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AIR POLLUTION

Actions to Promote Radon Testing

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The Honorable George E. Brown, Jr.
Chairman
The Honorable Robert S. Walker
Ranking Minority Member
Committee on Science,
Space, and Technology
House of Representatives

Exposure to radon is the second leading cause of lung cancer, according to the Environmental Protection Agency (EPA) and the Surgeon General. In September 1988 the EPA Administrator and the Assistant Surgeon General recommended that homeowners test for radon and take measures to reduce radon levels when tests show annual average radon levels at four or more picoCuries per liter (pCi/l) of air.

Concerned about the amount of radon testing in homes, you asked us to review programs and activities that promote radon testing. This report discusses information on (1) EPA's public information/education programs to promote radon testing, (2) state programs supported by federal grants, (3) voluntary radon testing during real estate transactions, and (4) radon testing requirements for real estate transfers financed through federally related housing programs and in federally subsidized housing.

Results in Brief

To promote radon testing, EPA initiated public information and awareness programs and provided grants to states to develop programs aimed at encouraging homeowners to test for radon. Nationwide telephone surveys, according to EPA, indicate that these efforts have raised the public's awareness of radon to as high as 78 percent but that about only 9 percent of those surveyed have tested their homes for radon. Concerned about improving risk reduction through its radon program, EPA convened a review panel. The panel not only recommended in May 1992 that the current voluntary approach be continued but also called for program changes to encourage more testing. These changes include targeting public information and other resources to areas where radon levels are predicted to be high and promoting testing and mitigation at the time of real estate transactions.

To support state radon efforts, the Congress authorized a grant program for yearly grants of $10 million for 3 years. Funds for this program were

recently extended for a fourth year through fiscal year 1993. Information to measure states' success in promoting testing by homeowners was generally not available because (1) much of the grant funding has been used to identify the extent of the radon problem; (2) federally funded public information projects were often directed to large audiences, making it difficult to measure testing rates; and (3) EPA's evaluation process for the grant program did not contain a component to measure increases in testing. We did, however, identify some state projects that have increased radon testing by targeting program efforts to homes in areas with potentially high levels of radon. The results of the state projects would seem to support the EPA review panel's recommendations on promoting radon testing through targeting program resources.

In two states we surveyed, the voluntary use of disclosure statements as part of a real estate sales contract was a frequent occurrence, and in one state radon testing commonly occurred during real estate transactions in areas with high radon levels. In the other three states we visited, officials told us that radon testing during real estate transactions was infrequent.

For the most part, the six housing agencies and federally chartered secondary mortgage institutions that finance or insure much of the nation's single-family and multifamily housing do not require the disclosure of radon information or testing for participation in their programs. However, the Department of Housing and Urban Development (HUD) has recently started to implement the McKinney Act Amendments of 1988, which require HUD to develop radon testing and mitigation programs in multifamily assisted housing. Finally, requiring radon testing in homes financed by the federal government remains an option for the Congress' consideration if current efforts to increase radon testing and mitigation prove ineffective.

Background

In 1988 the Congress passed Public Law 100-551—commonly referred to as the Indoor Radon Abatement Act—and established a national radon goal ". . . that the air within buildings in the United States should be as free of radon as the ambient air outside of buildings." Following EPA's and the Assistant Surgeon General's September 1988 announcement that most homes should be tested for radon, testing activity immediately increased, according to EPA officials. The increase, however, was not sustained.

EPA ranks exposure to indoor radon as one of the highest carcinogenic risks under its jurisdiction. EPA estimates, on the basis of mining studies,

that approximately 14,000 lung cancer deaths will occur annually from exposure to radon.[1] The lower and upper bounds of these estimates are 7,000 and 30,000 lung cancer deaths annually. Concern exists, however, about using the mining studies to estimate the risk from exposure to low levels of radon in homes. To better define the radon risk at low-level exposure, EPA is currently working with the National Academy of Sciences to update a 1988 report on cancer risks from radon. Also, EPA recently released preliminary radon-potential zone maps containing county-level data. According to the data, 32 percent of 3,141 counties in the United States are in zone 1, the highest-risk area.[2] (See fig. II.1 of app. II for a draft map presenting EPA's county radon zone designations for the United States.)

To address the radon risk, EPA radon program officials stated that the agency's fiscal year 1992 radon program funding totaled approximately $25 million.

Public Information Efforts Raised Awareness, but Testing Rates Remain Low

One of EPA's approaches to increase radon testing has been to inform the public of radon health hazards and ways to reduce them. EPA's public information or outreach efforts began in 1985 when, according to EPA officials, the public's awareness of radon was very low. The outreach activities included developing and distributing radon information through federal, state, and private sector outlets; news releases and conferences; radio and television advertisements; and presentations by EPA employees.

These efforts, while raising the public's awareness of radon, have had only limited success in increasing testing. For example, in 1989 EPA began to sponsor nationwide telephone surveys to measure the public's awareness of radon, testing activity, and other variables. These surveys, according to EPA, indicate that 62 to 78 percent of those surveyed were aware of radon but that only about 8 to 9 percent had tested their homes. Four surveys were conducted from October 1989 to February 1992.

One explanation for the low public response to radon testing may be the public's perception of the radon risk. Both a 1987 EPA study and a Cornell University study concluded that the public's perception of the radon risk is

[1]The estimates are derived from models based on studies of both animals' and underground uranium miners' exposure to radon.

[2]EPA defines a zone 1 area as, on an average, having screening measurements expected to exceed four pCi/l.

much lower than either the government's or scientists' perceptions.[3] According to the studies, one reason for the public's apathy to the radon risk is that radon is not manmade; thus, there is no "villain" on which to focus.

In 1991, partially because of the low public response to testing, EPA initiated a review of the radon program to identify options for reducing the radon risk. In May 1992 the Radon Program Review Panel, made up of senior EPA managers, released a draft report containing recommendations for changing the radon program. In the report, the panel stated that because of the public's generally weak response to public information efforts in terms of testing, EPA must move beyond a program of nationwide public information. The panel, among other things, recommended that in the short term EPA focus public information efforts on areas with potentially high levels of radon, and in the long term on creating support for building radon-resistant new homes and for testing for radon and employing mitigation measures in existing homes when they are sold. (App. III provides more detailed information on EPA's public information efforts.)

State Efforts to Promote Radon Testing Show Some Success, but Information Is Generally Not Available

One aspect of EPA's approach to reduce the radon risk has been to develop a partnership with states. To support this effort the Indoor Radon Abatement Act of 1988 authorized grants of $10 million yearly, for a 3-year period, to be divided among the states participating in the program. In addition, the legislation authorized the grant funding for a wide variety of activities, including surveys of radon levels, development of public information programs, implementation of programs to control radon in existing and new structures, training, and program administration. The legislation gives EPA the authority to establish program priorities if applications received exceed the funding available. In 1990 EPA awarded grants to 48 states, the District of Columbia, and Guam. According to EPA officials, $8.1 million was recently appropriated for fiscal year 1993 grants.

Generally, information was not available to measure direct increases in testing resulting from state efforts to promote radon testing because much of the grant funding was spent on nontesting activities, such as radon surveys to identify the extent of the problem, efforts to help mitigate radon levels, and program administration. For example, on average, 41 percent of all grant funds for the first grant year was used to survey radon levels in

[3]Unfinished Business: A Comparative Assessment of Environmental Problems, EPA Office of Policy, Planning, and Evaluation (Washington, D.C.); Clifford W. Scherer, Adoption of Health Risk Reduction Behaviors: The Case of Geologic Radon, Department of Communication, Cornell University.

the states, 18 percent was committed to problem response or mitigation, and 17 percent was used for program management. Twenty-four percent of the first-year funds was committed to public information activities to promote radon testing. These public information projects, however, were often aimed at large audiences, making it difficult to measure direct increases in testing. For example, radon information was distributed through school districts and schools, hotlines, public inquiries, and the print media. Some states also promoted radon testing through radio and television.

Furthermore, EPA did not have a process through which states were required to evaluate the effectiveness of grant activities in increasing radon testing. The former process consisted of determining whether the states had actually conducted the grant activities they committed to in their applications. However, EPA, in cooperation with its regions, is now developing procedures for the states to use to measure increases in radon awareness, testing, and mitigation resulting from their program efforts.

Despite the limited information on state grant activities, we did identify a few projects in the five states we visited—Colorado, Florida, New Jersey, Pennsylvania, and Wyoming—that appeared to be successful in increasing radon testing. For the most part these projects were targeted either to specific communities or to areas thought to have high levels of radon. For example, Wyoming is promoting testing through local county government health agencies by holding radon seminars and by subsidizing the cost of radon measurement devices. In only 3 months in one community where high levels of radon were found, about 10 percent of the homeowners were persuaded to test. Also, Pennsylvania combined public information activities with a test canister giveaway program in areas believed to have high levels of radon. As of November 1986 approximately 21,000 radon test kits were mailed to homeowners. Finally, New Jersey encourages testing in the area, or "cluster," around a house where radon levels above 200 pCi/l are found. As of January 1992 the state had completed 45 cluster projects and distributed radon test kits to approximately 1,200 homes. (App. III provides more information on these projects.)

Radon Testing During Real Estate Transactions Is Occurring in Some States

Radon testing during real estate transactions could significantly increase testing rates. For example, in 1991, according to National Association of Realtors information, about 3.7 million homes were sold in the United States. Also, the five states we visited had some experience with linking radon testing to real estate transfers. This practice not only allowed potential buyers to be informed of the presence of radon but also resulted in mitigation measures being taken before the real estate transaction was completed. For example:

- Florida state law requires that radon disclosure statements be used in all real estate transactions. The disclosure statement provides information on the hazards of radon and on where buyers may obtain additional information on radon. The disclosure statements, however, have not generated a great deal of testing, according to Florida real estate representatives, because buyers do not believe the radon risk is high in Florida.
- In Colorado and Wyoming, state officials and representatives of the real estate industry told us that although some real estate companies are using radon disclosure statements, very little testing occurs. Officials attributed the lack of testing to a general lack of awareness about radon or concern about its risks.
- In New Jersey radon testing at the time of real estate transaction is much more extensive. In our survey of New Jersey real estate companies, all 10 respondents in areas with high levels of radon said testing occurs in at least half of the real estate transactions.[4] In areas with medium levels of radon, 18 of 19 respondents said radon testing occurs in at least half of the real estate transactions. In areas where radon levels are low, six of seven respondents said radon testing occurs in less than 20 percent of the transactions. Furthermore, 33 of 36 New Jersey respondents said they use radon disclosure statements, which they generally provide to both buyers and sellers.

Furthermore, these high rates of testing as well as the use of disclosure statements may be attributed, in part, to a map developed by the state of New Jersey in 1987, according to state radon officials. The map identified areas in the state where radon levels are high, medium, or low. In addition, New Jersey requires lawyers to review all real estate contracts to ensure

[4]In a telephone survey of real estate companies, we spoke to a total of 81 companies, 45 in Pennsylvania and 36 in New Jersey. We identified companies in each of the radon zones as designated by EPA and selected a random sample of real estate agents. However, we were unable to contact enough agents by telephone. In New Jersey the companies are in counties that fall in high, medium, or low zones, while all the counties in Pennsylvania are in either high or medium zones. Because a judgmental sample was used, these results are not necessarily representative of real estate companies in these states.

that the buyers have been properly informed about the condition of the property. Generally, lawyers will insist that a sales contract include a radon disclosure clause, according to representatives from New Jersey's real estate association.

- In Pennsylvania 18 of 26 real estate agents who responded to our survey from areas with high levels of radon said radon testing occurs in less than half of their transactions; 8 of 26 respondents said testing occurs in 50 percent or more of their transactions. In areas with medium levels of radon, 7 of 19 respondents said radon testing occurs in less than half of their transactions; 12 of 19 respondents said radon testing occurs in 50 percent or more of their transactions. All 44 respondents who answered said they use radon disclosure statements, which they generally provide to both buyers and sellers. (See app. III for more information on the telephone survey results.)

In addition, some other states, such as California and New Hampshire, have legislation that requires radon disclosure at the time of the real estate transaction. Finally, a 1989 survey by the National Association of Realtors found that real estate companies in 24 states are voluntarily providing radon disclosure statements in real estate transactions.

Some real estate representatives and federal housing officials, however, expressed concern that testing during real estate transactions (1) may cause a sale to be delayed or canceled; (2) may add to closing costs; (3) invites test tampering, resulting in incorrect radon readings; and (4) results in decisions to mitigate based on one short-term test result.

To assess these concerns, we included questions relating to each concern in our survey of realtors in Pennsylvania and New Jersey. The survey results indicate that some delays and cancellations do occur, but not in great numbers. For example, of the 46 respondents who said that delays or cancellations had occurred, 28 reported an average of four delays over the past 2 years; the delays ranged from 2 to 90 days. Thirty-four of these respondents reported an average of four cancellations over the last 2 years. The results also provide information on the average cost of a radon test, which ranged from $10 to $450, according to the survey respondents. The average cost was $98 in New Jersey and $118 in Pennsylvania. Furthermore, when asked if they had ever experienced any tampering that would alter the accuracy of the results, 68 of 79 respondents said that they had not. Finally, most of the survey respondents did indicate that mitigation decisions are based on one short-term test, which is contrary to

EPA's current measurement protocols. EPA is addressing tampering in its draft real estate guide, according to officials. Also, according to EPA officials, the real estate guide will provide short-term testing strategies that could be used effectively to address radon problems in real estate transfers.

Addressing Radon in Federally Related Housing Programs

Because of the influence federal housing agencies and federally chartered secondary mortgage institutions have on the housing industry, requiring them to address radon could stimulate radon testing for the nation's homes. For the most part, the six agencies and institutions we reviewed do not require the disclosure of radon information or testing for participation in their programs. In fiscal year 1991 HUD, the Department of Veterans Affairs (VA), and the Farmers Home Administration (FmHA) financed or insured about 1.3 million single-family home loans. In addition, the Federal Home Loan Mortgage Corporation (Freddie Mac), the Federal National Mortgage Association (Fannie Mae), and the Government National Mortgage Association (Ginnie Mae) provide a substantial amount of funds for the secondary mortgage market in the United States. While precise information was not available, Freddie Mac officials estimated that their new mortgage business represented about 20 to 25 percent of the U.S. secondary mortgage market business in fiscal year 1992. In addition, Fannie Mae, America's largest supplier of conventional home mortgage funds, currently owns in a portfolio or holds in trust one of every eight mortgages in the United States.

Except for FmHA, the six agencies do not require the dissemination of radon information or radon testing as part of their housing programs. FmHA guidance provides for making information on radon and other indoor air pollutants available to loan applicants. FmHA headquarters officials had no estimate on what percentage of applicants actually receive such information. Also, the environmental assessments Fannie Mae requires for participation in its multifamily program usually include radon testing.

Although these housing agencies and mortgage institutions believe they have authority to require disclosure or testing, some cited various reasons for not doing so. Among the reasons cited were doubt about the reliability of radon tests and the possible delay of sales caused by testing at the time of real estate transactions. Some mortgage institution officials said they do not consider radon a mortgage risk. For example, Fannie Mae officials stated that the presence of radon has not resulted in any loans defaults,

and Freddie Mac officials indicated that they see radon as a public health issue that would be better handled by public health agencies.

Some state radon officials and real estate agents that we talked with stated that if federal housing agencies and mortgage institutions required radon testing in their programs, the example could serve as a catalyst leading the rest of the mortgage industry to require testing. Such action, according to these officials, would be similar to the HUD requirement for termite inspection, which has become accepted by the real estate industry.

Some efforts to require the housing agencies to address radon have begun. For example, the McKinney Act Amendments of 1988 required HUD to develop a radon policy that would include testing and mitigation programs in about 29,000 projects containing 2.8 million multifamily, public, and Indian housing units. Initially, HUD began a 4-year research program to fill information gaps. In early 1992, however, HUD changed its position and notified the Congress that it would begin testing 194 HUD-owned buildings in areas with high levels of radon and, in cooperation with EPA, would develop testing and mitigation guidance for use in a more extensive program of radon testing and mitigation. HUD and EPA anticipate the completion of this effort by September 1994.

Requiring radon testing in homes financed or insured by the federal government remains a strategy the Congress can adopt if radon testing does not increase to a satisfactory level. For example, past experience with the voluntary seatbelt program demonstrates that moving to a regulatory approach can make a significant contribution in addressing a risk. From its start in the mid-1970s, seatbelt usage increased from less than 10 percent to only 11 percent in 1982. In 1984 New York passed the first mandatory seatbelt use law, and the National Highway Traffic Safety Administration amended a Federal Motor Vehicle Standard to require either automatic restraints or mandatory-use laws. In 1989, after several other states had passed seatbelt laws, seatbelt usage rose to approximately 47 percent.

Conclusions

EPA's efforts to reduce the radon risk have raised the public's awareness of radon but have been less successful in motivating homeowners to test and mitigate when high levels of radon are found. To encourage more testing, an EPA radon program review panel recommended (1) continuing with the agency's voluntary approach, but with program changes that include targeting public information and other resources to areas with high levels

of radon, and (2) promoting testing and mitigation at the time of real estate transactions. We believe these proposed changes would help focus the use of limited resources as well as institutionalize the importance of the radon issue at the time homes are sold.

Requiring radon testing in homes financed or insured by the federal government remains an option if current efforts do not result in reducing the radon risk. Also, procedures being developed by EPA for states to measure radon testing and mitigation rates should provide better information for evaluating the effectiveness of current efforts in reducing the radon risk.

Recommendation to the Administrator, EPA

To further the goal of reducing the radon risk, we recommend that the Administrator, EPA, adopt the changes recommended in EPA's May 1992 Radon Program Review draft report that call for targeting public information and other resources to areas with high levels of radon and for supporting projects that promote testing and mitigation at the time of real estate transactions.

Agency Comments

As requested, we did not obtain written agency comments on a draft of this report. However, we discussed the facts contained in this report with the following agency officials: Director, Radon Division, EPA; Assistant Secretary for Policy Development and Research, HUD; Assistant Director for Property Management, VA; Assistant Administrator, Housing, FmHA; Director, Mortgage Credit Policy, Freddie Mac; Director of Regulatory Policy, Fannie Mae; and Executive Vice President, Ginnie Mae. These officials generally agreed with the facts discussed in this report, and we have incorporated their comments where appropriate. With regard to our recommendation, EPA program officials agree that in order to promote more radon testing, targeting resources to high-risk areas and encouraging testing at real estate transfers are potentially effective measures. In addition, they stated that it remains EPA's position that all homes should be tested for radon, regardless of location, because a significant portion of the risk is outside areas with high radon levels.

To collect information on ways to promote radon testing, we obtained records and interviewed officials at EPA, FmHA, HUD, VA, Freddie Mac, Fannie Mae, and Ginnie Mae. We also visited the states of Colorado, Florida, Pennsylvania, New Jersey, and Wyoming and met with officials

from those states, as well as with representatives of real estate and radon measurement companies. We surveyed a sample of real estate companies in New Jersey and Pennsylvania to collect information on addressing radon through real estate transactions. (Specific information on our objectives, scope, and methodology is presented in app. I.) Our audit work was conducted between November 1991 and September 1992 in accordance with generally accepted government auditing standards.

As agreed with your office, we plan no further distribution of this report until 30 days from the date of this letter. At that time, we will send copies to the Administrators of EPA and FmHA; the Secretaries of HUD and VA; the heads of Freddie Mac, Fannie Mae, and Ginnie Mae; and other interested parties. We will make copies available to others upon request.

This report was prepared under the direction of Richard L. Hembra, Director, Environmental Protection Issues, who can be reached at (202) 275-6111. Other major contributors to this report are listed in appendix IV.

Sincerely yours,

J. Dexter Peach
Assistant Comptroller General

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Abbreviations

EPA	Environmental Protection Agency
FmHA	Farmers Home Administration
HUD	Department of Housing and Urban Development
pCi/l	picoCuries per liter
SIRG	State Indoor Radon Grant Program
VA	Department of Veterans Affairs

Objectives, Scope, and Methodology

In reviewing federal efforts to promote radon testing, the House Committee on Science, Space, and Technology raised concerns about the effectiveness of information campaigns that have been the government's primary effort to increase testing. As a result, the Committee Chairman and the Ranking Minority Member requested that we collect information on actions that have been or can be taken to promote radon testing. We collected information on the following activities: (1) public information/education programs; (2) state programs supported by federal grants; (3) voluntary testing during real estate transactions; and (4) requiring radon testing in federally related programs, such as in federally assisted housing and housing loans insured or guaranteed by the federal government.

To evaluate information on EPA's efforts to promote radon testing through public information campaigns, we interviewed EPA, national Advertising Council, and American Lung Association officials on their respective roles. We also discussed how they determined what approach to use in the campaigns and their evaluations of the success of public information efforts. In addition, we gathered and reviewed documentation pertaining to the objectives of the public information efforts, including survey evaluations of the Advertising Council efforts, as well as EPA's own assessment of the radon program. Finally, we interviewed state officials in charge of radon programs in Colorado, Florida, New Jersey, Pennsylvania, and Wyoming on their efforts to promote radon testing. We selected three of the states—Florida, New Jersey, and Pennsylvania—because they have very active programs in addressing radon. We selected the other states—Colorado and Wyoming—to obtain some geographic variety and because both are known to have potentially high levels of radon.

To gather information on the state efforts to promote radon testing, we interviewed EPA headquarters officials and officials in three EPA regions. We gathered and reviewed pertinent information on the effectiveness of grant projects to promote radon testing. We also interviewed officials in the five states we visited and gathered and reviewed pertinent information on the effectiveness of grant-funded and state-funded projects to promote radon testing.

To collect information on addressing radon through real estate transactions, we interviewed EPA and state officials concerning their positions on testing during real estate transactions. In addition, we interviewed officials of state and national organizations that represent the

real estate industry, as well as real estate companies and radon measurement companies in the five states we visited.

To understand more about how radon testing affects residential real estate transactions, we selected two states that had varying levels of radon—New Jersey and Pennsylvania. We contacted each state's real estate association and obtained a list of residential real estate companies that were registered with the state and information on the county where each office was located. In addition, we obtained draft radon-potential maps from EPA that assign each county's radon potential. We then compared the realtor lists with the maps and, for each state, divided the realtor sample into those located in areas with high, medium, or low radon potential. New Jersey contains counties with all three levels of radon potential; Pennsylvania, at the time of our selection, contained counties with two levels of radon potential.

Furthermore, we designed a survey questionnaire to use in structured telephone interviews with random samples of real estate agents in New Jersey and Pennsylvania. These two samples were stratified according to radon-potential area and would enable us to report separately on the experiences of real estate agents in New Jersey and Pennsylvania. From this design we expected to report survey results with a sampling error not exceeding 10 percent.

Also, we anticipated having difficulty contacting real estate agents by telephone; therefore, we planned three attempts to contact each agent by telephone. Because these attempts, which took place over approximately 3 months, were not as successful as we had planned, our sample should be considered judgmental. Therefore, our results are unweighted results within each state. Table I.1 describes the planned sampling approach and presents the number of agents with whom we completed telephone interviews.

Table I.1: Real Estate Sampling Plan and Results

State	Agent population[a]	Number sampled	Provided usable data	Ineligible[b]
Pennsylvania				
Zone 1	1,590	199	26	5
Zone 2	1,281	100	19	0
New Jersey				
Zone 1	16	16	10	1
Zone 2	83	45	19	2
Zone 3	52	35	7	6

[a]The difference in the agent population is based on the different realtor lists obtained from the states. The Pennsylvania Association of Realtors provided us with a list of 2,871 designated brokers. A designated broker is an owner or broker in charge of a real estate office. In contrast, the New Jersey Association of Realtors gave us a list of their Board of Directors. The Association stated that its Board of Directors is comprised of 151 active realtors whom they believe are representative of all realtors in New Jersey.

[b]Ineligibles are those agents who were not involved in residential real estate transactions but were included in the list the state real estate association forwarded. For example, some of the agents were appraisers.

To collect information on requiring radon testing in federally related programs, such as federally assisted housing and housing loans insured or guaranteed by the federal government, we interviewed housing and lending institution officials from the Departments of Housing and Urban Development (HUD) and Veterans Affairs (VA), the Farmers Home Administration (FmHA), the Federal Home Loan Mortgage Corporation (Freddie Mac), the Federal National Mortgage Association (Fannie Mae), and the Government National Mortgage Association (Ginnie Mae) and discussed their policies for addressing radon, their views on requiring radon testing for real estate transactions financed or guaranteed by the federal government, and their authority to require radon testing. We also obtained documentation on these issues where it was necessary.

Our audit work was conducted between November 1991 and September 1992 in accordance with generally accepted government auditing standards.

Radon Risks and Distribution

On the basis of both animal studies and epidemiological studies of underground miners, radon has been classified as a known human carcinogen. As with other environmental pollutants, uncertainty is associated with the magnitude of health risks from exposure to radon. EPA, however, considers the data on radon risk to be better than the data on risk for many other cancer-causing pollutants because the radon risk data are derived from studies of exposure to humans.

Radon Cancer Risk Estimates

In 1989 EPA estimated that approximately 20,000 lung cancer deaths annually would occur from exposure to radon. The lower and upper bounds of these estimates were 8,000 and 43,000 lung cancer deaths annually. The estimates, derived from two models based on studies of underground uranium miners' radon exposure, were reviewed and supported by EPA's Science Advisory Board.[1] On the basis of these risk numbers, EPA ranked exposure to indoor radon as one of the highest carcinogenic risks under its jurisdiction.

Concern exists over extrapolating the data from the miner studies and applying the results to residential exposure in the general population. The concern is that miners do not represent the general population; the miners in the studies were generally exposed to higher levels of radon than is the general population in their homes, and many were smokers. A 1988 National Academy of Sciences report recommended further study of indoor radon risks to address these issues.[2]

Furthermore, the nature of the relationship between exposure to radon, cigarette smoking, and lung cancer is not completely understood. For example, the Academy's 1988 report concluded that since the lung cancer risk from smoking and radon exposure together is greater than the sum of the two individual risks, a multiplicative relationship exists between smoking and radon exposure. If this relationship is less than multiplicative, the estimated risk to smokers will decrease and the estimated risk to nonsmokers will increase. EPA's current risk estimates indicate that smokers are at an approximately 10 times greater risk of contracting cancer because of radon exposure than people who have never smoked. These estimates indicate that approximately 70 to 80

[1]The Science Advisory Board is a group of independent scientists who review the quality and sufficiency of scientific data underlying regulatory development of some EPA actions.

[2]Health Risks of Radon and Other Internally Deposited Alpha-Emitters, BEIR IV, National Research Council (1988).

percent of the 20,000 annual lung cancer deaths attributable to radon exposure will occur in either former or current smokers.

In response to the 1988 Academy report and as part of its continuing effort to refine radon risk assessments, EPA sponsored another study by the National Academy of Sciences to compare the doses of radiation received from a given exposure to radon in mines and in homes. In its 1991 report the Academy estimated the radiation dose to the lung for various exposed groups and concluded that mine-derived data can be used to predict residential risk, but that EPA's risk estimates should be reduced by approximately 20 to 30 percent.[3] This conclusion affected EPA's current risk estimates; the agency has revised the estimates to be approximately 14,000 deaths annually with lower and upper bounds of 7,000 and 30,000 lung cancer deaths annually. The report also stated that no new evidence had been published that would justify revising the conclusion of the 1988 report on the combined effects of smoking and radon exposure.

According to EPA radon officials, at their request the National Academy of Sciences has agreed to update the 1988 study on radon cancer risks. Additional occupational data from 1986 to the present are now available, as well as detailed data from Czechoslovakian studies. Also, EPA has asked the Academy to work with individual researchers to attempt to pool indoor epidemiological radon studies, both foreign and domestic, to focus on the risk between smokers and nonsmokers, the risk related to age, and the risk from low-level exposure.

Radon Measurement Data by Geographical Area

On the basis of the preliminary results of the National Residential Radon Survey released in March 1992, EPA estimates that 6.23 percent of U.S. homes have average radon levels greater than four picoCuries per liter (pCi/l).[4] State surveys, as well as the most recent county data, indicate that radon levels vary significantly by geographical area.

Beginning in 1986 EPA and individual states began surveys to identify potential radon problems; the surveys were based on screening measurements (short-term measurements, generally 2 to 7 days, taken in the lowest liveable area of the home). As of October 1992 EPA had conducted surveys with 42 states. On the basis of these data, EPA estimated, by state, the percent of homes that had radon screening levels above four pCi/l. Table II.1 presents the data.

[3]Comparative Dosimetry of Radon in Mines and Homes (1991).

[4]The survey gathered year-long residential radon measurements throughout the United States.

Table II.1: Results of Indoor Radon Screening Measurement Surveys

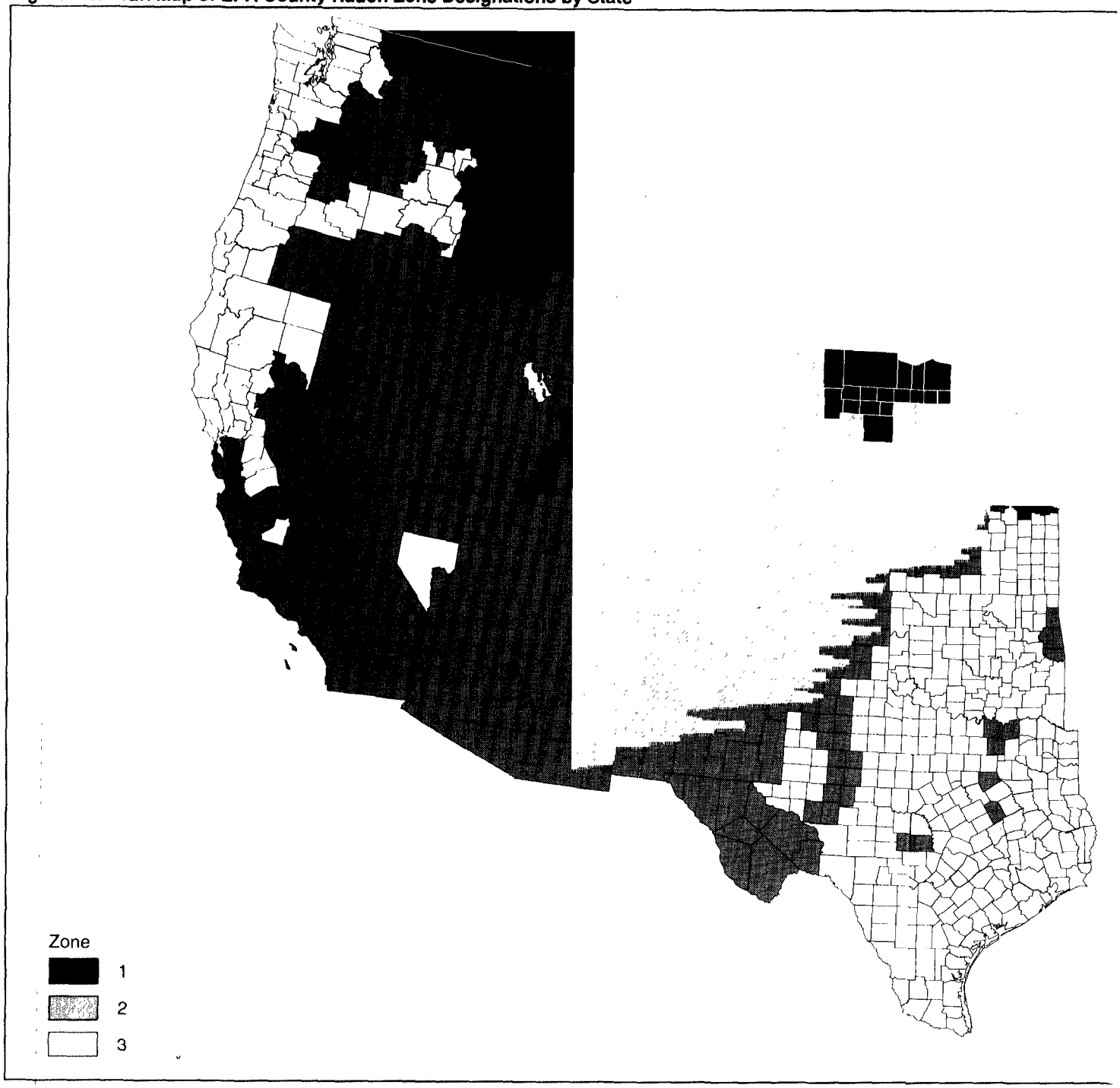
Number of States	Estimated percent of homes with measurements over 4 pCi/l	States
17	20 or more	CO, IA, ID, IN, KS, MA, ME, MN, MT,ND, NE, NM, OH, PA, RI, WI, WY
8	15-19	CT, IL, KY, MD, MO, TN, VT, WV
3	10-14	MI, NV, VA
7	5-9	AK, AL, AR, AZ, GA, NC, WA
7	0-4	CA, HI, LA, MS, OK, SC, TX
Total 42[a]		

[a]Oregon and South Dakota declined to participate in the state/EPA residential radon surveys. In addition, Delaware, Florida, New Hampshire, New Jersey, New York, and Utah conducted surveys of radon independently of the state/EPA surveys. According to EPA, each of the states that did not participate in the state/EPA surveys, conducted a unique survey, and many used varying data collection and survey implementation procedures, thus making a comparison of their findings scientifically unsound.

In addition, sections 307 and 309 of the Toxic Substances Control Act as added by the Indoor Radon Abatement Act, directed EPA to identify areas with potentially high levels of radon. To comply with these sections, EPA has worked with the U.S. Geological Survey to develop radon-potential maps at the county level.[5] Each county's designation will be based upon five factors, including indoor radon measurements, geology, aerial gamma ray surveys, soil parameters, and house foundation type. According to EPA radon officials, the preliminary map was provided to states for comment in March 1992. The final radon potential map is expected to be released in late 1992. According to EPA's data, preliminary results show that out of 3,141 U.S. counties, 32 percent (1,015) are in Zone 1; 35 percent (1,082) are in Zone 2; and 33 percent (1044) are in Zone 3. Table II.2 summarizes the county designations by state based on preliminary data. County designations could change as data are reviewed by states. Figure II.1 is a draft map presenting the county radon zone designations for the lower 48 states and the District of Columbia. Due to difficulties in mapping, Alaska and Hawaii are not included on the map. Table II.2, however, does include data on these two states.

[5]The map will designate each county as either high (Zone 1 with an average predicted screening level greater than four pCi/l), moderate (Zone 2 with an average predicted screening level between two and four pCi/l), or low (Zone 3 with an average predicted screening level less than two pCi/l) radon-potential areas.

Figure II.1: Draft Map of EPA County Radon Zone Designations by State



EPA recommends that all homeowners test their homes for radon, regardless of geographic location. Elevated indoor radon concentrations have been found in all three zones. Therefore, the only way to be sure about radon levels in any individual house is to test.

Table II.2: EPA's Radon Zone Designation by State and County

State	Total counties	Zone 1 counties	Zone 2 counties	Zone 3 counties
AL	67	11	36	20
AK	25	2	19	4
AZ	15	0	15	0
AR	75	0	28	47
CA	58	0	34	24
CO	63	30	33	0
CT	8	1	6	1
DE	3	0	1	2
DC	1	0	1	0
FL	67	0	9	58
GA	159	33	27	99
HI	5	0	0	5
ID	44	18	21	5
IL	102	56	43	3
IN	92	52	40	0
IA	99	99	0	0
KS	105	36	36	33
KY	120	25	87	8
LA	64	0	0	64
ME	16	6	10	0
MD	24	2	14	8
MA	14	3	9	2
MI	83	9	34	40
MN	87	63	24	0
MS	82	0	7	75
MO	115	50	58	7
MT	57	46	11	0
NE	93	53	23	17
NV	17	0	16	1
NH	10	1	9	0
NJ	21	8	2	11
NM	33	2	31	0
NY	62	33	5	24
NC	100	14	31	55
ND	53	53	0	0
OH	88	37	51	0
OK	77	0	7	70

(continued)

State	Total counties	Zone 1 counties	Zone 2 counties	Zone 3 counties
OR	36	0	12	24
PA	67	48	18	1
RI	5	2	2	1
SC	46	0	9	37
SD	66	49	17	0
TN	95	41	29	25
TX	254	0	54	200
UT	29	8	21	0
VT	14	0	9	5
VA	136	62	32	42
WA	39	6	13	20
WV	55	13	36	6
WI	72	28	44	0
WY	23	15	8	0
Total	**3,141**	**1,015**	**1,082**	**1,044**

Information Collected on Actions to Promote Radon Testing

This appendix summarizes information collected on the strategies we were asked to review, including public information/education programs; state programs supported by federal grants; voluntary radon testing during real estate transactions; and a radon testing requirement for real estate transactions financed through federally related housing programs and in federally subsidized housing.

Relying on Public Information Methods

Beginning in 1985, after high levels of radon were found in a Pennsylvania home, EPA began efforts to raise radon awareness and promote testing through public information activities. The public information or outreach activities included developing and distributing radon information through federal, state, and private sector outlets, such as the American Medical Association, the American Lung Association, and the National Association of Realtors; news releases and conferences; and personal presentations by EPA employees. In 1988 EPA changed its public information approach to one that more actively encouraged testing and mitigation.

In 1989 EPA and the national Advertising Council jointly developed a radon public information campaign designed to increase radon awareness and to motivate people to test for radon. The Advertising Council's public service announcements initially targeted those 33 states where at least 1 in 5 homes, or 100,000 homes in a given area, were believed to have screening levels above four pCi/l. Radon public service announcements were sent to over 630 television stations, 3,000 radio stations, and 4,000 newspapers and magazines. In October 1989 the first segment or "wave" of the advertising campaign was released. In September of 1991 the second wave of the campaign was released, focusing on how easy it is for homeowners to find out about radon, to test their homes, and to mitigate. According to EPA officials, the third wave was released early in February 1992, and the fourth wave was released in September 1992.

In addition, EPA has worked with the American Lung Association to promote radon awareness. A Lung Association official reported that there were 50,000 calls for radon information and 100,000 tests as a result of its 1991 radon grant activities. Officials also said the 100,000 radon tests were not directly related to the 50,000 calls received.

EPA officials stated that EPA's partnerships with outside organizations, including the American Medical Association, American Public Health Association, National Association of Counties, and the Consumer Federation of America, combined with the media campaign, helped to

raise levels of public awareness and stimulate radon testing, particularly during real estate transactions.

In this regard, according to EPA, nationwide telephone surveys indicate that public awareness of radon is generally high, between 62 and 78 percent. On the basis of these surveys, however, EPA estimates that only about 8 to 9 percent of those surveyed had tested their homes for radon. Four separate telephone surveys were conducted during the period from October 1989 through February 1992.

EPA, partially in response to the limited voluntary public testing, conducted a review of the radon program, identifying options for reducing radon risk. In 1991, at the request of both the Deputy Assistant Administrator for Air and Radiation and the Director of the Office of Radiation Programs, a panel comprised of EPA senior managers reviewed the radon program to develop findings and recommendations for the future direction of the program. In addition to input from EPA senior managers, the panel held a series of meetings with radiation and health scientists; risk communication specialists; federal, state, and local government officials; and representatives from the radon measurement and mitigation, real estate, and home building industries. The panel examined (1) EPA's fundamental goal of reducing health risks from exposure to indoor radon through a voluntary approach, as well as EPA's progress in achieving the goal, and (2) alternative approaches to further reduce radon risk.

The panel stated that over the past several years in an attempt to achieve the fundamental risk-reduction goal, EPA has improved its understanding of radon risk; completed nationwide and state radon surveys; established a testing and mitigation infrastructure; provided grants to establish or support radon programs in all states; and increased the public's awareness of radon. The panel noted, however, that the radon program has not increased radon testing rates to the degree the panel believed appropriate to adequately reduce risk.

The panel made the following major recommendations in its draft report:

- EPA should focus on the greatest risks first in the near term, targeting its efforts and resources on high radon potential areas and smoking-related risk.
- EPA should work now to support long-term strategies of promoting radon-resistant new construction and testing and mitigation in connection with real estate transfers. The panel stated that EPA should support pilot

projects at the state and local level, beginning in targeted areas, and explore new approaches, including the feasibility of both regulatory and voluntary measures.

- EPA should develop a new short-term strategy for public information that includes focusing public information efforts on areas with both high levels of radon and large populations. The panel also recommended that EPA continue its nationwide public information efforts such as the citizens' guide and the Advertising Council campaign.
- EPA should develop a research plan that prioritizes and coordinates future research in areas such as health effects, measurement, mitigation technology, geographic targeting, and risk communication approaches.

EPA radon officials said that the panel's report is expected to be submitted to the EPA Administrator in the fall of 1992.

Relying on States to Promote Radon Testing

To support state efforts, the Congress passed the Indoor Radon Abatement Act in 1988, which gave EPA authority to award grants for the purpose of establishing, implementing, and enhancing radon programs at the state level. The legislation authorized a 3-year, $10 million program to be reserved for the State Indoor Radon Grant (SIRG) Program.[1]

EPA's goal for the SIRG Program was to develop continuing capabilities at the state level, to identify radon problems in each state, and to assist citizens in making an informed response to radon risks. According to EPA officials, in grant year two, EPA asked states to focus their efforts on high radon risk areas because they believed this would identify more homes with elevated radon levels. To focus their efforts in high-risk areas, states relied on EPA state survey and other data. In addition, EPA officials believe that the maps now being developed to identify potential high radon risk areas will further assist states in focusing their resources.

According to EPA and state radon officials, information on the results of state efforts to increase radon testing is generally not available because (1) funds were used to develop state programs and plans to address radon,(2) some of the state projects were directed toward identifying the extent of the radon problem, and (3) some of the funds for public education projects were often directed toward a wide audience, thus making it difficult to measure specific increases in testing. In addition, EPA's evaluation process for the grant program did not initially include a component to measure

[1]Funds were first appropriated for the grant program for fiscal year 1990. Recently, $8.1 million was approved extending the program through fiscal year 1993, according to EPA officials.

increases in radon testing directly resulting from grant activities. Essentially, the evaluation called for a comparison of a state's proposed grant workplan to actual activities. EPA officials noted, however, that states were encouraged, in the second year grant guidance, to make assessments on the extent of testing as part of their grant activities.

To determine state progress in promoting radon testing, EPA is now working with its regions to develop procedures for the states to use in measuring increases in testing and radon awareness. As part of this effort, in the fall of 1992, the Conference of State Radiation Control Program Directors will conduct a survey of state awareness, testing rates, and mitigation rates. States will use survey results to set short- and long-term targets to increase these rates. Followup surveys will track progress and be used to refine program activities to enhance results. It is expected that the new procedures will be used in the 1993 evaluations.

Although information on state projects was generally unavailable, we identified a few projects in the states we visited where state efforts appeared to be successful in promoting testing. The following describes projects that were targeted to individual communities or to areas thought to have high levels of radon.

- Wyoming's strategy to promote radon testing, according to the Coordinator of the State Radon Project, has been to target efforts to individual communities and to involve local governments. She said that using the grant funds, the state primarily works through county public health organizations with a program of educating the public and subsidizing radon measurement devices. The state has established this program in various communities to promote testing and has had success in at least one community. For example, she said that in one community approximately 2,000 homes, in 3 months testing, increased from close to zero to approximately 10 percent.
- After a 1984 incident where very high levels of radon were found in a home in Pennsylvania, national attention to radon increased. Pennsylvania's strategy to encourage testing was to mail radon test kits to homeowners upon request. Homeowners were encouraged to request the test kits through a newspaper ad appearing in the three-county area around the home with the high reading. As of November 1986 Pennsylvania's Department of Environmental Resources had mailed approximately 21,000 radon test kits to homeowners. According to the Director of the Bureau of Radiation Protection, this program was suspended, however, because concern arose about whether the

Department of Environmental Resources was taking business away from private radon testing companies.

- New Jersey has two projects that have generated radon testing. First, in 1986 New Jersey conducted a statewide study of radon distribution. According to the New Jersey Department of Environmental Protection and Energy, preliminary data on 5,300 homes from this study, along with data from 12,000 test results supplied by commercial testing firms, provided the basis for New Jersey's first "Tier Map." The Tier Map shows radon potential as either high, medium, or low and recommends testing in areas with higher radon potential. The Tier Map along with the testing recommendation was issued in September 1987. State officials told us that radon testing rates increased in response to the Tier Map, but they believe that most of the testing occurred in areas with higher potential levels of radon. Officials said they are now de-emphasizing the maps and recommending that everyone test regardless of the areas's radon potential because testing has declined in tier areas with lower potential radon levels.

  In addition to the Tier Map, New Jersey is conducting a "cluster" project to encourage testing. New Jersey radon officials said that when a house with a radon reading above 200 pCi/l is discovered, the New Jersey Department of Environmental Protection and Energy selects an additional 30 houses in the area around the house that they believe could have high levels of radon and offers the homeowners free radon test kits. New Jersey radon program officials stated that the 200 pCi/l level was selected because their experience has shown that when such a high level is detected, it usually indicates an areawide problem. Also, limited resources preclude expanding this approach to homes with radon levels below 200 pCi/l. They said that 45 cluster projects had been completed as of January 1992, resulting in the distribution of about 1,200 radon test kits. Results from these additional tests showed that 886 homes had elevated levels of radon and that 86 of the homes with elevated levels had levels greater than 200 pCi/l.

Addressing Radon During Real Estate Transactions

Radon can be addressed at real estate transactions through the use of radon disclosure statements and/or radon testing. In the five states we visited, radon was addressed during real estate transactions to varying degrees. For example, in Florida radon disclosure statements were required by state law to be used at all real estate transactions. Officials representing Florida real estate companies told us, however, that use of the disclosure statement was not increasing radon testing. One reason,

according to real estate officials, is that very few homebuyers and real estate sales people in Florida believe radon is a problem. In Pennsylvania and New Jersey, disclosure statements and testing were more widespread, especially in areas believed to have high levels of radon. In Colorado and Wyoming the real estate agents we interviewed said that disclosure statements were being used at real estate transactions but that very little testing occurred. Real estate agents believe the lack of testing can be attributed to homebuyers not being concerned about radon risks.

To assess the extent to which radon testing is being conducted and how radon testing is affecting real estate transactions, we conducted a telephone survey from May to August 1992 of 81 real estate companies, 45 in Pennsylvania and 36 in New Jersey. We contacted each state's real estate association and obtained a list of residential real estate companies that were registered with the state and information on the county where each office was located. In addition, we obtained draft radon-potential maps from EPA that assign each county's radon potential. We then compared the realtor lists with the maps and, for each state, divided the realtor sample into those located in areas with high, medium, or low radon potential. New Jersey contains counties with all three levels of radon potential, while Pennsylvania, at the time of our selection, contained counties with two levels of radon potential. The following summarizes the results of our survey:

- In New Jersey, in high radon zones, 9 of 10 respondents said that they use some form of a radon disclosure statement. In the medium radon zone, all 19 respondents said they use radon disclosure statements. In low radon zones, 5 of 7 respondents said they use radon disclosure statements.
- In Pennsylvania, in both the high and medium radon zones, 100 percent of those who responded said that they use radon disclosure statements during real estate transactions.
- In both states most of the radon tests are requested by the buyer. For example, 55 of 81 respondents said that buyers were always the requesters of the radon tests, while 25 of 81 respondents said that either the buyer, seller, or another party involved in the real estate transaction requested the test; the other parties include relocation companies and private lending institutions.
- Across both states 70 of 81 respondents said that the radon tests during real estate transactions were always short-term tests, not longer than 7 days.
- Survey respondents identified an average cost range for radon tests. In New Jersey respondents cited an average cost for a radon test ranging

from $25 to $165, while in Pennsylvania the average cost cited ranged from $10 to $450. The average cost was $98 in New Jersey and $118 in Pennsylvania.

- Across both states 34 of 80 respondents said they had not experienced delays or cancellations in completing transactions as a result of a radon test. Of the 46 respondents who said that delays or cancellations occurred, 28 answered that they experienced delays and that the average number of delays over the last 2 years was four. The delays ranged from 2 to 90 days, with the average delay being 23 days. Thirty-four respondents answered that they experienced cancellations and that the average number of cancellations over the last 2 years was about four.[2] Some respondents who had experienced canceled transactions said they were not sure whether knowledge of the test results caused the cancellation or whether it served as an excuse to back out of the contract.
- Across both states 34 of 81 respondents said the radon testing caused them about the same degree of difficulty as a termite inspection. Another 25 of 81 respondents said radon testing was somewhat more difficult than a termite inspection, and 7 respondents said radon testing was much more difficult than termite inspections.
- Furthermore, across the two states 68 of 81 responding companies said they had not experienced any tampering with the radon tests.

Requiring Radon Testing in Federally Related Housing Programs

For the most part the six federal housing agencies and federally related secondary mortgage institutions that provide housing assistance do not require testing or the disclosure of radon information as a condition for participation in their programs.

HUD

HUD insures single-family home mortgages and in fiscal year 1991 provided insurance for approximately 1 million homes. HUD also provides assistance for multifamily rental housing for low- and moderate-income families.

In 1988 the Congress passed the McKinney Act Amendments, which required HUD to develop a radon policy that would include, among other things, testing and mitigation programs for its multifamily housing.[3] As of April 1992 approximately 29,000 multifamily housing projects containing

[2]To better interpret responses, we asked the companies for the number of residential sales transactions that they completed over the last 12 months. Our survey was conducted during the period from May 1992 to August 1992. The median number of residential real estate transactions conducted by the companies was 149 in New Jersey and 82 in Pennsylvania.

[3]HUD's multifamily housing includes both public and Indian housing and other multifamily housing that is subsidized under various federal programs.

approximately 2.8 million units were covered by this legislation. Instead of a policy specifying testing and mitigation programs as required, HUD, in April of 1991, recommended a 4-year research program to fill in information gaps related to testing and mitigating multifamily housing, particularly multistory buildings and attached row houses. We, the Senate Committee on Environment and Public Works, and the Senate Committee on Appropriations challenged this policy as not meeting the requirements of the McKinney Act Amendments.

In July 1991 the Senate Committee on Appropriations, citing EPA's position that existing testing guidance was applicable and could be used to develop tests for high-rise buildings, directed HUD to redesign its policy to provide for radon testing and mitigation to begin in 1992. The Committee also directed EPA to develop guidance for testing and mitigation procedures for multifamily buildings in HUD's inventory and to provide technical assistance to HUD in implementing a testing and mitigation program.

In letters dated January 8, and April 29, 1992, to the Chairperson, Senate Subcommittee on Veterans Affairs, HUD, and Independent Agencies, HUD presented its plan to revise its radon policy. Initially, HUD, in cooperation with EPA, will begin testing in 194 HUD-owned buildings in areas with high levels of radon. EPA will mitigate three to five of these buildings to demonstrate the application of existing mitigation techniques to HUD's multifamily housing. In addition, EPA will develop testing and mitigation guidance for HUD, HUD-assisted multifamily building owners, and the radon diagnostic and mitigation industry to use in a more extensive program of testing and mitigation. HUD and EPA anticipate the completion of testing in the spring of 1993, of mitigation in the summer of 1994, and of all guidance materials by September 1994.

HUD officials indicated that a number of budgetary, operational, and legal issues need to be resolved before they can expand the program. For example, they said that the availability of funding will affect expansion and that the current effort is being funded through HUD's Policy Development and Research budget, whereas expansion will involve other HUD offices. Also, they said that they need to resolve issues related to educating owners and tenants about radon; radon testing and mitigation; gaining access to privately owned, HUD-subsidized buildings and apartments to test and mitigate; and understanding landlord liability. HUD expects to resolve many of these issues during the current project. In addition, according to HUD officials, when the project is completed they

will develop a specific approach and timetable for addressing radon in their remaining housing.

Some residents of HUD multifamily housing may be exposed to relatively high levels of radon because some of HUD's housing units are located in EPA-designated potential high radon areas. For example, HUD's analysis shows that about 39 percent of multifamily projects and about 31 percent of multifamily units are located in EPA's designated zone 1 high radon potential areas.

VA

VA insures and guarantees home mortgage loans for veterans. According to data provided by VA, in fiscal year 1991 the agency guaranteed or insured approximately 181,000 loans. VA does not, however, have a radon policy and is not actively addressing radon. VA officials said that they have the authority to require disclosure statements or testing but such requirements may be imposed only after a health standard has been established and it has been determined that exceeding this standard would render the home unsuitable for dwelling purposes.

FmHA

FmHA makes direct loans for the acquisition and construction of single-family homes in rural areas. According to FmHA data, in fiscal year 1991 the agency had approximately 30,000 existing and new housing loans. FmHA also makes loans to individuals, trusts, organizations, and others to buy or build multifamily rental housing for low- and moderate-income persons and the elderly. As of September 1992 FmHA data showed that the agency had loans outstanding on 13,792 multifamily projects containing 369,497 units. Like HUD's projects, a significant portion of FmHA projects are located in EPA's designated high radon areas. Our analysis of these data on 13,711 of these projects shows that approximately 36 percent are located in zone 1 areas and an additional 32 percent in zone 2 areas. Due to data quality problems, we were unable to link FmHA and EPA county-level data for 81 projects.

FmHA's radon guidance calls for providing a copy to the loan applicant of EPA's publication "The Inside Story: A Guide to Indoor Air Quality." While FmHA's guidance calls for providing the EPA publication to the applicants, headquarters officials did not know whether it was being distributed. We talked with one FmHA county office that covers two counties in a high radon zone and found that the office is not providing the information. One FmHA county official said that some of the EPA booklets are on the office

racks and available to loan applicants if they choose to read them. She said that they do not provide the information because most of the applicants are commercial developers who, she believes, are aware of radon. In addition, officials in two districts in Pennsylvania said they were not actively providing this information to the applicant, although it is available at the offices. FmHA headquarters officials, while agreeing that they did not have data on offices distributing information, said the three offices cited represent a small portion of FmHA's approximately 2,000 field offices.

Fannie Mae

Fannie Mae is America's largest supplier of conventional home mortgage funds and currently owns in a portfolio or holds in trust for investors, one out of every eight mortgages in the United States. Fannie Mae officials do not see radon as a mortgage risk issue for single-family homes because radon has not resulted in any loans being defaulted. They see radon as a public health issue. Officials do not favor including radon tests in real estate transactions because they believe it would add cost and lengthen the time needed to complete the sale and financing process. They believe the best way to address radon is to educate the consumer, and they have joined with other housing agencies and EPA in the publication of the brochure "A Home Buyer's Guide to Environmental Hazards."

Fannie Mae's guidance provides that if the real estate broker, the property seller, or another party to the mortgage transaction informs the lender that an environmental hazard exists in or near the property, the lender must inform the appraiser and the borrower. The guidance also states that if the appraisers have knowledge of environmental hazards, such as radon, they should consider their influence on property values and make adjustments if necessary. Officials told us, however, that the appraisers are not required to ask about radon when determining the value of a single-family home. The officials do not know if the appraisers are addressing radon.

With respect to multifamily housing, Fannie Mae requires an environmental assessment that usually includes radon testing. According to Fannie Mae officials, 99 percent of the assessments include radon test results. Prior test results can be relied upon if the data appear reliable, according to officials.

Freddie Mac

Freddie Mac, one of the key players in the secondary mortgage market, purchases investment-quality mortgages from lenders, packages these

mortgages as securities, and sells these securities to investors. Like Fannie Mae, Freddie Mac officials do not see radon as a mortgage risk issue concerning single-family or multifamily properties. They believe that radon is a public health issue and would be better handled by public health agencies. While Freddie Mac does not have a radon policy, officials indicated that they do require lenders to adhere to all local and state environmental policies as a means of ensuring safe and decent housing.

Ginnie Mae

Ginnie Mae, also a key player in the secondary mortgage market, does not have a policy that addresses radon. It does not require either the dissemination of radon information or radon testing before accepting a loan. Rather, the agency defers to housing agencies administering programs to establish radon policy, according to a Ginnie Mae official.

Major Contributors to This Report

Resources, Community, and Economic Development Division, Washington, D.C.	Peter F. Guerrero, Associate Director Charles M. Adams, Assistant Director William F. McGee, Assistant Director Larry A. Goldsmith, Evaluator-in-Charge Alice G. Feldesman, Supervisory Social Science Analyst Charles R. Grissinger, Senior Evaluator William D. Updegraff, Senior Evaluator Robin S. Langdon, Staff Evaluator
Norfolk Regional Office	Philip L. Bartholomew, Staff Evaluator

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