NEW JERSEY RADON PROGRAM, 1991

Background

Early in 1985, the Pennsylvania Department of Environmental Resources contacted the New Jersey Department of Environmental Protection (NJDEP) and described finding high indoor radon levels in homes along the geologic formation known as the Reading Prong. Since the Reading Prong extends from Pennsylvania, through northern New Jersey, and into southern New York State, it was likely that a similar hazard existed in homes in New Jersey. A few months after this initial notification, a greater sense of urgency was added to the situation as a result of an article about radon and the Reading Prong which appeared in the New York Times. As a result of the article, the State received a large number of phone calls from concerned citizens.

Early on the NJDEP identified two major issues: 1) there was a potential indoor radon exposure problem in the State which required testing and remediation whenever necessary, and 2) the extent of the problem needed to be identified. It would not have been enough to assume that only the Reading Prong area was affected, but that was the natural starting place to begin studying and testing.

A review of available geologic data showed that uranium, of which radon is a natural decay product, was commonly present in a greater geographic area of the State than the Reading Prong. Based on this data, the NJDEP estimated that 1.6 million homes could potentially be affected. That meant as many as 4 million people or more might be affected, greater than one half of New Jersey's population. Two facts were apparent; indoor radon posed an extremely large potential environmental hazard and no single state agency had the resources to deal with a problem of such magnitude. In late 1985, planning began on what actions to take and how to involve all levels of government, as well as the private sector wherever possible.

The New Jersey Legislature also recognized the magnitude of the situation and enacted two separate pieces of legislation providing $4.2 million and mandating specific activities. The NJDEP was designated the lead agency and required to develop an information outreach program to educate New Jersey residents about the problem and methods of testing and remediation. Additionally the NJDEP was to institute a program of confirmatory monitoring for residents whose initial radon tests showed 4 picoCuries per liter (4 pCi/l) or higher and to also conduct a statewide scientific study to identify areas at risk for residential exposure to high levels of radon. Finally the legislation required the NJDEP to develop a certification program for companies offering radon testing and mitigation services. The New Jersey Department of Health (NJDOH) was required to conduct an epidemiologic study to identify potential risk of lung cancer associated with residential exposure and also to develop a voluntary registry of residents with

a radon exposure history.

Activities

The information outreach program that the NJDEP developed, centers around a toll-free "800" number that is open to callers every work day from 8:00 a.m. to 5:00 p.m. Since July of 1985 when the information phone line was first set up, more than 125,000 calls have been logged. Many callers want information about testing and remediation, so brochures were prepared and a standard information packet is sent to callers upon request. To date over 60,000 of these packets have been sent out. More than 350 presentations by Radon Program staff have been made to audiences including homeowners and local officials, realtors, health professionals, educators and students, testers and mitigators, and a number of professional groups at conferences convened for the purpose of information exchange. Other public awareness and education outreach activities include production of a radon slide show, which was also converted to a video. Three billboards were put up along roadways in high exposure areas in an attempt to generate more awareness about radon testing. Radon Program staff worked with representatives from New Jersey Transit on a project to put placards in buses, so as people rode to work or went shopping they would repeatedly see the radon testing message. A mass mailing to almost a half million households in the Tier 1 area, resulted in about 40,000 inquiries about radon, its health effects, and testing and mitigation programs. More recently, an insert was included in energy bills, which the participating utility company estimates goes to about 2,000,000 customers. It generated over 1,000 telephone inquiries, which is a small percentage, but calls are still coming in and the mailing was at no cost to the NJDEP. An article about radon, its identification, hazards, and control was prepared by Radon Program staff and is scheduled to appear in a real estate magazine and also in a New Jersey Transit publication which is available to commuters.

As important as it was and is to promote public awareness about the hazard of radon and the importance of testing, the NJDEP knew it could not offer every potentially affected homeowner a free test kit. Some communities, where an initial few high readings were found, did make radon test canisters available for free or at greatly reduced prices. Instead, the NJDEP established a program offering free confirmatory testing to any homeowner who requests it because their initial test results are equal to or above 8 pCi/l. Up to and including October 1988, the confirming test was offered if the initial result was equal to or above 4 pCi/l. This program has now been expanded to include followup measurements on homes which have been mitigated. The confirmatory and followup programs were an effective means to monitor the growing industry providing radon testing services and home mitigation services.

From October 1985 through October 1988, when confirmatory testing was offered for a test result equal to or greater than 4

pCi/l, 7,223 tests were conducted. Since the level was raised to 8 pCi/l in November 1988, an additional 1,909 tests have been performed, making a total of 9,132 confirmatory tests conducted through December 1990. From October 1985 through December 1990, 2,389 followup remediation tests have been conducted.

Perhaps the most significant undertaking in the beginning of the New Jersey Radon Program was determining the extent of the potential radon exposure problem.

To start, the NJDEP delineated the geographic area of the Reading Prong that ran through the State in order to make an initial evaluation of the number of potentially affected homes. The number exceeded 250,000. Then a review of available geologic data for the State was conducted. It showed uranium deposits extended beyond the Reading Prong formation. Additionally, an examination of a New Jersey Geological Survey literature review showed that "radioactive mineralizations" were present throughout northern New Jersey. This meant the potential geographic area was any part of the State north of Trenton, and that approximately 1.6 million homes were affected. Further the number of homes was increasing in that area as more people were building in the northwestern portion of the State during the 1980's. This initial review of available geologic data gave New Jersey officials a sense of the magnitude of the radon problem in the State. However officials were aware that an extensive statewide radon study needed to be conducted to determine where elevated radon levels were most likely to be found and to better understand how environmental and structural factors contribute to radon entry in homes.

Work on the legislatively mandated Statewide Study of Radon was begun in the summer of 1986 when a contractor for the project was selected. The study was to prepare a risk assessment of contracting lung cancer as a result of exposure to indoor radon and radon progeny. Almost 6,000 homes were tested in different geologic areas of the State over the course of the study. In order to estimate an annual exposure rate, the contractor took the average of radon readings based on a six month heating season and a six month non-heating season. Residency periods and smoking history were major factors in the risk assessment. Statistics showing risk of contracting lung cancer were compiled on both county and selected municipal levels. The findings confirmed, and further defined, the initial areas of concern identified by the State.

In the autumn of 1987, using information from both the initial NJDEP geologic data review and data already collected during the statewide study, the voluntary certification program, and the Cluster Study Program, the NJDEP released the first "Tier" map entitled, "Preliminary Recommendations for Radon Testing". The map outlined three tiers: Tier 1 was "test as soon as practical", Tier 2 was "test within one year", and Tier 3 was "test if concerned". Municipalities were categorized as Tier 1, 2, or 3 based on the percentage of homes measured with radon levels greater than or

equal to 4 pCi/l. Data on 25 homes was required to classify a municipality into a particular tier. If there was insufficient data, then classification of the municipality was based on the geological province data in which the municipality was located. The tiers are drawn on municipal boundaries because these were considered the smallest workable political and geographic subdivisions on which to identify radon potential.

Both a press release and a direct mailing to every homeowner in Tier 1 were done in conjunction with the map release. The mailing was sent to almost a half million home and resulted in approximately 40,000 inquiries about the radon issue and testing recommendations.

The Tier map continues to be periodically updated based on data submitted to the NJDEP by radon testing firms currently participating in the "Interim Voluntary Certification Program". Over the past four years the Tier boundaries have altered. The reported test results have shown that although the initial designated areas were on track further identification and definition are possible and necessary. Recently the tiers ceased to be defined as recommendations for testing. Instead, they are defined as radon potential. The current criteria used to classify municipalities into a particular Tier are outlined in Table 1.

TABLE 1

Criteria for Tier Designation

Tier	Municipality*	Geologic Province**
Tier 1 - High Radon Potential	≥25% of homes tested have radon levels ≥4.0 pCi/l	≥25% of homes tested have radon levels ≥4.0 pCi/l
Tier 2 - Moderate Radon Potential	5-24% of homes tested have radon levels ≥4.0 pCi/l	5-24% of homes tested have radon levels ≥4.0 pCi/l
Tier 3 - Low Radon Potential	0-4% of homes tested have radon levels ≥4.0 pCi/l	0-4% of homes tested have radon levels ≥4.0 pCi/l

* Criteria used if there are at least 25 homes that have been tested in the municipality.

** Criteria used only when municipality data is insufficient (less than 25 homes tested for radon) and at least 100 homes have been tested in the province.

The New Jersey Legislature had also mandated requirements for the NJDOH. An epidemiological study of radon and lung cancer based on actual radon measurements in homes and detailed smoking histories for individual subjects was conducted by the NJDOH. It was an extension of a previously conducted lung cancer study among New Jersey women. Residence criterion was established and both year-long alpha track detector measurements for estimating subject exposure as well as four-day canister quick screening for current residents were done. The entire study group, cases and controls combined, was 835 women. Detailed smoking histories were taken for the subjects. The findings reported by the NJDOH suggested "the trend for increasing risk with increasing radon exposure was statistically significant". Consequently, "the study suggests that the findings of radon-related lung cancer in miners can be applied to the residential setting. Excess radon exposures typical of homes may increase risk of lung cancer; extremely high residential exposures would be associated with very serious lung cancer risks." The NJDOH reported that the study findings supported the State's initiatives for technical information and services, citizen education, and research studies, and that smoking avoidance education for the public should also be included and emphasized in any radon reduction program.

The NJDOH was also charged with establishing and operating a Voluntary Radon Exposure Registry. Residents who were found to have high indoor radon levels which they had been exposed to for some time, could be listed on the registry. They are to receive follow-up information about hazard reduction, risk, and medical treatments. The registry is also a source for background information about exposures and exposure areas.

Current Program Activities

Two major programs are currently underway which should improve radon protection efforts in New Jersey. The first is the legislatively required certification program for testers and mitigators. The second is the federal State Indoor Radon Grant program.

The New Jersey Legislature enacted a law requiring that the NJDEP develop a mandatory certification program for all radon testers and mitigators who want to operate in the State. Initially, the NJDEP established a voluntary program in which testers and mitigators voluntarily submitted proof to the NJDEP that they met certain requirements. These companies were included on an "Interim Voluntary Certification" list. These companies have been the major source of information about home testing done in the State. To date they have supplied data for more than 140,000 tests conducted statewide.

Final regulations have been adopted, and as of May 13, 1991, no tester or mitigator may continue to operate in New Jersey, if he or she has not applied for and met the State's certification

requirements. The certification process begins with a tester or mitigator taking a training course that is given by the NJDEP or that is NJDEP-approved. Then the applicant must take an examination. There are four exams, each given for a particular title, and they are Radon Measurement Specialist, Radon Measurement Technician, Radon Mitigation Specialist, and Radon Mitigation Technician. Finally, there is an application form on which the applicant reports his or her qualifications and experience, and this form must be submitted to and reviewed by Radon Program staff. Applicants may choose to submit their certification forms for review prior to taking the examination.

However, it is not sufficient to simply await data that is supplied by testers and mitigators. There remain large portions of the homeowning population who know about radon and its associated risk but still do not test. And there is also a large population group that may be unaware of radon problems although they might very well be at risk. With funds from the United States Environmental Protection Agency's State Indoor Radon Grant program, the NJDEP is working to increase awareness and educate the public about radon issues.

One project is the development of school activities to teach children about radon and also about the concept of risk, using radon as an example. The intent is that these children will grow up being more aware of potential hazards in life and how to make rational risk based decisions regarding them. It is also hoped that the children will carry the message home to their parents. Somehow, adults find it hard to ignore information that is presented to them by a child who has just learned a new and interesting lesson in school. Especially, when that lesson has direct bearing on all their lives.

Another project that received funding is training local health officials to evaluate elevated radon areas. This creates a valuable working resource, lessening the burden on Radon Program staff in conducting labor intensive radon evaluation studies. Evaluations of elevated radon areas are needed when a home test result is at or above 200 pCi/l because it has been found in a number of communities that as many as three quarters of the surrounding homes will have readings exceeding 4pCi/l. A protocol was developed for State employees to conduct area evaluations and recently, with grant funding, local health officers are being trained in the protocol. It consists of confirmatory testing, public meetings to explain the situation and plan of action, selection of candidate homes for radon testing based on geologic data, house structure and a gamma survey, radon canister placement and pickup by evaluating staff, and a public report of findings and recommendations. In the first year of the project, 28 local health officers were trained and others have expressed interest.

Contacting and communicating with low income residents and residents of metropolitan areas (urban environments) about radon presents a unique challenge. Currently, two grant projects are

being funded to identify and assess the radon exposure, testing, and remediation needs of low income and disabled persons, and also urban populations especially focusing on multifamily dwellings. Many of the standard means for informing and educating the public are not applicable to these population groups. Additionally, questions such as testing and remediation expenses and building owner responsibility and liability must be dealt with.

A fifth grant project is to survey real estate transactions in New Jersey. This project has four objectives: 1) to assess the current radon knowledge and information needs of buyers, realtors, bankers, and real estate attorneys; 2) to assess the assistance and notification that current home buyers are receiving about radon; 3) to develop additional information pieces for all of these groups; and 4) to develop guidelines and policies on radon testing and real estate transactions.

Since the New Jersey Radon Program began work in the spring of 1985, the direction of the program has been identifying the extent of the radon problem in the State, educating the public about radon, and assuring that the latest and most effective means for control and mitigation are available. The NJDEP believes that residential exposure to radon is the most serious environmental health threat facing New Jersey citizens today. The NJDEP has taken steps to make each State resident aware of the hazards of radon exposure by providing information about potential radon occurrence in local areas via the Tier map, advertising the toll-free Radon hotline number, and preparing and distributing informational materials.