

**ESTABLISHMENT OF A REVISED PROTOCOL FOR
RESIDENTIAL
RADON MITIGATION SYSTEMS**

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ABSTRACT

Reno, like most American communities, has adopted the International Building Code and its sister codes. Working with these codes on a daily basis in my capacities as plans examiner and building inspector for the City of Reno as well as being active in the field of radon mitigation, I have come to believe that some of the standards developed for reducing radon levels in homes are infeasible, impractical and frequently excessively expensive for the homeowner or building owner. By this presentation I would like to urge you to work toward changing these standards so that they are more focused on the needs and desires of the homeowner, simply that of providing a healthy interior environment.

INTRODUCTION

Reno, Nevada, is a growing community nestled against the eastern slope of the Sierra Nevada Range just 30 minutes from Lake Tahoe. It is also an area common to elevated radon concentrations because of the large amount of igneous rock and similar radon producing minerals in the soils.

It is a given that both the homeowner and those at the EPA who developed the Residential Radon Mitigation Protocol have a common goal, that of reducing radon in the home to levels to below 4 picocuries (pCi/L) per liter. However the cost-conscious homeowner also desires an installed system that will impact his/her lifestyle as little as possible with minimum expense, yet be functional and aesthetically pleasing.

CHALLENGES OF USING RADON REDUCTION SYSTEMS

Consider some of the challenges of radon reduction systems installed in various types of existing homes. Following EPA radon mitigation protocols for the single story ranch-style home with an attic will be much less difficult than for a three-story home with a finished walkout basement. These standards, which require radon equipment along with associated piping to be installed on the outside of the house, may be impractical or excessively expensive. Consider, also, that neighborhood architectural associations may restrict installation of equipment such as radon fans and associated piping on the exterior

of the building unless concealed from view and may even restrict where vent terminations can be located at the roof of the building.

As for vents discharging above the roof, this concept, too, can get very expensive for existing homes where concrete tile has been installed as a roof covering. These tiles are a popular roof covering in the western states but fragile and prone to leaks and breakage if not handled properly. The need to vent through the roof where a concrete tile roof is in place can greatly add to the homeowners' cost of an installed mitigation system due to the fact that the services of a professional roofer familiar with these roofing tile systems would have to be obtained.

EPA installation standards applying to the placement of radon reduction fans within or beneath buildings seem to be outdated and overly restrictive. I believe that there are more practical, affordable solutions to lowering radon levels in homes and buildings that will satisfy the desires of the homeowner as well as reduce radon to acceptable levels. By following the standards established in the International Codes for equipment installed in buildings, we can provide an equally acceptable level of radon reduction within the building.

Building codes, which set the standards for construction practices, testing and performance of building components and systems, were first published in 1929. As technology, quality of materials and construction practices have changed, the codes and standards have been revised to reflect the current "state of the art." Through their continued use and consolidation with other well known codes, they have evolved to the present day International Building Code and International Residential Code. Republished every three years, individual areas of the codes are reevaluated if experience shows they are inadequate in protecting the safety of the building occupants. Likewise, with improvements in building technology and development of superior products, the codes will continue to be revised.

POSSIBLE REVISIONS OF PROTOCOLS

Some of the areas where the present protocol might be revised are as follows:

According to current standards, radon fans must not be installed within the building area. Consider however, that fuel burning equipment such as furnaces and water heaters which produce poisonous carbon monoxide gas, have been installed within living areas of buildings for years and have proven to be safe. I think we would all agree that fans manufactured by trusted firms such as Fantech and Radonaway for the purpose of reducing radon in buildings are well constructed and prevent radon leakage in addition to being U.L. approved.

In addition, protocol requires that all installed radon vents must terminate above the roof. In comparison, fuel burning, or 'direct vent'¹, appliances are permitted in accordance

1. A direct vent appliance is one that is constructed to discharge all flue gases to the outside atmosphere.

with codes to terminate: *a) Not less than 4 feet below, 4 feet horizontally and 1 foot above any air inlet into the building; b) 3 feet above and 10 feet away from any forced air inlet; c) 12 inches above finished grade;* (IMC Sec. M1804.2.6/UMC Sec. 8-2.8).

Although radon is a dangerous gas, nobody can argue that the effects of overexposure to carbon monoxide produced by direct vent appliances are not much more dangerous and immediate. Yet, the requirements of both accepted mechanical codes for the expulsion of such gases are much less stringent than standards for the expulsion of radon from the home. Consider also that there are about 0.35 pCi/L of radon in the outside air we breathe. Even where soils are known to have elevated radon levels it is not considered a risk until within the confines of a building. Likewise, it would seem logical that once radon has been exhausted from the building it will quickly dissipates to a harmless concentration in the surrounding air just as carbon monoxide does. It seems, therefore, that requirement for radon vent terminations should be similar to the code minimums for other dangerous gases.

There are other practical problems that arise by installing vertical vent piping on the building exterior. Systems installed in cold climates are prone to problems with moisture buildup in vertical vent piping on the building exterior. This problem can be minimized when the systems components are installed within the envelope of the home.

As noted earlier, specialty fans manufactured today for the purpose of radon reduction are well constructed, sealed units and are certainly no less safe than a fuel burning appliance installed within a living area. It would seem reasonable that a properly installed system using PVC plastic piping with solvent cement joints has minimum risk of leakage just as do other systems using this solvent cement jointed PVC. The mitigator, in accordance with his training, should be doing a post-test to assure that radon levels have come down to an acceptable level. In addition, he/she must advise the building owner to do annual testing to assure optimum operation of the installed mitigation system.

CONCLUSIONS

I like to recommend that the members of this organization consider working more closely with, and increase their awareness of the work of the International Code Council, the writer and publisher of the International Codes. Let me point out that although a member of ICC, my only interest is that of seeing a more widespread understanding of the issues of the problems of radon in our buildings

I was delighted to see the issue addressed in Appendix F of the 2003 International Residential Code (IRC). Although this is a significant step toward recognizing the importance of radon resistant construction, if this information were moved from the appendix to the main body of this code and published in the International Building Code (IBC) as well, it would get more widespread attention.

When there is reasonable logic and science to support a code change, a code development committee reviews and recommends final approval or disapproval to the ICC Class A membership (made up of building officials.) Upon approval it is published in the body of the next edition of the applicable code. If the voting body feels the code proposal as written has value but may need additional refinement, it is published in the appendix of the code. The adoption of a published code does not mandate the adoption of items referenced in any appendix section, however, and in fact, most communities choose NOT to adopt items referenced in the appendix until they are refined or otherwise rewritten and published in the main body of the code. Until installation standards of radon reduction systems for buildings more closely follow those of other building mechanical ventilation systems, it will remain in IRC Appendix F and remain undetected in many areas of the country.

The IRC is a code dedicated only to single family and two-family construction. We all understand the need to also address the issues of radon in our schools, senior living facilities, day care facilities, apartment houses as well as any other building where people spend much of their time. Information regarding these types of building is found in the IBC.