COMPARISON OF EXCLUSION ZONE CALCULATIONS AND VAPOR DISPERSION MODELING TOOLS

2ND QUARTERLY REPORT MARCH 31, 2016

PHMSA Solicitation:	DTPH56-15-RA-000001
Research area:	Liquefied Natural Gas (LNG)
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1 INTRODUCTION

CH·IV International (CH·IV) has contracted with DOT PHMSA to provide research on vapor dispersion modeling (Project). This Project will compare the various design spill selection methodologies and compare the exclusion zone results for various facility types. The comparison will include a review of the DEGADIS, Phast, and FLACS modeling tools currently approved by DOT PHMSA to perform dispersion modeling to calculate vapor dispersion exclusion zones. The Project will also evaluate several design spill selection methodologies and apply them to import, export, peak-shaving, and mid-size truck loading Liquefied Natural Gas (LNG) plants. This Project will calculate vapor dispersion exclusion zones with each associated design spill. As a result, this project will help DOT PHMSA better define the approach for determining vapor dispersion exclusion zone distances.

2 PREVIOUS COMPLETED WORKS

- Agreement #DTPH5615T00005 was executed by CH·IV and DOT PHMSA and effective starting September 30, 2015.

2.1 Kick Off Meeting and TAP Update

- On October 8, 2015, an initial kick off meeting was held with CH·IV and DOT PHMSA to discuss the overall timeline and scope of the research project. Call attendees were Phil Suter and Jenna Wilson with CH·IV and Julie Halliday with DOT PHMSA. The proposal was to perform vapor dispersion for an LNG import, export, peak shaving, and mid-scale truck loading. As a result of the call and based on current projects being proposed, the scope of the proposal was changed to include LNG export, peak shaving, truck loading, and bunkering.
- Scope of Work Change: Change LNG import, export, peak shaving, and mid-scale truck loading to LNG export, peak shaving, truck loading, and bunkering.
- It was also discussed that there was a potential to add additional modeling for mitigated releases but a decision on that would be made later in the project.
- The Technical Advisory Panel (TAP) members were also discussed on the call and both CH·IV and DOT PHMSA were in favor of adding additional members from DOT PHMSA, DOE, USCG, and FERC to the TAP to raise the overall level of confidence in the research.
- DOT PHMSA reached out to FERC, DOE and USCG. As a result, Andrew Kohout from FERC, Kyle Moorman from DOE, and Ken Smith from USCG were added to the TAP. Additional personnel from DOT PHMSA and FERC will also be involved in reviewing each Task but Andrew Kohout and Julie Halliday will remain the main points of contact.
- On November 19, 2015 a full kick off meeting was held with DOT PHMSA and the TAP to re-introduce the project to the new members of the TAP who were recently added.

2.2 Task 1

Technical Status: The Project identified a generic design basis for the following LNG facility types: bunkering, export, peak-shaving, and mid-scale LNG fuel loading. The design basis was then broken up into the major areas of LNG facilities (such as marine loading/unloading, tank storage area, liquefaction area, vaporization area, etc.) and was populated with common design parameters for each area. The design basis includes information necessary to serve as the basis for vapor dispersion modeling and provides a consistent means for comparing results across different methodologies and modeling tools. The generic design basis captured design elements common to the majority of currently proposed LNG projects and therefore the associated vapor dispersion exclusion zones will be applicable to the majority of currently proposed LNG projects. A generic LNG facility plot plan was developed based on each generic LNG facility design basis to represent a generic layout of each facility type.

- On December 7, 2015 a draft of Task 1 deliverables were sent to the TAP for review with a review deadline on December 18, 2015.
- Comments were provided by DOT PHMSA, FERC, and Rich Kooy on the draft Task 1 deliverables. CH·IV consolidated all comments into a single document and provided responses to all comments. On December 29, 2015 the consolidated comments and responses were provided to DOT PHMSA for review.
- On December 30, 2015, CH·IV and DOT PHMSA convened a TAP Task 1 comment response review call and made final decisions on the comments from the TAP.

2.3 Task 6

- Completed quarterly report 1 for the quarterly period through December 31, 2015.

3 WORK COMPLETED DURING THIS QUARTERLY PERIOD

3.1 Task 2

Technical Status: The Project team researched the failure criteria used by LNG facility applicants to determine a "single accidental leakage source" and defined a generic Connection Based and Failure Rate Based Methodology. The Project team utilized its previous experience working for applicants during the DOT PHMSA design spill review process and utilized information presented on DOT PHMSA's FAQ website to determine an acceptable approach.

- On February 4, 2016, a draft of Task 2 deliverables were sent to the TAP for review with a review deadline on February 19, 2016.
- Comments were provided by DOT PHMSA, Filippo Gavelli, James Davis, and Brian Eisentrout on the draft Task 2 deliverables. CH·IV consolidated all comments into a single document and provided responses to all comments. On March 11, 2016 the consolidated comments and responses were provided to DOT PHMSA for review.

- On March 21, 2016, CH·IV and DOT PHMSA convened a TAP Task 2 comment response review call. On March 23, 2016 DOT PHMSA made final decisions on the comments from the TAP. On March 24, 2016 CH·IV provided the final comment responses to the TAP members.

3.2 Task 3

Technical Status: The Project team applied both the generic Connection Based Methodology and Failure Rate Based Methodology to each generic design basis for each LNG facility to identify "single accidental leakage sources". This resulted in defined generic "single accidental leakage sources" for each facility type. An excel spreadsheet was made for each generic facility type to create a sample piping and equipment inventory database similar to what applicants are required to prepare for DOT PHMSA. The Project started on a comparative discussion on the differences in the "single accidental leakage sources" based on the different methodologies for each facility type.

- Task 3 has commenced and the design spills have been defined. The Task 3 deliverables are in progress.

3.3 Task 6

- Completed quarterly report 2 for the quarterly period through March 31, 2016.

4 SCHEDULE UPDATE / THIRD QUARTER TASK PROJECTIONS

- It is anticipated that Task 3 will be completed early 3rd quarter.
- It is anticipated that Task 4 will commence and be completed late 3rd quarter.
- CH·IV is scheduled to present on the current results at the DOT PHMSA workshop on May 19th.
- Peer Review #1 has been scheduled for May 25th.