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MEMORANDUM FOR: Earl H. Markee, Jr., Leader
Meteorology Section, HMB, DSE

FROM: Barry Zalcman, Meteorologist
Meteorology Section, HMB, DSE

SUBJECT: NUREG/CR-1152 - HAZARDOUS SUBSTANCES

I have reviewed the subject report prior to approval for printing. I have several concerns that may be appropriate as comments but appear too late in the process to be expected to be addressed. The concerns I have will follow, however, I have prepared a Foreward that is attached.

The literature survey concentrated on "special conditions", associated with the evaluation of negatively buoyant releases and obstacles to flow (building complex and complex terrain). The ultimate objective was to provide recommendations regarding the evaluation of hazardous vapors; i.e., transport and dispersion of such gases in the vicinity of nuclear power plants.

The report identifies eight components of the problem that segregates this problem from traditional Gaussian treatment. Of these components, only two: buoyancy and wake effects were dealt with in any degree of detail. Although this inbalance is clearly evident, and supported by the NRC, there should have been a refinement of the objective. The document should have reflected the narrow field of subjects under discussion.

Of the various postulated situations that could be considered at nuclear power stations, at least one case in particular was not dealt with in adequate detail. Potential sources of hazardous substances in the vicinity of nuclear power plants are either mobile (tankers of sorts on water, land, or rail) or stationary (tanks or pipelines). It would not be uncommon to visualize a high pressure gas pipeline in a plant vicinity. A postulated rupture of a positively buoyant gaseous mixture unlike a liquified mixture in air could well be an accident with a relatively high probability of occurrence when compared with other hazardous substance accidents. The treatment of this case need not have been discussed in great detail, but did merit some discussion.

The basic models ultimately presented appear to concentrate on heavy gases or cold liquids, both of which initially settle groundward. The interim methods proposed for evaluation included a Gaussian based model, gravity current or jet models, or numerical solutions to the equations of motion. As an interim measure

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the latter method is not feasible; it does, however, represent the direction to be taken. I could not agree more with the conclusion of the report. The authors have taken a large step in attempting to scope the problem, the document should serveaas a starting point for those continuing the research.

ORIGINAL SIGNED

Barry Zalcman, Meteorologist
Meteorology Section
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Attachment:
As Stated

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

FOREWORD

This literature survey of atmospheric transport and dispersion characteristics of hazardous substances provides a basis for recommendations for input to the evaluation of postulated accidents in the vicinity of nuclear reactor sites. The study was requested by the NRC staff to review the state-of-the-art with respect to the unique characteristics of some hazardous substances. Of the various components of this unique diffusion problem, the treatment of buoyancy (negative, neutral, or positive) characteristics was of paramount concern. In providing recommendations for interim guidance, this review clearly demonstrates the need for additional research and refinement. Work was substantially completed in 1978; therefore recent information may not be reflected in the review, but does not detract from an initial attempt to consolidate the elements of the problem.

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