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Mr. Roy S. MacDowell, Jr.
Legacy Farms, LLC
21 Center Street
Weston, Massachusetts, 02493

Re: Technical Review of Smith & Burgess Report

Dear Roy:

The following short technical letter report summarizes our review of the Smith & Burgess LNG Spill Dispersion Report dated February 9, 2016. There are several major technical issues with the Smith & Burgess Report that render it non-credible.

This short technical letter report will focus on major technical issues associated with the tank failure scenarios and will not address other technical issues for the piping failure that appear to be properly addressed by the Sanborn Head technical review report of the Smith & Burgess report.

These major technical issues include but are not limited to the following:

1. The Smith & Burgess CFD dispersion analysis calculates distances to ½ the lower flammable limit (LFL). It is well known (see Sandia National Labs numerous publications) that CFD codes will under-predict the rate of air entrainment into the dispersing LNG vapor cloud when practical CFD mesh sizes are used as was used in this case. As a result, CFD dispersion results will over-predict the hazard extent distances. Therefore, CFD calculations should only be performed to LFL and NOT to ½ LFL. This fact underscores the lack of understanding of CFD dispersion analysis for LNG spills by Smith and Burgess. The dispersion results are not realistic and do not represent the true extent of dispersion and should be considered non-credible.

2. The vaporization rates of LNG from tank failure are incorrectly calculated. For example, under atmospheric stability class F and a wind speed of 2 m/s, the vaporization rate of LNG will decrease with time as the spill surface is cooled by the liquid LNG and the vaporization process. This is illustrated in Figure 1. The vaporization rates are

overestimated by at least a factor of two. This overestimation of vaporization rate leads to overestimation of the dispersion hazard distances. As a result, the calculated hazard distances are non-credible.

3. The Smith & Burgess Report ignores the ignition probability of the dispersing cloud. It is well known that the ignition probability of such a major LNG release will be near 100 %. It is impossible for the vapor cloud to disperse to the LFL when ignition occurs. The credible worst case scenario is therefore a massive pool fire and not a vapor cloud fire. Substantial thermal radiation shielding is provided to the proposed development because of the difference in elevation between the tanks and the proposed development.

4. The Smith & Burgess Report ignores the probability of failure of LNG storage tanks. The catastrophic failure rate for one of the LNG tanks is 5/10,000,000 years. The cumulative failure rate for all three tanks is 1.5/1,000,000 years. A person living in the town of Hopkinton is more likely to be injured due to a magnitude 7 earthquake which has a return frequency of 12/1,000,000 years.

5. Finally and more importantly, Smith & Burgess failed to show that the CFD model they used is properly validated and calibrated. There are numerous available large scale test data sets including the Falcon test series that should have been used to demonstrate that the selected model can actually be used to extrapolate from the measured large scale field test data to the actual release conditions considered here from one or more tank failures.

The major technical deficiencies highlighted above should cast serious doubt about the validity of the Smith & Burgess report. Please do not hesitate to call or email me with any questions or concerns.

Sincerely,

G. A. Melhem, Ph.D.
President and CEO

Figure 1: LNG Vaporization Rate as a Function of Time Due to Tank Failure