Quarterly Report – Public Page

Date of Report: *7th Quarterly Report-July 8, 2020*
Contract Number: *693JK31810011*
Prepared for: *Government Agency: USDOT - PHMSA*
Project Title: *River Scour Monitoring System for Pipeline Threat Prevention*
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For quarterly period ending: *June 30, 2020*

1: Items Completed During this Quarterly Period:

During the 7th Quarter, the following items were completed:

Item #	***Task #***	***Activity/Deliverable***	***Title***
22	***7***	Daily data collection	Collection of field data
23	***7***	Monthly analysis of data	Summary report of monthly data
33	***8***	7th Quarterly Status Report	Quarterly report

2: Items Not-Completed During this Quarterly Period:

The following tasks were not completed during this Quarterly Period:

Item #	***Task #***	***Activity/Deliverable***	***Title***
24	***2***	System Upgrade (version 4.0)	Upgrading of system
25	***5***	Software/Website Upgrade (version 3.0)	Upgrading software/website
28	***7***	Daily data collection	Collection of field data
29	***7***	Monthly analysis of data	Summary report of monthly data
31	***7***	Daily data collection	Collection of field data
32	***7***	Monthly analysis of data	Summary report of monthly data

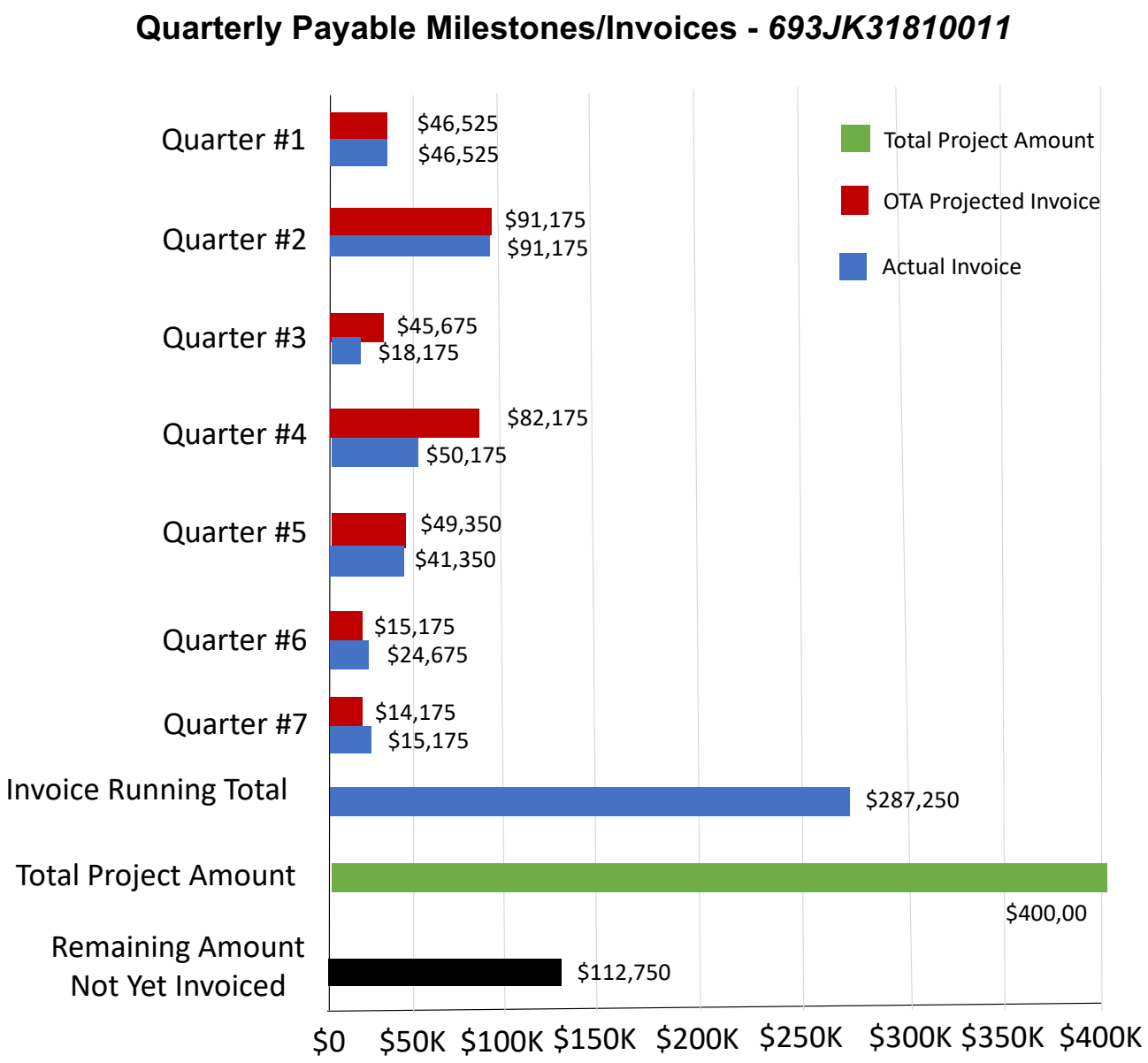
Item 24, Task 2 – System Upgrade (version 4.0), we are currently working on integrating a camera into the system to give a visual indication of the river status. We have found an off the shelf product that can be tied into the existing above ground electronics, but it is progressing.

Item 25, Task 5 – Software/Website Upgrade (version 3.0), the software team is currently upgrading the website to allow viewers to view the most recent images and download additional images.

Item 28/31, Task 7 – Daily data collection, we are currently collecting data from five recent installations of the River Scour Monitoring Systems that were deployed in late November, December, and March.

Item 29/32, Task 7 – Monthly analysis of data, we will continue to analyze the collected data from the five installations.

3: Project Financial Tracking During this Quarterly Period:



4: Project Technical Status

Data Collection and Monthly Data Analysis

Item #22/23, Task #7 – Daily data collection (every 10 minutes) and monthly analysis was conducted for the five installations at the Tongue River (2), Elk River (2), and Freeman River (1) sites installed in November, December and March, respectively. Temperature data on the pipe, soil and air as well as a battery voltage is being collected every ten minutes at each sensor location since installation. Currently the data is viewed on the Pure hub with an interactive graph and downloaded as an excel spreadsheet.

Tongue River, North Dakota

The Tongue River system was installed between November 18th and 20th, 2019. Two pipelines are currently being monitored for temperature changes. Sample data on Pipeline #1 is presented in Figure 4 and Table 1, while data for Pipeline #2 is shown in Figure 5 and Table 2.

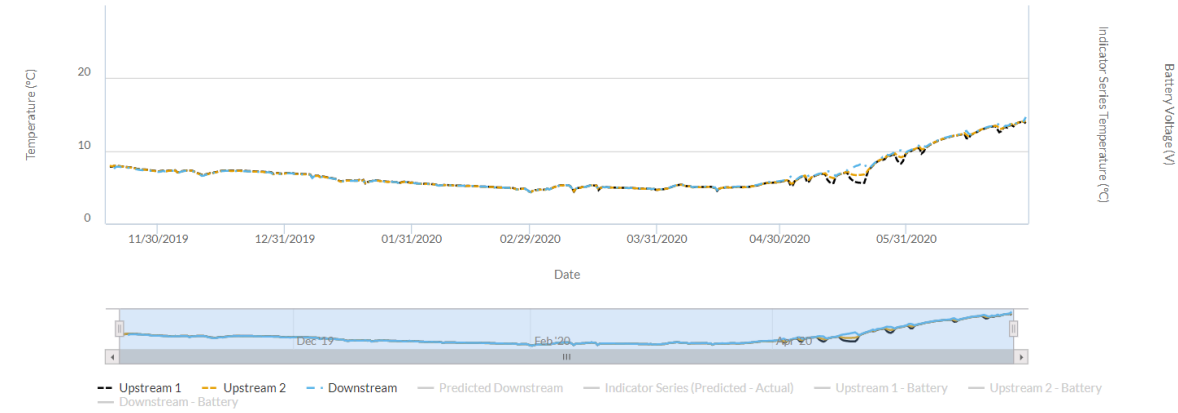


Figure 4. Pipeline Temperatures on Tongue River Pipeline #1

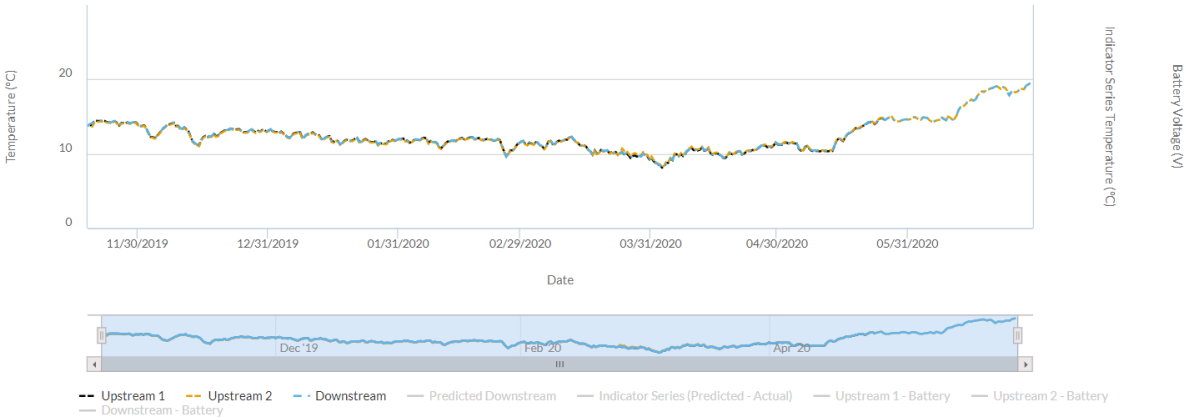


Figure 5. Pipeline Temperatures on Tongue River Pipeline #2

Elk River, Kansas

The Elk River system was installed between December 3rd and 7th, 2019 in Kansas. Two pipelines are currently being monitored for temperature changes. Pipeline #1 was installed in the 1950s using open cut construction to cross the river. Pipeline #2 was installed in the 2000s and used a horizontal directional drill to the construct the river crossing. Sample graphs and data tables for Pipeline #1 and #2 are presented in Figure 6, Figure 7, Table 3 and Table 4, respectfully.

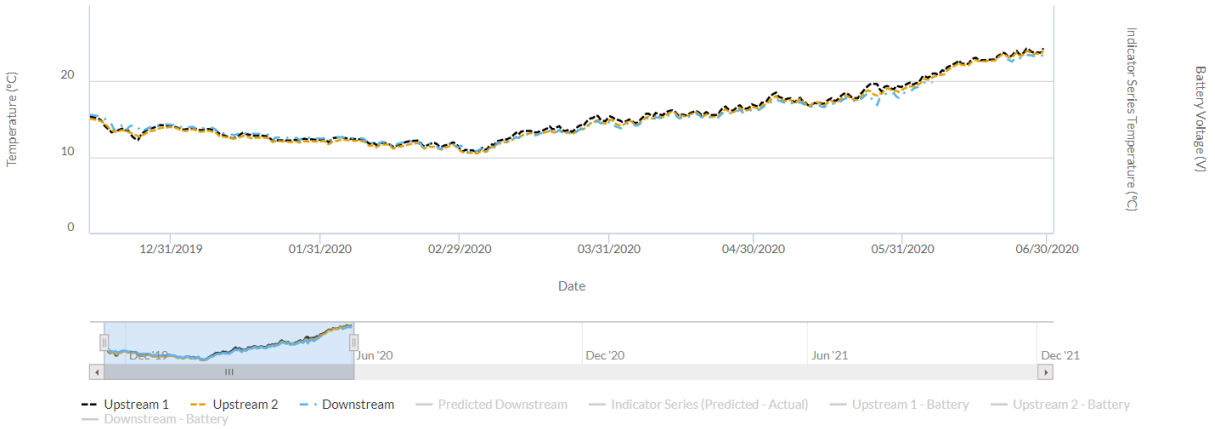


Figure 6 - Pipeline Temperatures on Elk River Pipeline #1

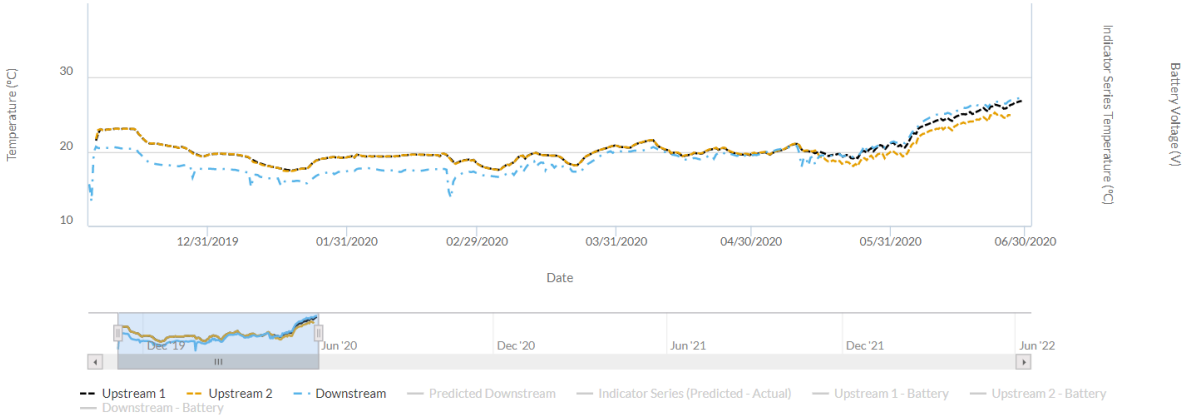


Figure 7. Pipeline Temperatures on Elk River Pipeline #2

Freeman River, Alberta Canada

The Freeman River system was installed March 7-11, 2020 on a 16-inch pipeline owned and operated by Pembina Pipelines under the Freeman River near Fort Assiniboine, Alberta Canada. Three sensors were placed on the pipeline; two upstream and one downstream. The pipeline was exposed and recoated using conventional trenchless pipeline repair methods. The pipeline is currently being monitored for temperature changes. Sample graphs and data tables for the pipeline are presented in Figure 8 and Table 5. A camera system was installed in April 2020 to take daily pictures to monitor the river condition throughout the winter melt and subsequent flooding. A picture captured from the camera system is shown in Figure 9. In June 2020, after some high river levels, a potential scour was identified during analysis of the data. A crew was mobilized with a high-resolution multi-beam sonar device to map the bottom of the river to verify a pipe exposure. The bathymetric data from the survey is currently still being processed and will be evaluated when completed.

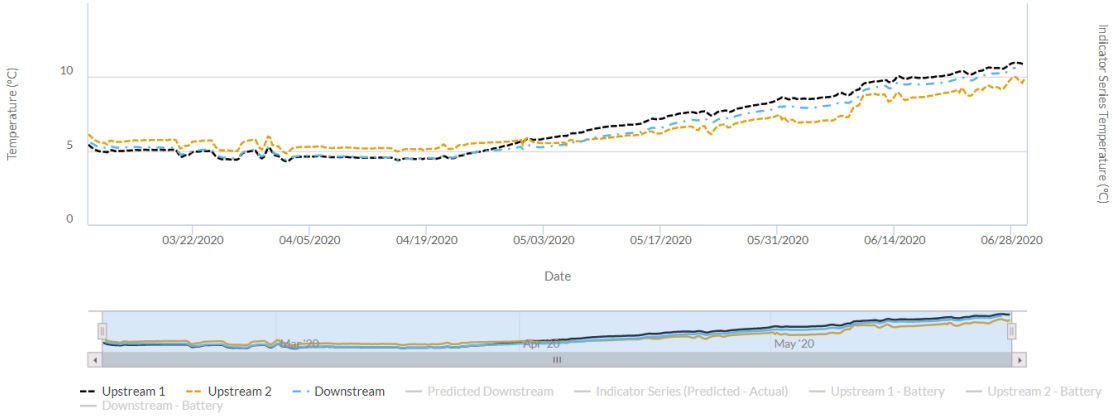


Figure 8. Pipeline Temperatures on Freeman River Pipeline

Figure 9. Pipeline Right of Way on the Freeman River Pipeline

System Upgrade (version 4.0)

Currently, work has begun increasing the data sampling rate of the temperature sensors. This is being done to help increase the sensitivity and identification of scour. The engineering team is also working on incorporating a camera system for visual indications of the river conditions. To assist with data analysis, PureHM is incorporating an automated bias calibration with SCADA information.

Software/Website Upgrade (version 3.0)

The software upgrade is mainly the creation of a client specific login page. Currently all data is hosted on one page and for confidentiality reasons cannot distribute login information to multiple operators. This will allow operators view their river crossings without the ability to see competitor's river crossing information. With the incorporation of a camera into the system, the software team is working on hosting those images on the same site that the RSS information is currently on.

5: Project Schedule

As discussed in Quarterly Report #6, the project is slightly behind schedule due to permitting issues. These have been resolved and now all five installations of the River Scour Monitoring Systems (RSS) have been complete in North Dakota, Kansas, and Alberta. We continue to successfully collect and analyze the data using remote communication. Furthermore, System Upgrade (version 4.0) and Software/Website Upgrade (version 3.0) are expected to be completed within the next Quarter.

Now that we have installed all of the RSS units, the project should progress in a timely manner without any anticipated issues.