CAAP Quarterly Report

Date of Report: 12/30/2023

Project Name: Performance Evaluation and Risk Assessment of Excessive Cathodic Protection on Vintage Pipeline Coatings

Contract Number: 693JK32250008CAAP

Prime University: The University of Akron

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Reporting Period: 10/1/2023-12/30/2023

Project Activities for Reporting Period:

Here are the major project activities for each task:

a) Task 1. Identification of vintage pipeline coatings and influencing factors in coating cathodic disbondment (The University of Akron and Marquette University)

   Task 1 is in progress this quarter. The Ph.D. student, Yuhan Su, at The University of Akron, is working on literature reviews to understand pipeline coatings and the influencing factors in coating cathodic disbondment.

   The first objective of Task 1 has been completed, which is to classify pipeline coatings. The second and third objectives of Task 1 are working on. The conditions in which the vintage coating experiences cathodic disbondment and the key influencing factors on the cathodic disbondment are studied.

b) Task 2. Evaluation of coating cathodic disbondment considering key influencing factors through laboratory testing (The University of Akron)

   One Ph.D. student, Yuhan Su, and one undergraduate student, Tanner Laughorn, at The University of Akron, are working on this task.

   One type of CP-compatible coatings and one type of CP shielding coatings are determined to be prepared and tested in the lab. The liquid epoxy coating as CP-compatible coating has been purchased. Pretesting has been conducted for the liquid epoxy coating of different thicknesses and disbondment sizes. The testing includes electrochemical impedance spectroscopy measurements and pH monitoring. The experimental setups for applying CP while monitoring coating degradation behavior have been designed and will be further tested and verified. The students were also contacting pipeline companies to obtain some commercially available new pipeline coating samples.

c) Task 3. Numerical simulation of pipeline coating disbondment behavior and CP system (Rutgers University)

   This task just got started at Rutgers University this quarter. One Ph.D. student, Xiao Chen, is starting to set up the COMSOL model to simulate coating disbondment behavior under CP.

d) Task 4. Probabilistic degradation model of coated pipe wall due to excessive CP (Marquette University)

   This task just got started at Marquette University this quarter. Dr. Huang is working on the literature review on this subject and she will assign a graduate student working on this project next quarter.

e) Task 5. Determination of recoating time using reliability-based approach (Marquette University)

   Task 5 will start in the 9th quarter of this project.

Project Financial Activities Incurred during the Reporting Period:

Here is the cost breakdown list for the expenses during the reporting period:

	10/1/2023- 10/31/2023	Nov. 2023 (To be billed)	Dec. 2023 (To be billed)
a) Graduate assistant	$799.68		
b) Fringe benefits	$18.4		
c) Supplies	$1007.36		
d) Indirect cost	$949.27		
Total a) to d)	**$2774.71**		
Cost share	$2867.37		
Total	**$5642.08**		

Project Activities with Cost Share Partners:

No cost share activity during this reporting period with cost share partners.

Project Activities with External Partners:

Dr. Qixin Zhou and Dr. Qindan Huang (sub-university) have bi-weekly meetings to update the progress of each other and discuss the work of this project. Dr. Huang is hiring graduate students to work on this project.

The PIs contacted external partners from the oil and gas pipeline industry for industrial collaborations during this reporting period. We sent a survey to pipeline companies to acquire field information through the platform of PRCI.

We received several vintage pipes with coating from Dr. Rafael Rodriguez through his company.

Potential Project Risks:

No potential project risks during this reporting period.

Future Project Work:

The second and third objectives of Task 1 will be completed in the next 90 days. That needs to fully understand the influencing factors on the cathodic disbondment and cathodic disbondment conditions.

The coating samples of Taks 2 will be prepared or purchased in the next 90 days. The experimental design for coating cathodic disbondment characterization will be tested and verified in the next 90 days.

Tasks 3 and 4 at sub-universities will be in progress in the next 90 days.

Potential Impacts to Pipeline Safety:

Knowing the types of coatings that have issues with excessive cathodic protection, brings attention to the pipeline industry to replace these types of coatings in vintage pipelines.