

## AQRP Monthly Technical Report

<b>PROJECT TITLE</b>	Evaluating Methods for Determining the Vapor Pressure of Heavy Refinery Liquids	<b>PROJECT #</b>	17-007
<b>PROJECT PARTICIPANTS</b>	UT Austin	<b>DATE SUBMITTED</b>	February 6, 2017
<b>REPORTING PERIOD</b>	<b>From:</b> January 1, 2017 <b>To:</b> January 31, 2017	<b>REPORT #</b>	03

A Financial Status Report (FSR) and Invoice will be submitted separately from each of the Project Participants reflecting charges for this Reporting Period. I understand that the FSR and Invoice are due to the AQRP by the 15<sup>th</sup> of the month following the reporting period shown above.

### Detailed Accomplishments by Task

During the month of January, project team (PT) made progress on the following activities:

#### Task 4.2 Project reports and presentation

The December Monthly Technical Report was prepared and submitted.

#### Task 4.3 Purchase and receipt of Automated Mini-method Instrument

Members of the PT provided Grabner and Eralytics with technical specifications of the materials to be tested and the tests required for the project. A material sample was sent to Grabner. The PT obtained and reviewed VP results from Eralytics made on the No. 6 oil sample the PT sent them last month. This was very encouraging news. Sought further information on the technical capabilities of the Eralytics instrument. Communicated with Bob Stamp, our sales rep for Eralytics, about getting a demonstration of this instrument and the lease/borrow options for their ERAVAP instrument.

#### Task 4.4 Identify labs to conduct the ASTM D2879, E1719, and D323 testing

Have not received a follow-up response from American Testing Labs with a quote of their analytical services. Confirmed with Fesco Labs (David Dannhaus) that they can perform D323 if needed. Therefore, the PT is discontinuing pursuit of the US Customs and Border Protection Lab as a source for this test method. Made contact with Chilworth about their Method D2879 prices. Provided them with a video of a PT member pouring a heavy liquid (HL) sample for reference. Tried to reach the Wiltec Research Company with questions about their vapor pressure measurement capability.

Talked to Louis Jaspersen at Wiltec Research Company about vapor pressure measurements and the way they remove dissolved air and water from the samples; sent Mr. Jaspersen a followup email asking about any reports on the vapor pressure of heavy refinery liquids they might be able to release and asking him how they return the trapped light ends to the sample after separating

out the dissolved gases and water. Reviewed vapor pressure data provided by Joe Dauner from Magellan.

Task 4.5 Obtain Materials for testing and Material Safety Data Sheets

Continued to pursue John McDonald as a source for heavy liquids. Placed a purchase order for 2 liters of No. 6 oil and liquid asphalt.

4.6 Remove Identifying and VP Information from MSDSs, Prepare Samples, and Send First Stage Samples with "Sanitized" MSDSs to Labs for Testing

Ordered materials to construct the sample-dispensing system and followed up on purchases and their delivery. Tested the hot plate and closed loop thermocouple for functionality and accuracy at the boiling point of water.

Task 4.7 For first stage of samples, UT Austin measures VP of materials using Automated Mini-method and reports results; Commercial labs conduct their sample measurements of first stage samples and report results

No further progress on this task.

Task 4.8 Conduct study of activity model binary interaction parameters to gain insight into the applicability of using light end composition and Raoult's Law to estimate the vapor pressure of heavy refinery liquids

Used the NIST-modified UNIFAC model to suggest three alternatives for our "known" recipe that return a vapor pressure result similar to heavy liquids using the model and Raoult's Law.

Task 4.9 Analyze and Assess the VP Measurements for First Stage Samples

Calculated Antoine's constants for the No. 6 fuel oil vapor pressure results from Eralytics. Asked Eralytics if their instrument can perform measurements at temperature below and whether the vapor pressure of liquid asphalt can be measured with their instrument. They were also asked if Methods D5191 and D6377 can be run on their instrument and why D6378 correlates with dry vapor pressure equivalent from D5191 (it's not really dry, it's just not saturated with water). Conducted a review of selected research literature to understand water content effects and whether it must be removed for vapor pressure testing.

Task 4.10 Remove Identifying and VP Information from MSDSs, Prepare Samples, and Send Second Stage Samples with "Sanitized" MSDSs to Labs for Testing

No work performed on this task.

Task 4.11 For the Second Stage of Samples, Test Samples Using an Automated Mini-method Designed to Measure the VP of Low Volatility Materials (e.g., the Grabner MINIVAP VPXpert-L); Commercial Labs Conduct their Sample Measurements of First Stage Samples and Report Results

Renovated a large forced-air heated chamber in anticipation of its possible use with the mini-method instrument that will be used during the project.

**Preliminary Analysis**

None performed during the report period.

**Data Collected**

None collected during the report period.

**Identify Problems or Issues Encountered and Proposed Solutions or Adjustments**

The costs for laboratory analysis have increased, for unexplicable reasons, five to ten times more than originally quoted at the time of the proposal. If this holds true, fewer materials may have to be used to remain within the project budget allocation.

**Goals and Anticipated Issues for the Succeeding Reporting Period**

Verify whether the Grabner automated mini-vap instrument can be used to measure the vapor pressure of the materials being investigated on this project in addition to the Eralytics instrument.

**Detailed Analysis of the Progress of the Task Order to Date**

**Do you have any publications related to this project currently under development? If so, please provide a working title, and the journals you plan to submit to.**

Yes       No

**Do you have any publications related to this project currently under review by a journal? If so, what is the working title and the journal name? Have you sent a copy of the article to your AQRP Project Manager and your TCEQ Liaison?**

Yes       No

**Do you have any bibliographic publications related to this project that have been published? If so, please list the reference information. List all items for the lifetime of the project.**

Yes       No

**Do you have any presentations related to this project currently under development? If so, please provide working title, and the conference you plan to present it (this does not include presentations for the AQRP Workshop).**

Yes       No

**Do you have any presentations related to this project that have been published? If so, please list reference information. List all items for the lifetime of the project.**

Yes       No

---

Submitted to AQRP by

Principal Investigator Vincent M. Torres