

2ND QUARTERLY REPORT - PUBLIC
GTI PROJECT NUMBER 21873

**Project Title: Statistical Review and Gap
Analysis of LNG Failure Rate Table**

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Funds and Work Completed this Quarterly Period

The following work was performed during this quarterly period.

Task 2. Review Literature and Data and Prepare Preliminary Bibliography – GTI continued Task 2 during this quarter, as summarized by these accomplishments:

- Continued identifying and reviewing equipment failure rate data, and other relevant information, such as obtaining and reviewing three additional references that summarized prior Bayesian analyses by authors from Texas A&M (as recommended by TAP members during Project Kick-Off Call).
- Gained additional familiarity with and statistically reviewed the UK HCR (Hydrocarbon Release) database set, and benchmarked GTI's analysis to a prior public analysis by DNV.
- Received input from subcontractor CH-IV International Inc. (as a subcontract deliverable) regarding their known relevant literature references.
- Submitted Preliminary Bibliography on Jan. 29, 2016. It identified 38 references that appear to contain failure rate data relevant to PHMSA's LNG Failure Rate Table, and identified 58 additional references relevant to analysis methodology.

Task 3. Develop Preliminary Framework Layout and Component Protocols – GTI completed Task 3 during this quarter, as summarized by these accomplishments:

- Continued analysis of data found in literature search, by cross-referencing identified data to Preliminary Framework Layout and Component Protocols.
- Submitted Preliminary Framework Layout and Component Protocols on Feb. 29, 2016
- Received input from subcontractor CH-IV (as a subcontract deliverable) regarding their comments on Preliminary Framework Layout and Component Protocols.

Task 4. Contact Additional SMEs and Other Interested Parties – GTI continued Task 4 during this quarter, as summarized by these accomplishments:

- Spoke with TAP member Brandon Jones, LNG Plant Manager for Southwest Gas Corp. (he replaced Jeff Maples) to review this PHMSA project and gather his current thoughts and input.
- Spoke with new TAP members Mike Wardman and Jill Wilday of the UK HSE Health & Safety Laboratory (HSL) to review this PHMSA project and gather their current thoughts and input.
- Attempted to re-contact FERC's representative (via PHMSA) to see if FERC's existing spreadsheet database of equipment failure rate data, and other failure rate records, were available.

Task 5. Develop Integrated Database and Analyze Data – GTI commenced Task 5 during this quarter, as summarized by these accomplishments:

- Began developing database and continued analysis of data, by applying the data found in literature search and as represented in the Framework Layout
- Begin preliminary layout of structuring Bayesian analysis of data. We are using AgenaRisk software supplemented by custom-generated software code as well as MicrosoftExcel.

The payable milestones completed during this quarter were:

1. Preliminary Bibliography that Summarizes Initial Results of Review of Literature and Data. Due to DOT within four (4) months of the effective date of the Agreement. Completed on Jan. 29, 2016.
2. Summary of Preliminary Framework Layout and Component Protocols. Due to DOT within five (5) months of the effective date of the Agreement. Completed on Feb. 29, 2016.
3. Quarterly Report #2. Due to DOT within six (6) months of the effective date of the Agreement. Completed on Mar. 31, 2016.

Results and Conclusions

The project is progressing as scheduled, with the exception of a delay in submission of Task 4 Deliverable in order to take advantage of GTI's upcoming participation in LNG18 conference in Perth, Australia and American Gas Association Supplemental Gas Committee meetings in Phoenix, AZ in April 2016. Excellent input was provided by participants in the TAP from government and industry, and from subcontractor CH-IV. The project is at a fairly early stage and no findings, discoveries conclusions or other summarizing information has yet been developed.

Plans for Future Activity

Planned activities for the next quarter include:

- Continue and finish Task 3 - Develop Preliminary Framework Layout and Protocols, and Prepare Summary of Preliminary Framework and Component Protocols
- Continue and finish Task 4 - Contact Additional SMEs beyond TAP, and Prepare Summary of Findings from Additional SMEs beyond TAP.
- Continue and finish Task 5 – Develop Integrated Database and Analyze Results, and Prepare Preliminary Summary of Database and Results
- Begin Task 6 – Revisit/Finalize Framework, Protocols, and Data Analysis
- Begin Task 7 – Develop Gap Analysis and Summarize Process Results
- Pursue additional members to join TAP based on the current TAP's Initial Input.
- Submit monthly reports and quarterly report.
- Participate in Peer Review session.

End of Quarterly Report
