

Internal Quarterly Report

Date of Report: 1st Quarterly Report - December 31, 2020

Contract Number: 693JK32010009POTA

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

Project Title: Improve Pipeline leak Rate Estimation

Prepared by: BMT Canada Ltd / BMT Commercial USA

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For quarterly period ending: December 31, 2020

1: Items Completed During this Quarterly Period:

<i>Item #</i>	<i>Task #</i>	<i>Activity/Deliverable</i>	<i>Title</i>	<i>Federal Cost</i>	<i>Cost Share</i>
1	1	Project kick-off meeting held	Meeting held, minutes circulated	4,000.00	1,000.00
3	2	Review and update test procedures	Test procedure documented	20,000.00	5,000.00
5	2a	Commence first leak rate test for Task 2a	1 of 10 leak rate tests commenced	6,640.80	1,660.20
6	4	1st Quarterly Status Report	Submit 1st quarterly report	2,820.80	705.20
<i>SUBTOTALS:</i>				<i>\$33,461.60</i>	<i>\$8,365.40</i>

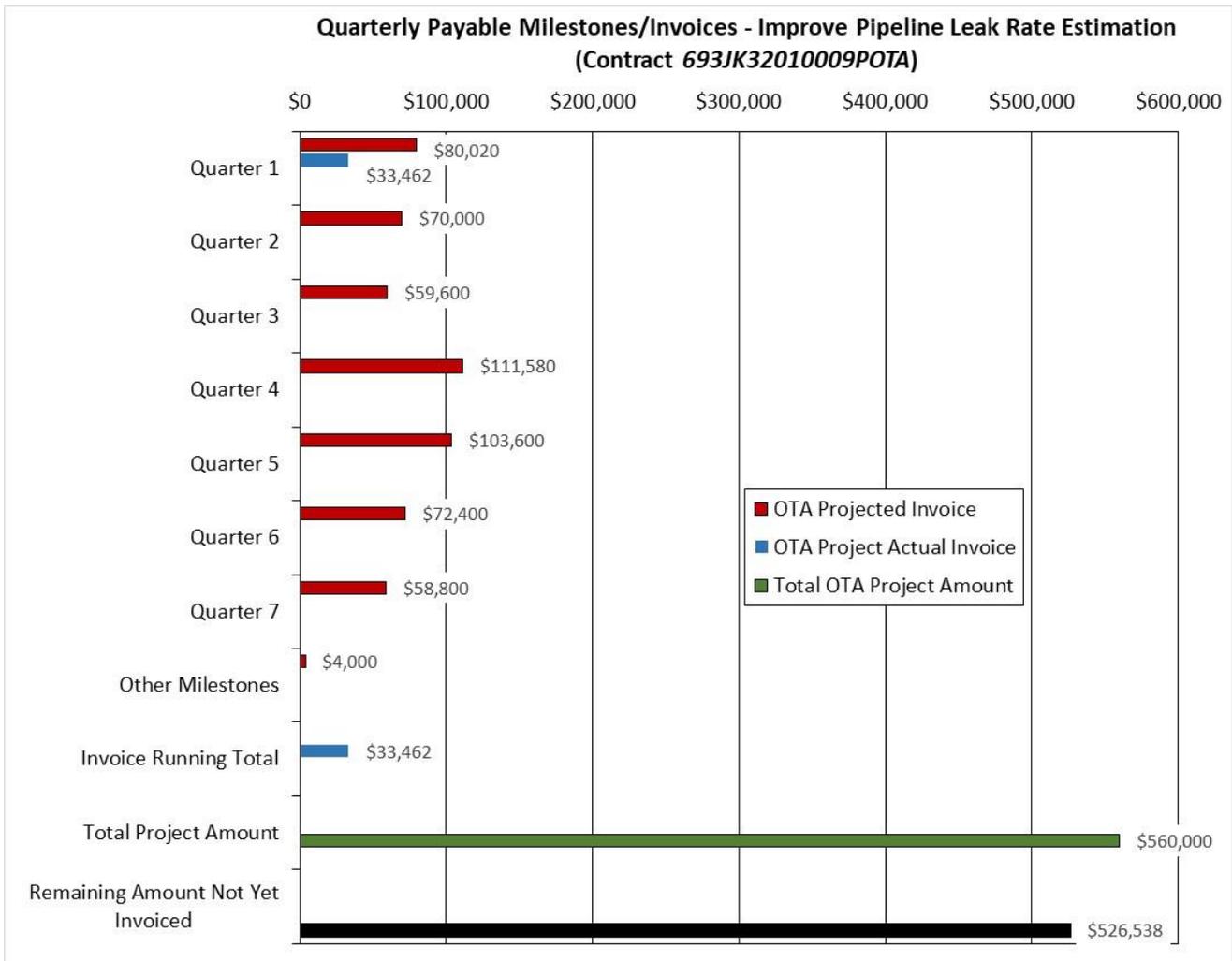
2: Items Not Completed During this Quarterly Period:

<i>Item #</i>	<i>Task #</i>	<i>Activity/Deliverable</i>	<i>Title</i>	<i>Federal Cost</i>	<i>Cost Share</i>
2	1	Updated test matrix prepared	Reviewed test matrix prepared and circulated	6,558.40	1,639.60
4	2a	Prepare Task 2a test specimens for 10 of 10 leak rate trials (5 of 5 test vessels)	5 of 5 test specimen vessels prepared	40,000.00	10,000.00
<i>SUBTOTALS:</i>				<i>\$46,558.40</i>	<i>\$11,639.60</i>

There was a seven-week delay in scheduling the kick-off meeting. Work was started after the kick-off meeting. At the project kick off meeting, the TAP requested that the NPMS database system be searched to compare the proposed test matrix to pipeline geometries that have had leaks. The idea would be, if possible, to have the pipe sizes in the test matrix resemble the leak event pipe sizes. This was considered a good idea but was an unexpected undertaking that has delayed issuing the updated test matrix. The request for an NPMS database query has been sent to PHMSA and action in this will be followed up early in Jan 2021.

Preparation of test specimens was commenced to support completing the first leak rate test. Due to the late project start milestone Item 4, Prepare Task 2a test specimens for 10 of 10 leak rate trials (5 of 5 test vessels), was only partially completed and is thus not invoiced in this quarter.

3: Project Financial Tracking During this Quarterly Period:



4: Project Technical Status – Dec 2020

Item #	Task #	Activity/Deliverable	Title	Federal Cost	Cost Share
1	1	Project kick-off meeting held	Meeting held and minutes circulated	4,000.00	1,000.00

A kick-off meeting was held with technical advisory panel on November 18th 2020. The meeting minutes were prepared and circulated to the technical advisory panel for comments. The minutes were revised to address comments and re-issued and posted to the DOT website.

3	2	Review and update test procedures	Test procedure documented	20,000.00	5,000.00
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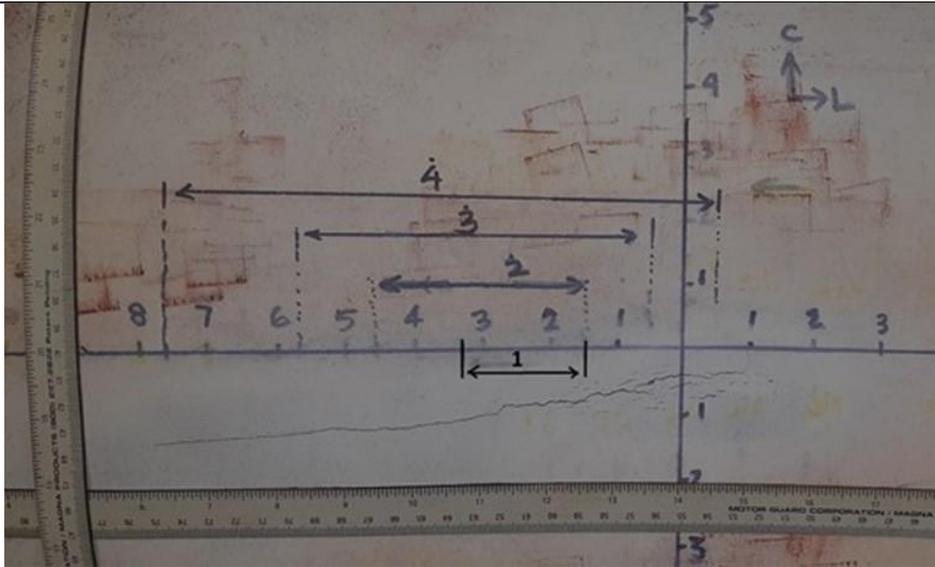
A leak rate test protocol document was prepared and circulated to the technical advisory panel. The document has also been uploaded to the DOT website.

5	2a	Commence first leak rate test for Task 2a	1 of 10 leak rate tests commenced	6,640.80	1,660.20
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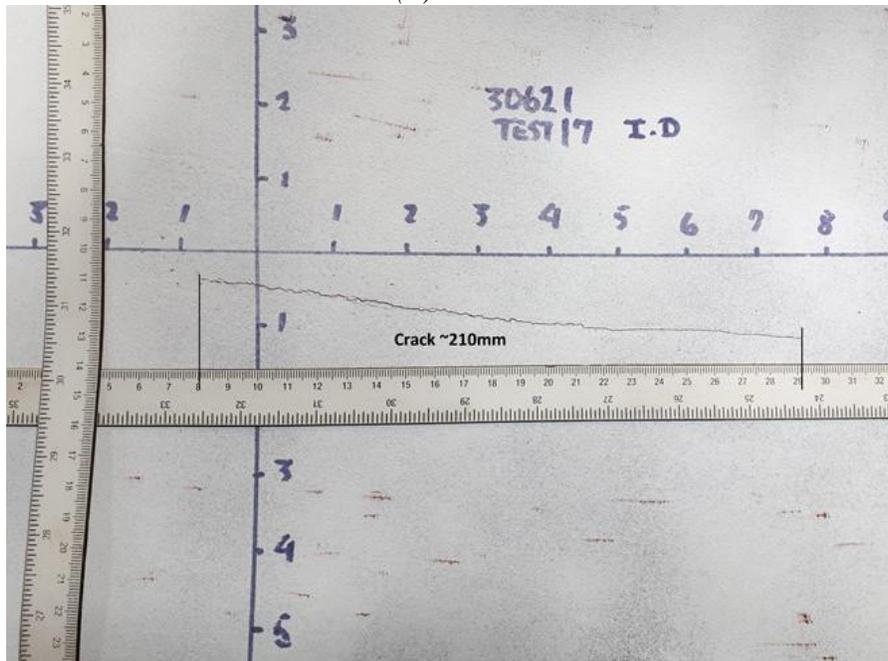
Leak rate test was carried out on a dented 40” OD, 0.344” WT, Grade X-60 pipe. The pipe with the dent was removed from service. EndCaps were welded at pipe ends to fabricate a pressure vessel. The test specimen was cycled between 50 psi (5% SMYS) and 565 psi (55% SMYS) till appearance of a through wall fatigue crack close to the dent peak. MPI and UT measurements were carried out to measure crack size at OD and ID. Leak rate test was then carried out at pre-defined pressures. The pressure vessel was held at a fixed pressure for a fixed period of time and water collected in a vessel. The volume of water collected was measured and leak rate calculated. The same process was repeated and a leak rate curve was developed for the crack size. The pressure vessel was then cycled gain to grow the through wall crack size. In this test four leak rates were measured at four different through wall crack sizes. Figure 1a shows the MPI of the OD surface with four different crack sizes marked on it. Figure 1b shows the MPI of the final ID crack. Figure 2 shows the leak rate curves for the four different crack sizes.

Table 1: Pipe Geometry and Crack Sizes for Leak Test 1

Leak Test #	Pipe Nom OD (in)	Pipe Nom WT (in)	Pipe Grade	Crack #	Total Through Wall Crack Size (mm)	Total Through Wall Crack Size (in)
1	40	0.344	X60	1	46	1.8
				2	78	3.1
				3	134	5.3
				4	210	8.3



(a) OD MPI



(b) ID MPI

Figure 1 MPI of OD and ID Surface. OD Surface Photograph also shows through Wall Crack Sizes of the 4 Cracks. Dent Center is at the Cross-hair.

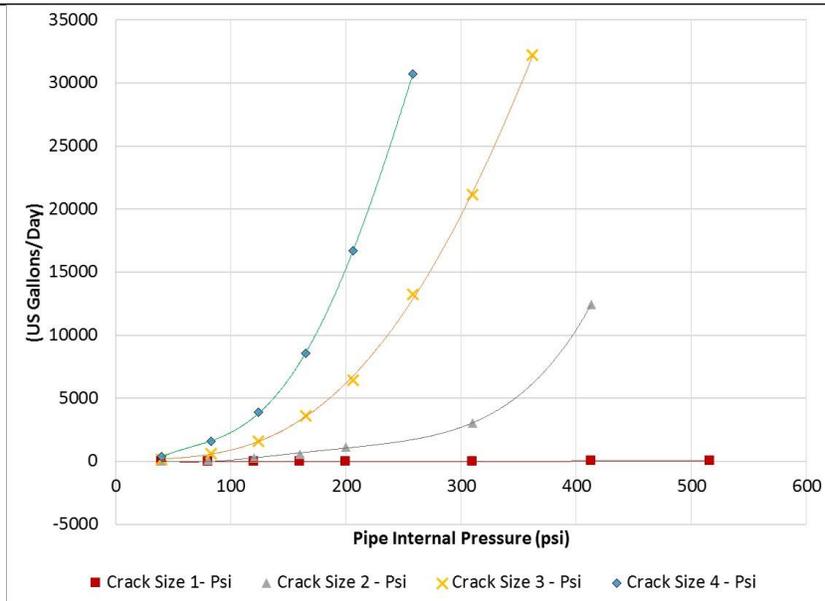


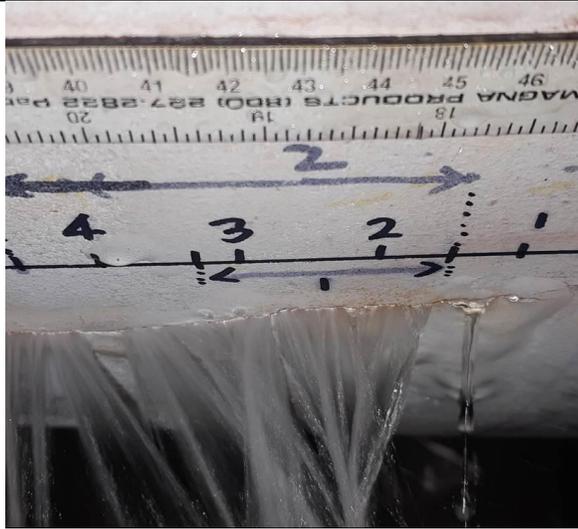
Figure 2: Leak Rate Curves for Four Different Fatigue Crack Sizes at Different Pressures.



Leak Test Photograph @ 206 psi - Crack Size 1



Leak Test Photograph @ 206 psi - Crack Size 2



Leak Test Photograph @ 206 psi - Crack Size 3



Leak Test Photograph @ 206 psi - Crack Size 4

10	6	Project Management and Reporting	Quarterly	\$3,500	\$700
			Status Report submitted		

This document is the quarterly status report.

5: Project Schedule

The project is currently slightly behind schedule.

The reasons for the delay are described in Section 2.