External Quarterly Report

Date of Report: 2nd Quarterly Report – March 31, 2022 Contract Number: #693JK3211RA0001 Prepared for: PHMSA DOT Project Title: Assessment of Nondestructive Examination (NDE) and Condition Monitoring Technologies for Defect Detection in Non-Metallic Pipe Prepared by: EWI Contact Information: Meghan Harley Yugulis <u>MYugulis@ewi.org</u> 614-688-5279 For quarterly period ending: March 31, 2022

1: Items Completed During this Quarterly Period:

The literature review and associated report and second quarterly update were completed during Quarter 2.

Item		Activity/Deliverable	Title	Federal	Cost
#	#			Cost	Share
1	1	Task report summarizing findings of literature review	Literature review of recent research on	\$40,311.30	0.00
		Include review	NDE of polymers &		
			composites - issue		
			task report		
3	10	Submit 2 nd Quarterly Report	2 nd Quarterly Status Report & Quarterly	\$11,870.00	0.00
			collaboration		
			meeting		

2: Items Not Completed During this Quarterly Period:

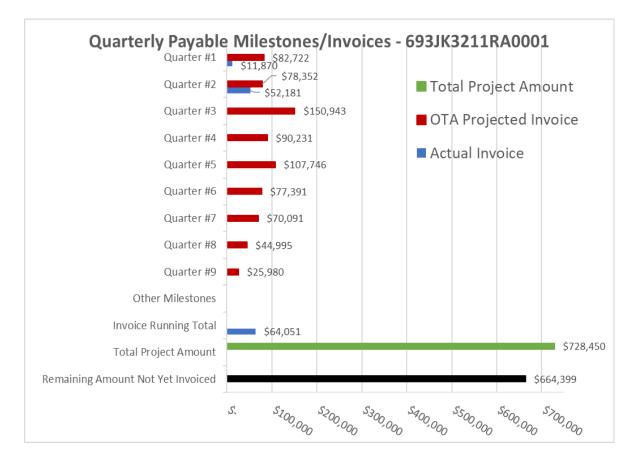
The NMP Sample matrix is in-process but not completed. The majority of pipe samples to be provided have been identified but details regarding shipping schedules and plans for inducing intentional damage remain unfinished for some pipe samples. EWI is awaiting input from our partners to finalize these details. EWI will be visiting pipe manufacturing partners in Houston in early April to address this item.

Item	Task	Activity/Deliverable	Title	Federal	Cost		
#	#			Cost	Share		
2*	2	NMP sample matrix detailing type of	Prepare detailed	\$30,540.73	\$66,782.84		
		pipe and defects, anomalies or damage	matrix of NMP				
		per sample	samples				
4*	3	Develop NDE procedures for inspection	Completion of				
		of NMP samples using non-contact and	written NDE	\$49,331	\$20,310		
		3 coupled UT methods, microwave	procedures				
		inspection method and 2 thermography					
		methods					

3: Project Financial Tracking During this Quarterly Period:

The actual spend is behind planned.

- Task 1 More time was spent during this reporting period due to holidays in the first quarter.
- Task 2 EWI has requested input from our project partners, this information was requested at November's kickoff, 12/15/21 follow up email of action items, 1/31/2022 Monthly Update email, 3/23/22 Quarterly Update Meeting, 3/24/2022 follow up email, and will be further pursued in April. EWI is aware that delays associated with information and samples will impact EWI's ability to prepare pipe samples and is actively communicating with project partners.
- Task 3 EWI has begun drafting the NDE procedures. Extending the literature review in Q2 and lack of physical pipe to confirm what samples are available for testing have delayed finalizing these procedures



4: Project Technical Status -

Item	Task	Activity/Deliverable	Title
1	1	Task report summarizing findings of literature review	Literature review of recent research on NDE of polymers & composites - issue task report
2*	2	NMP sample matrix detailing type of pipe and defects, anomalies, or damage per sample	Prepare detailed matrix of NMP samples
3	10	Submit 1st quarterly report	1st Quarterly Status Report & Quarterly collaboration meeting
4*	3	Develop NDE procedures for inspection of NMP samples using non-contact and 3 coupled UT methods, microwave inspection method and 2 thermography methods	Completion of written NDE procedures
6	6	Task 6 Test Procedures and Chamber Assembly	Prepare & Provide a Written Test Procedure for Erosion Tests
3	10	Submit 2 nd quarterly report	2 nd Quarterly Status Report & Quarterly collaboration meeting

Task 1 – Literature Review was completed by EWI and NDE4zero's Mark Lozev. The report was supplied to the project team on 3/31/2022

Task 2 – NMP Sample Matrix. EWI has received information on numerous pipe samples to be provided but details regarding pipe condition, methods for inducement of damage and schedule for shipment to EWI remain uncertain. EWI has communicated to project partners the urgent need to finalize these details. EWI will be visiting 3 project partners in early April to help facilitate completion of this item.

Task 3 – The NDE procedures are in development. Progress has been delayed due to the literature review and final information on available pipe samples.

Task 6 – The cost share portion of this task began in December 2021. The first of six test cells have been built and tested. The other 5 test cells are ready to be built pending the April 7^{th} discussion on test properties. The federally funded portion of this work will begin once pipe samples are received, anticipated April 2022

Task 10 – The 1st quarterly status report was provided on 1/4/22. The 2nd quarterly status report will be provided on 3/31/2022. The next collaborative meeting is anticipated to occur in June, please see upcoming Doodle calendar poll.

While not tied to a specific milestone during the first quarter, the following activities were undertaken: (1) EWI followed up with GTI about NDA for both our collaboration and their role on the TAP (2) EWI discussed TC Energy joining the project as an In-Kind partner 2/4/2022 and 3/29/2022, continued follow up with FlexSteel to join as an In-Kind partner and hope to have signed agreements soon.

(3) EWI followed up with TAP members, providing NDA documents to be completed. The current Tap includes:

- Rick Hill Microalloying International
- Khalid Farrag GTI
- Jim Mason Mason Materials Development, LLC

- Dr. Randy Knapp Plastic Pipe Institute
- Qing Tian California Energy Commission

(4) EWI drafted a Data Management Plan to meet the US Department of Transportation (USDOT) policy on the dissemination and sharing of research results. This is currently in review.

5: Project Schedule –

The delay of both pipe matrix details, and physical arrival of the pipes has hindered completion of Task 2 (identification of pipe samples and associated damage features). Only one set of pipes have been shipped to EWI so far. EWI is actively asking our partners to provide this information ASAP. This information needs to arrive at EWI in April or we will experience delays in starting Task 4. The adjustments to our schedule are highlighted in yellow below.

Task	Description	Quarter								
	Description		2	3	4	5	6	7	8	9
1	Literature Review & Report	Х	Χ							
2	Selection, Procurement & Preparation of Pipe Samples	Х	Χ	Χ						
3	Draft NDE Procedures		Χ	Χ						
4	NDE Trials			Х	Χ	Х	Х			
5	NDE Validation & Assessment					Χ	Χ	Χ		
6	Characterization of Erosion Properties and Detectability		Х	Х	Х	Χ				
7	Development of NDE Procedures and Best Practice Guide						Χ	Χ		
8	Establish Field Inspection Requirements							Χ		
9	Virtual Workshop							Х	Χ	
	Progress Meetings (virtual and in-person)			Х			Х		Χ	
10	Annual Review				Χ				Χ	
	Quarterly Progress Reports	Х	Х	Х	Χ	Χ	Χ	Χ	Χ	
	Final Report								Χ	Χ
PM	Program Management	Х	Х	Х	Х	Х	Х	Χ	Χ	Χ