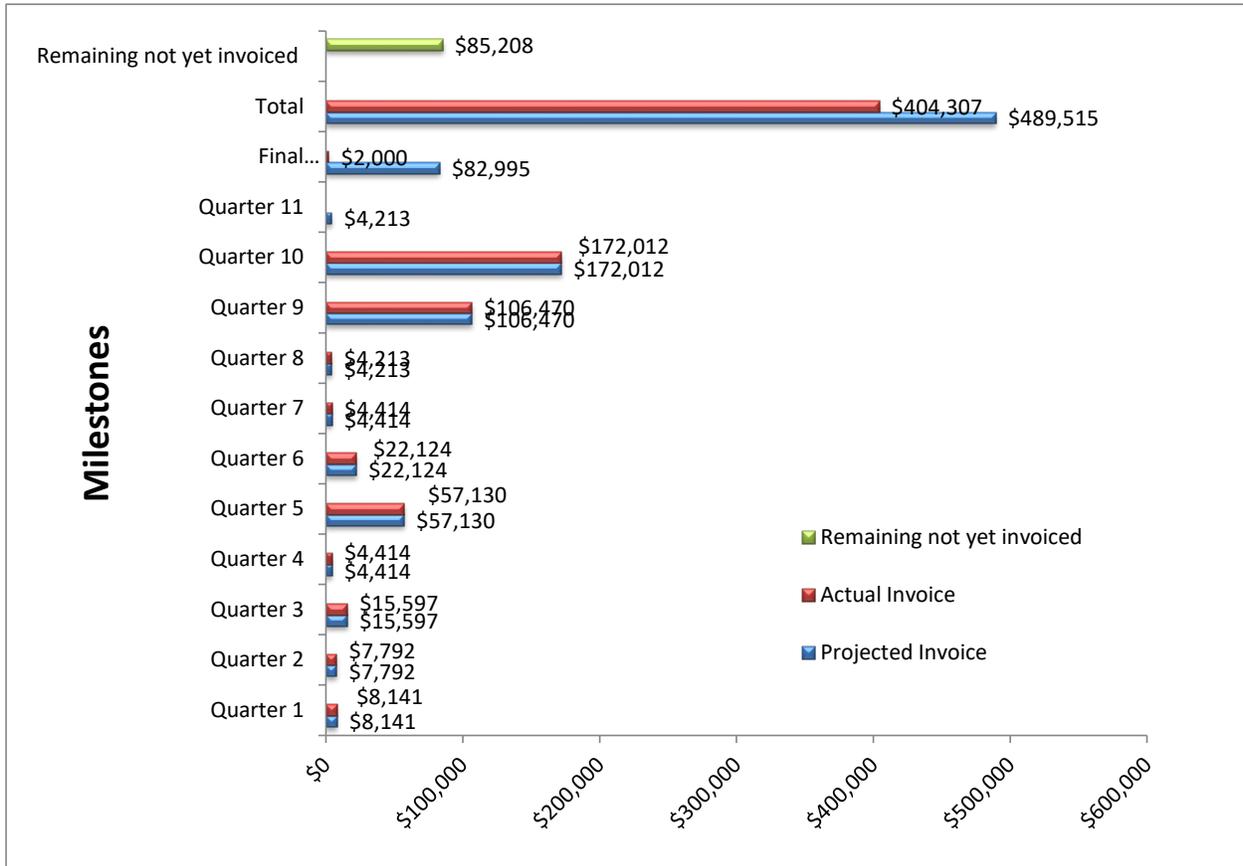
**Table 2: Lists of Milestones Linked to Activities/Deliverables/Tasks this Reporting Period**

Item No.	Task No.	Activity/Deliverable	Quarter No.	Scheduled Due Date	Completion Date	Payable Milestone/Title
<b>17</b>	4	Data Analysis and Model Development and Optimization	10	1/31/2021	1/31/2021	Summary of Data Analysis and Model Generation and Optimization
<b>18</b>	6	10 <sup>th</sup> Quarterly Status Report	10	1/31/2021	1/31/2021	Submit 10 <sup>th</sup> quarterly report

# Resource Status

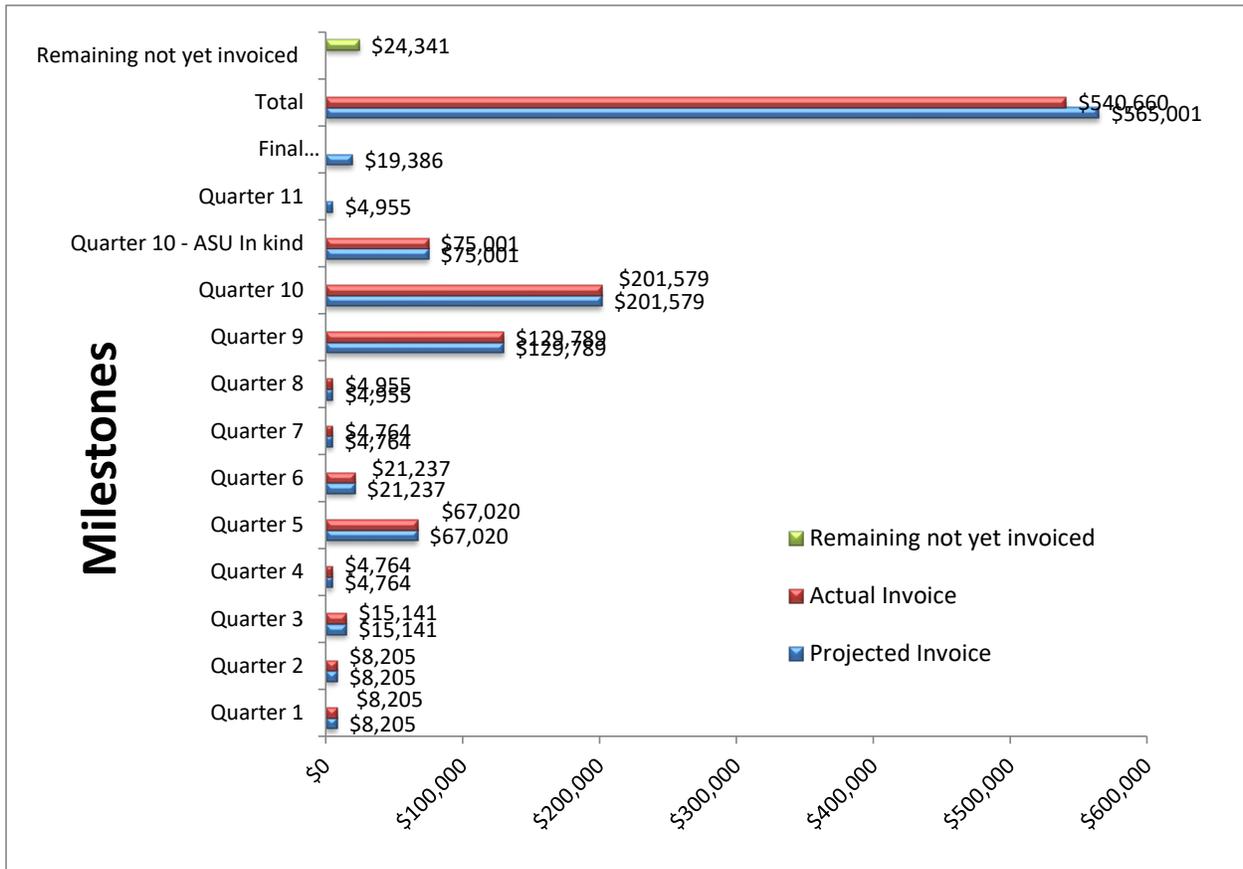
The nature of the contract for this research effort is fixed price, with clearly defined milestone/deliverable payments. Please see Figure 1 for an update on the fund status for DOT/PHMSA, and Figure 2 for the fund status of OTD and ASU.

**Figure 1: Quarterly Payable Milestones/Invoices – DOT PHMSA**



The 10<sup>th</sup> quarter invoice will be issued shortly after the end of the 10<sup>th</sup> project quarter.

**Figure 2: Quarterly Payable Milestones/Invoices – OTD and ASU**



The 10<sup>th</sup> quarter invoice will be issued shortly after the end of the 10<sup>th</sup> project quarter.

## Project Risks

- All project tasks are on schedule after aggressive efforts by GTI and ASU to keep these on track. There are no budget or scope issues.

# Schedule Update

The updated project schedule is shown in Figure 3.

Figure 3: Project Schedule

ID	Month	Task / Milestone Name	Start	Finish	% Complete	2018		2019				2020				2021	
						Q1	Q2	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
1	---	<b>Task 1 - Form Technical Advisory Panel and Scope Confirmation</b>	8/1/2018	1/31/2019	100%												
2	1	M1 - Conduct kick-team meeting and present scope of work and objectives	10/31/2018	10/31/2018	100%												
3	3	M2 - Submit final TAP list and finalize tasks and methods	10/31/2018	10/31/2018	100%												
4	6	M4 - Confirmation of subcontract SOW in place	1/31/2019	1/31/2019	100%												
5	---	<b>Task 2 - Develop Project Database and Pipeline Sample Library</b>	11/1/2018	1/31/2020	100%												
6	9	M6 - Develop a project database on existing data	4/30/2019	4/30/2019	100%												
7	18	M11 - Submit summary of pipeline sample library	1/31/2020	1/31/2020	100%												
8	---	<b>Task 3 - Develop &amp; Execute Test Matrix</b>	5/1/2019	10/31/2020	100%												
9	15	M9 - Submit project testing/plan matrix	10/31/2019	10/31/2019	100%												
10	27	M15 - Submit summary of executed testing plan data input into project database	10/31/2020	10/31/2020	100%												
11	---	<b>Task 4 - Data Analysis and Model Development and Optimization</b>	8/1/2019	1/31/2021	100%												
12	30	M17 - Summary of data analysis and model generation and optimization submitted	1/31/2021	1/31/2021	100%												
13	---	<b>Task 5 - Final Report and Implementation Guide</b>	10/31/2020	4/30/2021	30%												
14	33	M25 - Prepare and submit final draft report	4/30/2021	4/30/2021	0%												
15	NA	M26 - Address comments and submit final report	4/30/2021	4/30/2021	0%												
16	---	<b>Task 6 - Project Management</b>	8/1/2018	4/30/2021	80%												
17	3	M3 - Submit quarterly report - Q1	10/31/2018	10/31/2018	100%												
18	6	M5 - Submit quarterly report - Q2	1/31/2019	1/31/2019	100%												
19	9	M7 - Submit quarterly report - Q3	4/30/2019	4/30/2019	100%												
20	12	M8 - Submit quarterly report - Q4	7/31/2019	7/31/2019	100%												
21	15	M10 - Submit quarterly report - Q5	10/31/2019	10/31/2019	100%												
22	18	M12 - Submit quarterly report - Q6	1/31/2020	1/31/2020	100%												
23	21	M13 - Submit quarterly report - Q7	4/30/2020	4/30/2020	100%												
24	24	M14 - Submit quarterly report - Q8	7/31/2020	7/31/2020	100%												
25	27	M16 - Submit quarterly report - Q9	10/31/2020	10/31/2020	100%												
26	30	M18 - Submit quarterly report - Q10	1/31/2021	1/31/2021	100%												
27	33	M19 - Submit quarterly report - Q11	4/30/2021	4/30/2021	0%												
28	NA	M20 - Present at public event or publish a paper	4/30/2021	4/30/2021	0%												
29	NA	M21 - Final virtual meeting	4/30/2021	4/30/2021	0%												
30	NA	M22 - Peer review #1 (date TBD)	5/1/2019	5/1/2019	100%												
31	NA	M23 - Peer review #2 (date TBD)	5/1/2020	10/21/2020	100%												
32	NA	M24 - Peer review #3 (date TBD)	1/1/2021	4/30/2021	NA												

# TECHNICAL STATUS

## (Project Quarter #10: 11/1/2020 to 1/31/2021)

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This section provides a high-level overview of the technical activities during the reporting quarter and the status.

Additional details, reports, presentations and other support material if present are placed in this report's Appendix and only referenced below.

### **Task 3 - Develop and Execute Testing Matrix**

#### **NDE Toughness Testing of 30 Pipe Samples (carry over item)**

1. The remaining 30 coupon NDE fracture toughness tests were completed. All physical testing for the project is completed.

### **Task 4 - Data Analysis and Model Development and Optimization**

A high-level summary of this task results is presented below. Task 4 was completed.

- GTI worked with ASU to assist with data explanations and prioritization for their advanced modeling effort.
- Completed the Milestone **M17** - ASU completed the Summary of Data Analysis and Model Generation and Optimization.
- The final modeling analysis will be combined with ASU findings in the final report due next quarter.
- All R-code (open source) for the ASU models and input variable tables have been completed and will be uploaded with the final report next quarter after quality checking is completed.

### **Task 5 - Final Report and Implementation Guide**

- Commenced Task 5 this quarter and work continues on assembling draft final report.

### **Task 6 - Project Management**

- Submitted Milestone **M17** - Summary of Data Analysis and Model Generation and Optimization on 1/31/2021.
- Submitted Milestone **M18** - 10th Quarter status report on 1/31/2021.

# **PLANS FOR FUTURE ACTIVITY**

## **(Project Quarter #11: 2/1/2021 to 4/30/2021)**

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In the next quarter the project team will continue work on Task 5. The planned activities are listed below.

### **Task 5 - Final Report and Implementation Guide**

- Complete and submit Final Draft report and any updates to the project data set.

### **Task 6 - Project Management**

- Submit Milestone **M19** - 11<sup>th</sup> Quarter status report on 4/30/2021.
- Submit Milestone **M25** - Draft Final Report on 4/30/2021.

Respectfully submitted by,

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**End of Report**