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Contributing to the accident was the lack of odor in the leaked gas when it reached the houses and the atmosphere.

## RECOMMENDATIONS

The National Transportation Safety Board recommends that:

1. The Office of Pipeline Safety of the Department of Transportation:
  - (a) Require pipeline operators who use materials not specifically covered in the Federal regulations to formally advise the Department of Transportation of its use. (Recommendation No. P-74-37)
  - (b) In its study of plastic pipe, determine whether occluded particles during extrusion are a significant safety problem, and, if so found, take necessary regulatory action to control that problem. (Recommendation No. P-74-38)
2. The Department of Housing and Urban Development:
  - (a) Study the flow of natural gas through various basement wall and floor materials and through various types of construction. The study should include effective methods of sealing the space around underground utility lines and ducts where they enter a building, and methods of permitting gas to escape in the open atmosphere when conducted to these entrance areas. (Recommendation No. 74-39)
3. The American Society of Mechanical Engineers Gas Piping Standards Committee:
  - (a) Develop guidelines to assist pipeline operators to maintain adequate public protection in areas where odorant adsorption by soil could occur. (Recommendation No. P-74-40)
  - (b) Develop guidelines for the sampling of combustible gases to assure proper concentrations of odorant as required by 49 CFR 192.625(f). (Recommendation No. P-74-41)
  - (c) Develop guidelines to assist pipeline operators in training meter readers and others who work at customers' premises to detect vegetation areas that might be an indication of gas leakage. (Recommendation No. P-74-42)
4. The American Gas Association:
  - (a) Give a high priority to the problem of soil adsorption of odorant compounds in its planned research to develop an improved odorant. (Recommendation No. P-74-43)

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- (b) Give consideration to measuring the odorant level of gas escaping from underground leaks in its planned research on odorant monitoring. (Recommendation No. P-74-44)
- (c) Develop methods of testing soils to determine the potential effect on odorants. (Recommendation No. P-74-45)
- (d) Study the natural gas permeating and migration phenomena in various types of soil and under paved surfaces. Based on the results of this study, recommend the use of certain types of soil for pipeline backfill material that will aid in allowing leaking gas to vent to the atmosphere at the leak location with a minimum permeation or migration effect. (Recommendation No. P-74-46)

5. The National Fire Protection Association:

- (a) Advise firefighting personnel of the phenomenon of adsorption of gas odorant compounds by certain types of soils. They should be reminded of the need to use combustible gas indicators when attempts are being made to detect the presence of leaking gas. (Recommendation No. P-74-47)

6. The Washington Gas Light Company:

- (a) Continue its efforts at the accident site to dissipate the residual gas remaining in the ground. P-74-48
- (b) Continue to monitor and test the affected homes in the area for the presence of gas until no further hazard from the residual gas is apparent. (Recommendation No. P-74-48)

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