Quarterly Report # 2

[For the quarter ending 3/31/2005]

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Prepared for: ***U.S.DOT, Research & Special Programs Administration, Distrigas of Massachusetts Corporation***

Project Title: ***"Modeling and Assessing a Spectrum of Accidental Fires and Risks in a LNG Facility"***

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PUBLIC PAGE

In this quarter (# 2) the various scenarios of potential LNG fires in on-shore storage terminals as well as releases form LNG ships were identified and catalogued. Only those fires that have a potential for having direct impact on the public have been considered.

Additional literature review for obtaining quantitative information on the formation of soot/smoke in turbulent diffusion fires, and especially in natural gas fires was undertaken. No data are available for smoke production rate in LNG or LPG diffusion fires on liquid pools. Considerable work is reported in the literature on the production of soot in premixed, and in some cases diffusion fires, of laboratory scale. It is difficult to extrapolate these data for other conditions, especially when the scaling law with respect to the chemical burning and the size (diameter) of fire are not known. Direct measurement of the soot/smoke yield in a field size diffusion fire (17 m diameter) has been reported for crude oil fires. These results will form the basis for the development of a semi-empirical model to predict the radiation output from a large LNG fire.

Computer programs have been developed to determine the locations of contours of constant thermal radiation flux levels on the ground from a fire on top of a LNG storage tank. Other sub-models to evaluate the hazards from other fires in the scenarios identified in this project will be developed in the coming months.

A preliminary model to describe the variation of the surface emissive power with length along the flame axis has been developed, assuming a soot/smoke yield and assumed intermittency of the fire burning characteristics. Preliminary results indicate that for a large fire, the mean surface emissive power over the visible length of the fire may be

reduced by a factor of 1.5 to 2 for sizes of large fires postulated to result from large ship releases of LNG. More developmental work on this model will be pursued in the coming months.