AQRP Monthly Technical Report

PROJECT TITLE	Improving Emission Rates Estimates of Commercial Marine Vessels	**PROJECT #**	24-003
PROJECT PARTICIPANTS	University of Houston, Ramboll, FluxSense	**DATE SUBMITTED**	06/10/2025
REPORTING PERIOD	**From:** 05/01/2025 **To:** 05/31/2025	**REPORT #**	10

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 15th of the month following the reporting period shown above.

Detailed Accomplishments by Task for reporting period

- Removed the University of Houston's (UH) research boat from the water on May 1st, 2025, and delivered it back to the university's campus.
- University of Houston, FluxSense, and Ramboll held a meeting to discuss the data collected and determine plans for analysis.
- Worked on extracting precise plume times for easier identification and cross-referencing with ship identification logs.
- The University of Houston's team quality assured/quality checked (QA/QC) on the raw trace gas and meteorological data collected during the intensive campaign.
- Used public data sources to identify the engine characteristics for nearly all vessels whose plumes were measured.
- Final trace gas and meteorological data was delivered to the field team on May 28th, 2025 for them to begin analysis tasks.

Preliminary Analysis (if available)

- Ramboll conducted a preliminary analysis of a sample of the Nitrogen Oxides (NO_X) and Carbon Dioxide (CO_2) plume concentrations to identify uncertainties in the measurements.
- Used a technique employed by other remote sensing researchers to compare the relative NO_X vs. CO_2 concentrations by using linear slope regression.
- Found the resulting NO_X emissions relative to the fuel consumed were mostly within the range of expected values for the few vessels analyzed.

Data Collected

Yes

Identify Any Problems or Issues Encountered and Proposed Solutions or Adjustments

- Relative concentrations of NO_X and CO_2 were not precisely time-aligned, so time alignments will be used to minimize regression errors.
- It was not readily apparent whether Carbon Monoxide (CO), Particulate Matter (PM), or Sulfur Dioxide (SO_2) plume concentrations were distinct relative to background concentrations. The same regression techniques will be applied to these emission concentrations.

Goals and Anticipated Issues for the Succeeding Reporting Period

- Write a program to analyze all plumes to allow precise plume time alignments
- Tabulate the results relative to the expected emissions values with regression uncertainties.

Detailed Analysis of the Progress of the Task Order to Date

None

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 (ie: publications that cite the project) 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**

Have any personnel changes occurred that were not listed in the original proposal? If so, please include a detailed description of the personnel change(s) below.

☐ **Yes** ☒ **No**

Are any delays expected in the progress of the research? If so, please include a detailed description of the potential delay below.

☐ **Yes** ☒ **No**

Describe any possible concerns/issues (technical or non-technical) that AQRP should be made aware of.
N/A

Are you anticipating using all the available funds allocated to this project by the end date? If not, why and approximately what is the amount to be returned?

☒ **Yes** ☐ **No**

Submitted to AQRP by
James Flynn