



Project Summary

Recommended HVAC Standard of the Florida Radon Research Program

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The report contains the recommended language for the heating, ventilation, and air-conditioning (HVAC) section of the "Florida Code for Radon-Resistant Construction and Mitigation." It deals with elements of construction that relate to the HVAC of houses. Its primary intent is to prevent pressure differentials in houses that can increase the transport of radon into houses. Three pathways of compliance are available to meet the requirements of the HVAC portion of the standard. The first is purely prescriptive. The second is a performance and prescriptive approach. The third is a marketplace approach.

This Project Summary was developed by EPA's Air and Energy Engineering Research Laboratory, Research Triangle Park, NC, to announce key findings of the research project that is fully documented in a separate report of the same title (see Project Report ordering information at back).

Introduction

The report contains the recommended language for the heating, ventilation, and air-conditioning (HVAC) section of the "Florida Code for Radon-Resistant Construction and Mitigation" from the HVAC Specifications Committee of the Florida Radon Research Program.

This section of the Florida Code for Radon-Resistant Construction and Mitigation deals with elements of construction that relate to the HVAC of houses. The primary intent of the recommended measures is to prevent pressure differentials

in houses that can increase the transport of radon into houses.

Three pathways of compliance are available to meet the requirements of the HVAC portion of the standards. The first path is purely prescriptive. Builders need only comply with all the measures listed in Section 307.

The second path is a performance and prescriptive approach. Builders would comply with a reduced number of prescriptive measures and pass a performance test. The performance test would have two parts: the first would determine the airtightness of the air distribution system, and the second would determine pressure differentials with various house configurations and various mechanical systems operating.

A third path is a marketplace approach in which the state requires builders to provide a radon information sheet (which the buyer to conduct periodic radon information sheet (which the buyer and builder sign at closing) which encourages the buyer to conduct periodic radon tests. The builder agrees to take care of the problem if elevated radon levels are found within the normal construction warranty period. No performance test or prescriptive measures are required.

Approach

Radon is an invisible, odorless, radioactive gas which can enter houses and increase the risk of lung cancer. It originates from the decay of radium in the soil. Since it is a gas, it can migrate through the soil and enter buildings.



Several variables influence the amount of radon to enter a building. First, there must be radon in the soil. Certain soils have higher radon levels. The higher the level in the soil, the greater is the potential radon level in the building.

Second, there must be pathways for radon to travel between the soil and the building space. An air-impermeable barrier can prevent radon passage. Concrete is an effective barrier to radon. While radon can pass through concrete, its progress is so slow that most of the radon decays en route, rendering it essentially harmless. In the real world, however, the effectiveness of the concrete slab and a plastic sheet below the slab is comprised substantially by penetrations and cracks created during construction.

Third, there must be a driving force to transport the radon from the source through the pathway into the building. When pressure differences occur across the air barrier, much larger quantities of radon can be transported into the building. Therefore, control of pressures within buildings is a very important variable in the reduction of radon intrusion. In order to better understand the extent and causes of pressure differentials in Florida houses, a study has been undertaken. The objectives of the study are to:

1. Discover what pressure differentials exist in a sample of 70 or more new (age 5 years or less) houses.

2. Discover the causes of the pressure differences.
3. Recommend how pressure differentials can be controlled in order to reduce radon intrusion.
4. Provide pressure differential data to groups designing subslab ventilation systems.

In each house, pressure differences across the house envelope to the outdoors and to the subslab were measured:

1. When no air-moving systems in the house were turned on.
2. When the central AC system was turned on.
3. When various items of exhaust equipment were turned on; e.g., kitchen exhaust fans, bathroom exhaust fans, dryers, and attic exhaust fans.
4. When interior doors were closed and the air handler was operating.

A total of 70 houses have been tested. The findings of this project show that mechanical systems in the house produce greater pressure differentials across the slab than the natural forces of wind and temperature. Duct leaks, closed interior doors, and exhaust fans frequently create pressures greater than 4pCi/L (0.016 in. WG), while naturally produced pressures are generally less than 2 pCi/L. In some cases, depressurization across the slab

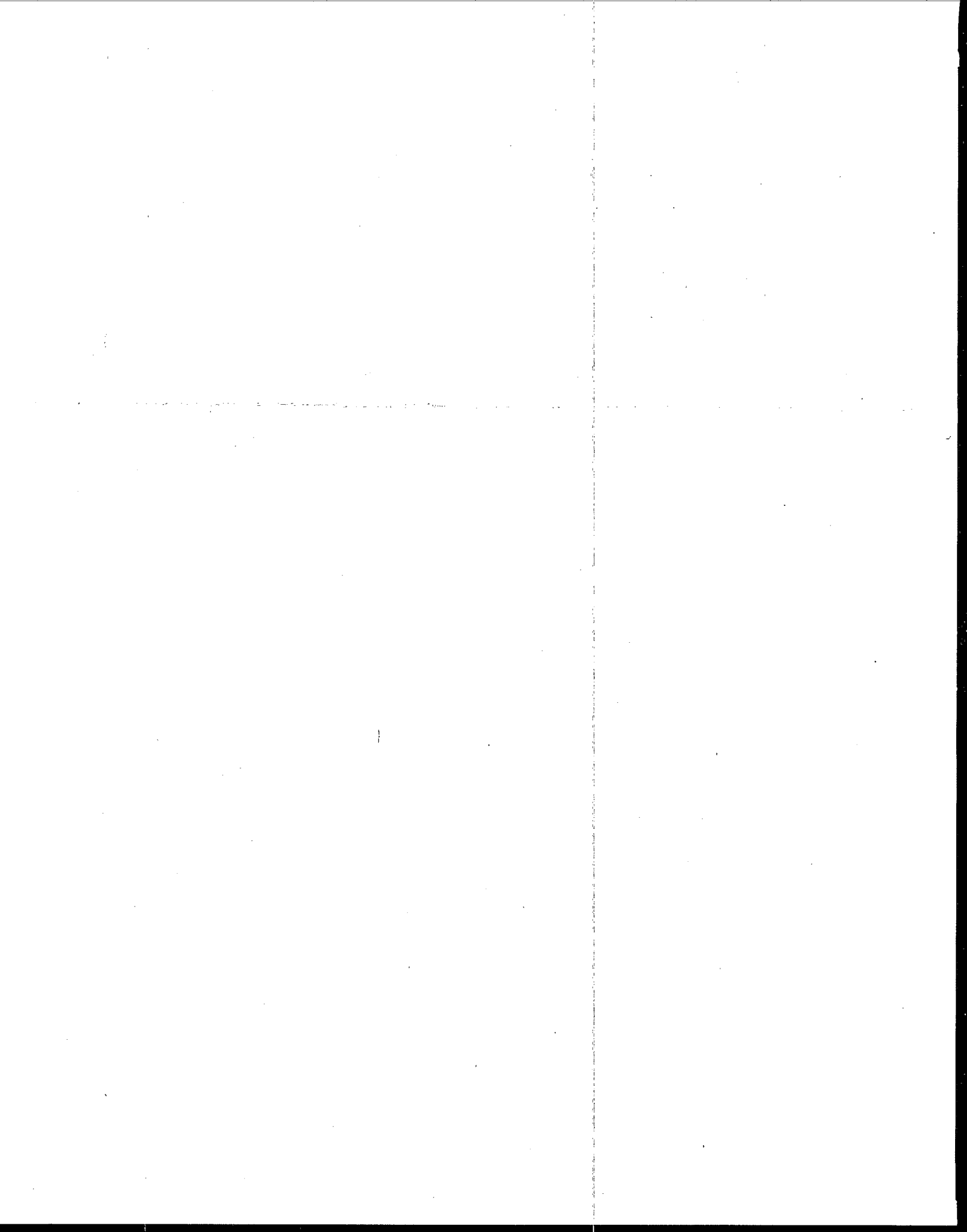
is as high as 20 pCi/L (0.080 in. WG) or more.

The findings from this research on 70 houses are documented in the report, "Radon Pressure Differential Project, Phase I."

To reduce pressure-driven radon intrusion in Florida buildings, an HVAC related building code has been developed. This code is contained in "Recommended Changes to the Florida Code for Radon-Resistant Construction and Mitigation" as well as in this report. The remainder of this report supports, explains, and justifies the recommended changes and additions to the Florida Radon Code.

Conclusions

It is the opinion of the HVAC Specifications Committee that the state of knowledge concerning the correlation of mechanically induced pressure differentials and radon intrusion is not sufficient at this stage of research to guarantee that compliance with these recommended code measures or multiple pathways will ensure that elevated radon levels will not occur in Florida houses. Also, it should be noted that resolution of mechanically induced pressure differentials in houses is only part of the solution.



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The complete report, entitled "Recommended HVAC Standard of the Florida Radon Research Program," (Order No. PB92-147909/AS; Cost: \$17.00; subject to change) will be available only from:

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