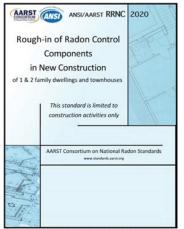
Radon Resistant Building Codes Resources and Action Planning

for Radon Programs

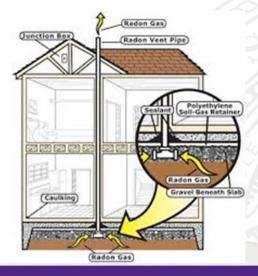


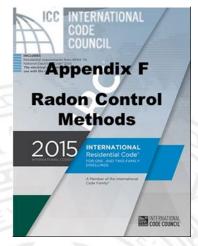
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Two Webinars

May 28, 2020

June 11, 2020





KANSAS STATE

Introduction and Welcome

Poll for your response: *Have you engaged in any previous code adoption activities?*

- Yes
- No
- I don't know

June 11 - Join us to improve your understanding and ability to navigate the code adoption process for radon resistant new construction (RRNC) codes.

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Purpose of the Webinars

Ryder Freed – US EPA Region 9

These webinars will address key questions program administrators need to know to understand the code adoption process in their states and local jurisdictions, identify necessary resources and partners, and build on lessons learned from other states and the radon community to guide development of program specific plans and action steps.

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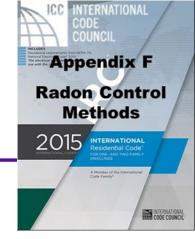
Review of Preparation Materials and Resources

- Where is radon addressed in current building codes?
- What are the basic elements of RRNC in Appendix F?
- What was added to Appendix F in 2020?
- Which AARST-ANSI Building Standards address RRNC?
- How are building codes/RRNC adopted?
- Are building codes/RRNC adopted differently on Tribal lands?

https://sosradon.org/Resources-for-RRNC-Code-Adoption



IRC Appendix F: Section 103 Requirements (Overview)



- 1. General
- 2. Subfloor Preparation
- 3. Soil-Gas Retarder
- 4. Entry Routes
- 5. Passive Submembrane Depressurization (PSD) Systems: Crawlspace
- 6. PSD Systems: Basements and Crawlspace

- 7. Vent Pipe Drainage
- 8. Vent Pipe Access
- 9. Vent Pipe Identification
- 10. Combination Foundations
- 11. Building Depressurization
- 12. Power Source

5

Kansas St

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1. Testing shall be performed after the dwelling passes its air tightness test

2. Testing shall be performed after the radon control system and HVAC installations are complete. The HVAC system shall be operating during the test. Where the radon system has an installed fan, the dwelling shall be tested with the radon fan operating



3. Testing shall be performed at the lowest occupied floor level, whether or not that space is finished. Spaces that are physically separated and served by different HVAC systems shall be tested separately

4. Testing shall not be performed in a closet, hallway, stairway, laundry room, furnace room, bathroom or kitchen



5. Testing shall be performed with a commercially available radon test kit or testing shall be performed by an approved third party with a continuous radon monitor. Testing with test kits shall include two tests, and the test results shall be averaged. Testing shall be in accordance with this section and the testing laboratory kit manufacturer's instructions

6. Testing shall be performed with the windows closed. Testing shall be performed with the exterior doors closed, except when being used for entrance or exit. Windows and doors shall be closed for at least 12 hours prior to the testing

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7. Testing shall be performed by the builder, a registered design professional, or an approved third party.

Testing shall be conducted over a period of not less than
 48 hours or not less that the period specified by the testing
 device manufacturer, whichever is longer

9. Written radon test results shall be provided by the test lab or testing party. The final written test report with results less than 4pCi/L shall be provided to the code official.

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10. Where the radon test result is 4 pCi/L or greater, the fan for the radon vent pipe shall be installed as specified in Sections AF103.8 and AF103.12

11. Where the radon test result is 4 pCi/L or greater, the system shall be modified and retested until the test result is less than 4 pCi/L.



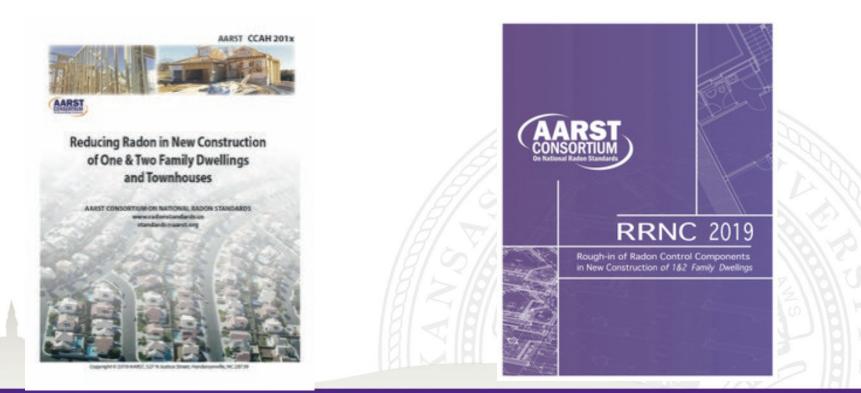
Dave Kapturowski – Spruce Environmental Technologies

Dave has served as Chair on the AARST/ANSI RRNC & Soil Gas Mitigation Standard Committees.

Dave is currently the AARST Treasurer and is a past President of New England AARST.



Complementary New Construction Standards



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CCAH – (Construction Code Applicable to Homes) -2013

- Model Building Code for New Construction
- Adopted as an alternative code to Appendix F in Mass.
- ICC Appendix F code adoption proposals unsuccessful
- HUD adopted for 1 & 2 Family New Construction in 2018



CCAH- 2020 Changes

- No Limit on Foundation Size
- Performance Path Provided (Test <4pCi/L)
- Option for Conditioned Attics
- Fan Access Requirements Increased to 30 Feet



CCAH- 2020 Changes

- Testing Within 60 Days of Occupancy
- Fan Sizing to be Performed by Radon Professional
- Active System Monitors Required
- Numerous Small Changes and Clarifications



RRNC (Radon Resistant New Construction) - 2020

- Similar to ICC Appendix F "Radon Control Methods"
- Requires Rough-in of ASD System
- No Testing Required (For Now)
 - Performance Option for Testing less than 4 pCi/L



Code adoption process, partners, and stakeholders

- Building Codes Updated every 3 years
- Code Change Proposals Submitted
- Committee Hearings
- Public Comment (Modify Initial Proposal)
- Final Action Hearings (In Room Code Officials)
- Online Voting

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RNATIONAL CODE COUNCIL

SAFF



Code adoption process, partners, and stakeholders

- Industry (AARST)
- State Radon Officials
- American Lung Association
- Consumer Advocates
- Lung Cancer Advocacy Groups (CanSAR, CRRR)
- Code Officials
- Builders

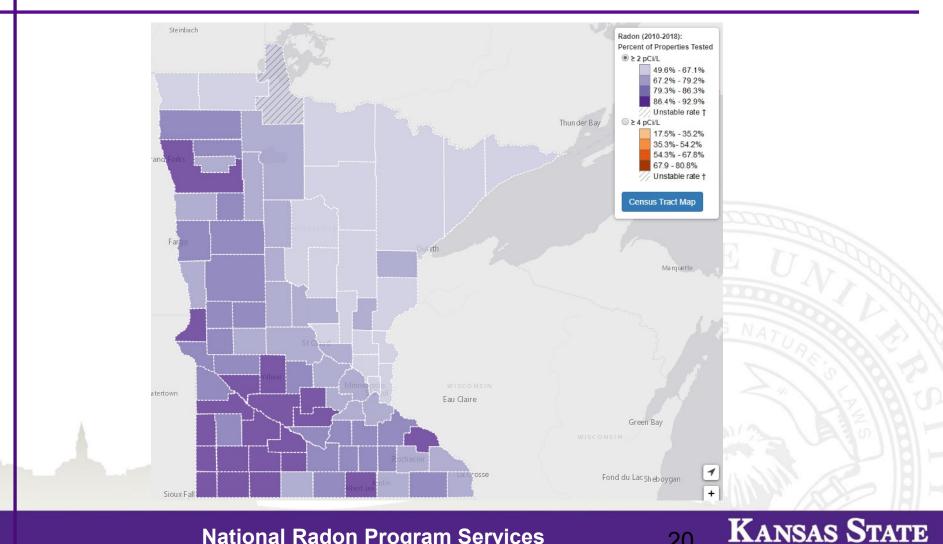


Case Studies in Code Adoption Five Minute Summaries

- Jurisdictions
- State code status
- Time to accomplish
- Key participants
- Key actions/decisions
- Current status
- Lessons learned



Josh Kerber - Minnesota



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- What State/and or jurisdiction(s) were the targets for the code adoption?
 - Entire state of Minnesota
- What is the status of building codes in your state?
 - Statewide



- How long did it take to accomplish the adoption/implementation? Many years!
- 1980s-2000s: General outreach to builders
- 2005-2006: targeted outreach to BAM and DLI
 - Presented multiple code meetings
 - BAM opposed any building code changes
- 2007: Legislation proposed and passed
 - State Rep's constituent upset about radon in new home
 - BAM supported



2007-2008: Code Committee and Rule Creation

- Based on Appendix F
- Language put into Energy Code (only open rule at the time)

June 2009: RRNC Required in Energy Code

- Applies to only some residential properties

2011-2012: All DLI Rules open for review

- RRNC moved from Energy to Building Code
- Language simplified

2015: RRNC Required in ALL Residential Buildings

Statewide requirement



- Who were the key actors/stakeholders/participants in the adoption process?
 - Legislators, MN Dept. of Health, U of MN
- What were the key actions/decisions in the process?
 - Remain highly visible
 - Engage your opponents professionally with facts and be prepared for a lot of questions



- What is the current status of the effort?
 - Statewide adoption of RRNC in <u>ALL</u> residential buildings
 - Lower lung cancer risk in new homes
 - New MN homes have roughly 1/2 the radon (20% elevated) as compared to those built prior to 2009 (45% elevated)
 - http://aarst-

nrpp.com/proceedings/2015/MINNESOTA DEPARTMENT_OF_HEALTHS_RADO N_RESISTANT_NEW_CONSTRUCTION_EFFECTIVENESS_STUDY.pdf

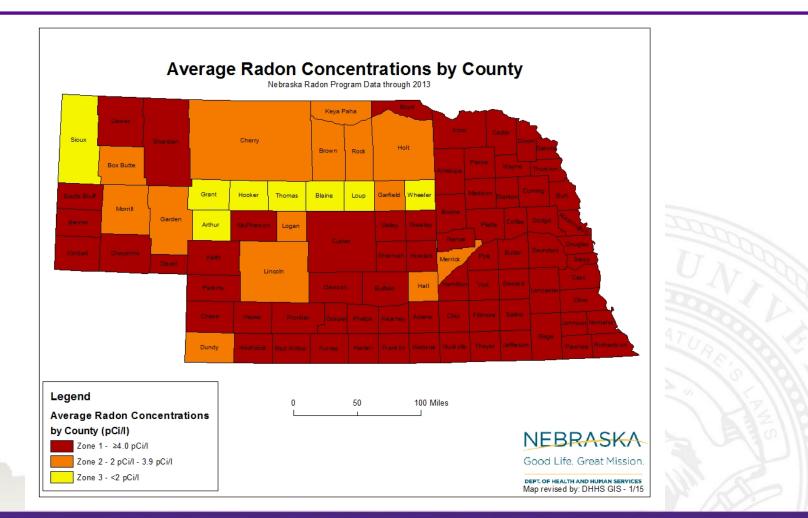




- What are the lessons learned for other states/jurisdictions with similar building code structure?
- Be prepared to:
 - Answer lots of questions
 - Deal with hostility
 - Make advocates out of adversaries



Ellen Zoeller - Nebraska



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- What State/and or jurisdiction(s) were the targets for the code adoption?
 - Nebraska
 - Radon Zones 1 & 2



- What is the status of building codes in your state? Statewide? Home Rule? Hybrid?
 - There is a state building code that is adopted and regulated by local jurisdictions.
 - Local jurisdictions also have the ability to adopt their own local codes that generally conform to the state building code.



- How long did it take to accomplish the adoption/implementation?
 - A bill to begin the process of implementing RRNC standards was introduced in 2013, then again in 2015.
 - August 24, 2017, a 17 member Radon Resistant New Construction Task Force was established by the Legislature.
 - In 2018, the Radon Resistant New Construction Task Force recommended minimum standards for radon resistant new construction to the Governor, the Health and Human Services Committee of the Legislature, and the Urban Affairs Committee of the Legislature.
 - In May 2019, the state legislature adopted the Radon Resistant New Construction Act requiring that new construction incorporate passive RRNC elements outlined in the law. Ne. Legis. Bill 130; Ne. Stat. 76-3504, 3505.
 - On September 1, 2019 the Radon Resistant New Construction Act became effective.

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- Who were the key actors/stakeholders/participants in the adoption process?
 - Builders
 - Home Inspectors
 - Realtors
 - Representatives
 - Respiratory Disease
 - Cancer Research
 - League of Nebraska Municipalities
 - Public Health representatives for different Congressional districts
 - Engineer
 - Architect
 - Representative with expertise in residential or commercial building codes

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- What were the key actions/decisions in the process?
- The task force was required to:
 - design the minimum standards so that they may be enforced by a county, city or village as part of its local building code.
 - consider Appendix F of the IRC for one two family dwellings.
 - consider including a requirement that the installation of an active radon mitigation system only be performed by a building contractor/subcontractor or by a radon mitigation specialist.
 - consider a requirement that the installation of radon resistant new construction only be performed by a building contractor/subcontractor or by a radon mitigation specialist, and
 - consider a requirement that only a building contractor/subcontractor or a radon mitigation specialist be allowed to install a radon vent fan or upgrade a passive new construction pipe to an active radon mitigation system.

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- What is the current status of the effort?
 - State of Nebraska
 - Ongoing regulation review to compliment new building code
 - Data collection
 - Guidance and education
 - Local building inspectors
 - Enforcement
 - Builders
 - Compliance in Zones 1 & 2
 - Voluntary adoption in Zone 3





- What are the lessons learned for other states/jurisdictions with similar building code structure?
 - Recommend considering getting systems in place prior to implementation for:
 - Education
 - Enforcement
 - Data collection



Brian Hanson - KS

Cheyenne	Raw	vlins	Decatur	Norton	Phillips	Smith	Jewell	Republic	Washington Mar	shall Nem	aha ^{Brov}	VN DP	2
Sherman	Thomas		Sheridan	Graham	Rooks	osborne	Mitchell	Cloud	Clay Riley	РТ* р	ackson	JF*	V*
Wallace	Loga	in	Gove	Trego	Ellis	Russell	Lincoln Ellsworth	Ottawa Saline	Geary DK*	- , ""	SN*	r - L	WY*
Greeley 🖗	lichita	Scott	Lane	Ness	Rush	Baiton		McPherson	Marion Cha	Lyon	Osage	Franklin	Miami
Hamilton K	Hamilton Kearny Finn			Hodgeman	Pawnee Edwards	Stafford	Reno	Harvo		┍┶──	Coffey Woodson	AN*	Linn Bourbon
Stanton	Grant	Haske	Gray	Ford	Kiowa	Pratt	Kingman	Sedgwi		Elk		Neosho	Grawfurd
Morton S	tevens	5ewai	d Meade	e Clark	Comarche	Barber	Haipe	r Sumn	er Cowley	CQ*	MG*	Labette	CK*

KANSAS STATE

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Average Radon Level = 4.6 pCi/L Maximum Reported Radon Level = 1,121.6 pCi/L Total Number of Measurements = 161,690 Total Measurements 4 pCi/L or greater = 62,555 Total Measurements 20 pCi/L or greater = 3,296 Tota Estimated Mitigation (2005-2018) = 33,066

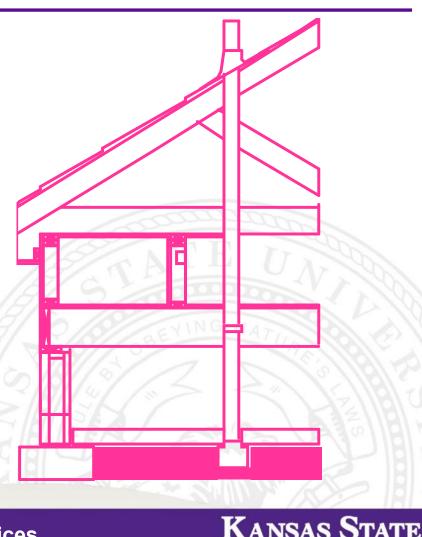
- What State/and or jurisdiction(s) were the targets for the code adoption?
 - Activities have occurred in several communities across the last twenty years in Kansas
 - Kansas is a home rule state no statewide building code – must be adopted by local jurisdiction





- Known Kansas RRNC
 Requirements
 - Cities
 - Manhattan
 - Topeka
 - Lawrence
 - Salina
 - Junction City
 - DeSoto
 - Gardner
 - Eudora
 - Counties
 - Shawnee (unincorporated)
 - Douglas (unincorporated)

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Project History

- Salina received a Level 1 Community Action for a Renewed Environment (CARE) grant from the U.S. EPA in October 2008 to identify and prioritize local environmental health issues
 - A Level 2 CARE grant awarded in October 2011 funded a broad community outreach program focused on radon awareness, measurement, and mitigation
- March 4, 2013
 - Salina City Commission adopted a modified version of the International Residential Building Code (IRBC) Appendix F
 - Effective as of June 15, 2013
 - Appendix F requires that a passive radon reduction system be installed in all new-built single- and two-family homes

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Project Timeline

- January 2016
 - Recruitment letters were sent to 130 new-built homes in Salina. Volunteered homes would receive
 - No-cost evaluation of the passive radon reduction system
 - No-cost radon testing of the home
 - Activation of the passive system at no cost if the house tested 4.0 pCi/L or higher (EPA Radon Action Level)
- February 2016
 - 16 houses initially responded
 - 15 houses were evaluated
 - » 13 homes evaluated starting week of 3/14
 - » 2 homes evaluated started week of 3/21
- March 2016
 - 6 homes that tested at/above 4.0 pCi/L were activated and retested

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Radon test results in Salina, Kansas, with operational passive radon-reduction systems

Street	Passive test 1	Passive test 2	Passive test Avg.	Post-activation avg.	Floor
House #1	1.6	1.6	1.6		1st floor
House #2	1.7	1.5	1.6		Basement
House #3	2.0	1.4	1.7		1st floor
House #4	1.7	1.9	1.8		1st floor
House #5	1.8	1.9	1.9	00000	Basement
House #6	2.1	2.2	2.2	Provided LT Radon Test	Basement
House #7	2.6	2.5	2.6	Provided LT Radon Test	Basement
House #8	2.6	3.3	3.0	Provided LT Radon Test	Basement
House #9	3.7	2.8	3.3	Provided LT Radon Test	Basement
House #10	4.3	4.0	4.2	0.8	Basement
House #11	4.1	4.7	4.4	1.1	Basement
House #12	5.3	4.8	5.1	1.0	Basement
House #13	5.5	5.7	5.6	1.4	Basement
House #14	6.3	5.2	5.8	1.1	Basement
House #15	14.2	13.4	13.8	1.3	Basement

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Evaluation Process

- All 15 homes had at least a partial passive radon reduction system installed
 - Systems were evaluated for
 - Connection to the sub-slab zone
 - Sealing of any sump pits in the home
 - Ventilation pipe run from the slab thru the roof
 - Ventilation pipe labeling
 - Accessibility in the attic for installing a radon reduction fan

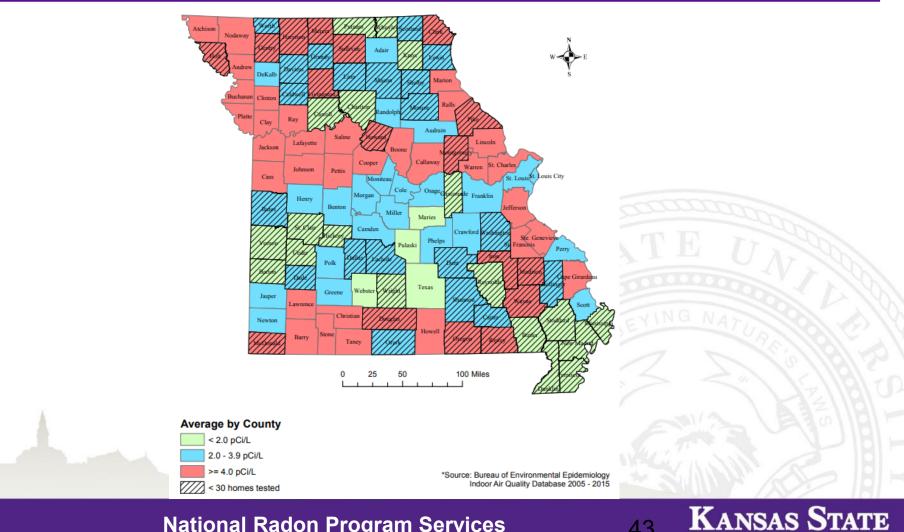
National Radon Program Services

Evaluation Findings

- Common installation errors included
 - 6 systems had improperly sealed sump pits near the ventilation pipe
 - 7 systems had either no labeling or incomplete labeling
 - 5 systems had insufficient clearance in the attic for a fan installation
 - Several other systems had clearance for a low-wattage fan but nothing larger
 - 2 systems had excessive horizontal pipe runs
 - 2 systems had the ventilation pipe completely enclosed in sheet rock
 - 1 system had the ventilation pipe cut off within the attic
 - None of the systems had electrical junction boxes in the attic near the ventilation pipe
 - Note: The Salina code adoption process voluntarily removed this requirement from the Appendix F when it was adopted

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Denise Winder - Missouri



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What State/and or jurisdiction(s) were the targets for the code adoption?

Local governments; including municipalities, code officials and all 115 counties in Missouri.



What is the status of building codes in your state? Statewide? Home Rule? Hybrid?

The state of Missouri has not adopted statewide building codes. Several municipalities and counties throughout Missouri have independently adopted the International Residential (IRC), the International Building Code (IBC) and Appendix F.

Radon testing and/or mitigation in privatized military housing is now required as of March 1, 2020.



What efforts have the program taken to achieve RRNC or Appendix F to be adopted in local codes?

In 2013, Missouri Department of Health and Senior Services (DHSS) completed a health impact assessment to model cost savings from RRNC construction. This information was then provided to local code enforcements to encourage adoption of RRNC.

In 2016, documents were mailed to over 500 code enforcement offices with guidance on how to approach adopting Appendix F.

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Who were the key actors/stakeholders/participants in the adoption process?

Key stakeholders include the real-estate industry, homeowners, code officials and the radon industry.



What were the key actions/decisions in the process?

DHSS has not been involved in the direct process. Our direction has been in awareness and education. We have provided information to realtors, contractors, local governments and the public to promote RRNC and Appendix F adoption.



What is the current status of the effort?

DHSS is working to compile more accurate data on areas that have already adopted Appendix F, as well as identifying areas to prioritize outreach and encourage the adoption of Appendix F.



Current Statutes

Title XXIX OWNERSHIP AND CONVEYANCE OF PROPERTY; Chapter 442.055

"Contamination of premises, radioactive or hazardous material — disclosure to prospective lessees, purchasers, or transferees — penalty. — In the event that any premises to be rented, leased, sold, transferred, or conveyed is or was previously contaminated with radioactive material or other hazardous material, the owner, seller, landlord, or other transferor shall disclose in writing to the prospective lessee, purchaser, or transferee the fact the premises is or was previously contaminated with radioactive material or other hazardous material; provided that, the owner, seller, landlord, or other transferor has knowledge of such radioactive or other hazardous contamination. In the event that an owner, seller, landlord, or other transferor does not make the disclosure as required under this section^{*}, and the person had knowledge of such radioactive or other hazardous contamination, the person shall be guilty of a class A misdemeanor."

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What are the lessons learned for other states/jurisdictions with similar building code structure?

The real-estate industry is an important area to partner with. When testing occurs during real-estate transactions and remediation becomes a negotiation tool, building RRNC could become the most economic option and will smooth the path for code adoption.



Contact Information

Denise K Winder, MS

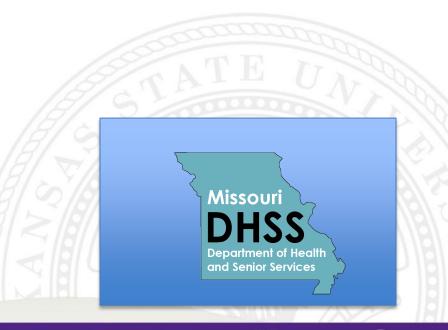
Missouri Department of Health and Senior Services

Radon Program Coordinator

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Radon@health.mo.gov

Denise.Winder@health.mo.gov



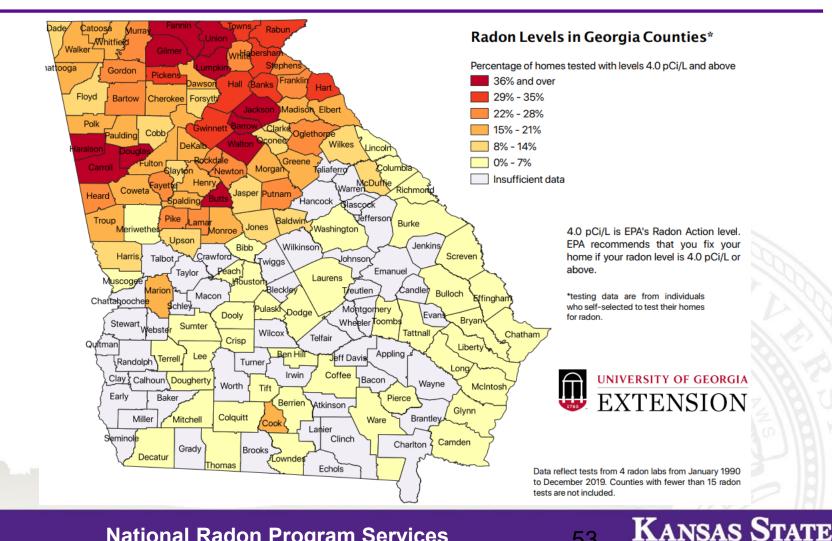


Matt Koch - Georgia



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Status of RRNC Requirements

- Currently no state-wide code requirements
- Code requirements overseen by the Department of Community Affairs (DCA)
- DCA did not support proposed amendments to adopt RRNC requirements in either of the past two code adoption cycles
- Only one county has requirements for RRNC



Local Code Requirements

- Gwinnett County (EPA Zone 1) has adopted Appendix F
- Adopted in 2017
- Appendix F not practical in construction in GA
- Correct installation costly builders object
- Code officials do not enforce
- Will issue a CO without RRNC
- More like a code recommendation than requirement





Problems with Appendix F

- Typical new construction home in GA has between 4 and 10 separated footing areas
- This would result in 4-10 vent pipe risers in a basement!
- NOT GOING TO HAPPEN

AF103.6.2 Multiple vent pipes.

In buildings where interior footings or other barriers separate the subslab aggregate or other gas-permeable material, each area shall be fitted with an individual vent pipe. Vent pipes shall connect to a single vent that terminates above the roof or each individual vent pipe shall terminate separately above the roof.

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RRNC in Multifamily Construction

- No state or county code requirement
- Required by HUD
- Required by some financial institutions
- Required by DCA in financed multifamily projects for low income housing



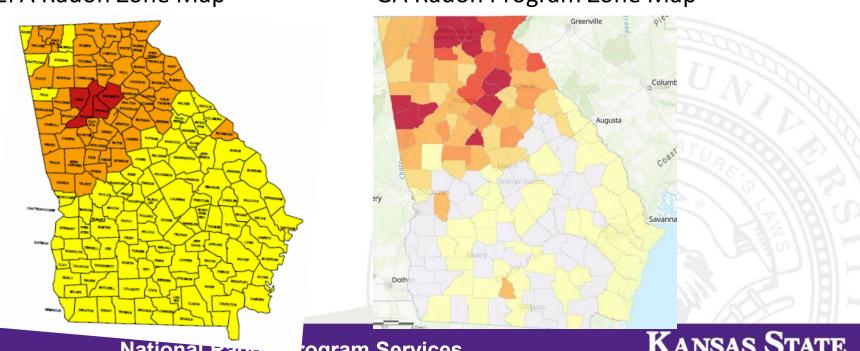
Problems in Multifamily RRNC

- Systems frequently designed by unqualified persons
- Systems designed by certified individuals frequently wrong
- No method of oversight or review for correctness



Where RRNC Requirements Would be Beneficial

• EPA Zone map does not accurately reflect potential for elevated radon levels



EPA Radon Zone Map

GA Radon Program Zone Map

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Opportunities for RRNC Adoption

- Where RRNC would have the most impact
- Although EPA Zone map is incorrect, it does reflect total population risk potential

County	EPA Zone	% Elevated	Population (1000's)	Homes elevated (1000's)
Gwinnett	1	29%	928	269
Fulton	1	18%	1,050	189
Dekalb	1	19%	757	144
Cobb	1	13%	757	98
Hall	2	34%	202	69
Douglas	2	37%	145	54
Carroll	2	36%	118	42
Walton	2	36%	94	34
Barrow	2	40%	81	32
Jackson	2	44%	70	31
Haralson	2	45%	30	14
Gilmer	2	41%	31	13
Fannin	2	45%	26	12
Union	2	45%	24	11
Butts	2	38%	24	9



What Next

- Likelihood of code adoption in GA **Slim to none**
- Likelihood of builders who install RRNC in GA doing so correctly – Slim to none
- Appendix F must be modified to reflect real world building practices
- Attempt to get Appendix F adopted as a Permissive Code
- RRNC is only 4% of NRPP mitigation exam If RRNC is important, the training should reflect it

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Key Points - Issues

Be prepared to: Answer lots of questions Deal with hostility Make advocates out of adversaries

Be ready to compromise

Recommend considering getting systems in place prior to implementation for:

Education Enforcement Data collection



Pre-webinar question results

Question #1: How do you rate your knowledge of your state and/or local code adoption process?

Poor	Good	Excellent
46.8%	40.4%	12.8%

Question #2: How do you rate your current understanding of radon resistant new construction (RRNC) building techniques?

Poor	Good	Excellent
20.5%	61.4%	18.1%

Question #3: How do you rate your current understanding of the Appendix F of the International Residential Code (IRC)?

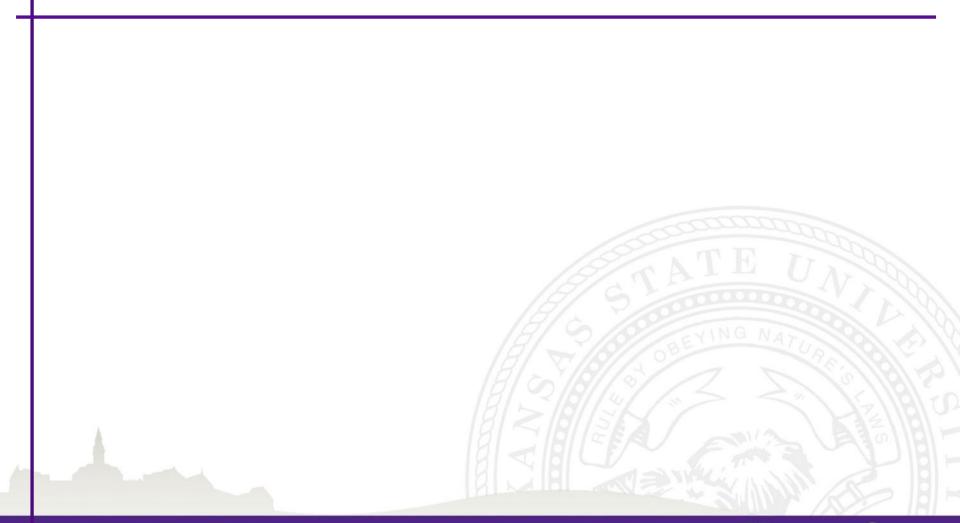
Poor	Good	Excellent
43.2%	50.9%	5.9%

Question #4: What is your current comfort level with conducting code adoption process?

Poor	G000	Excellent
51.7%	40%	8.3%

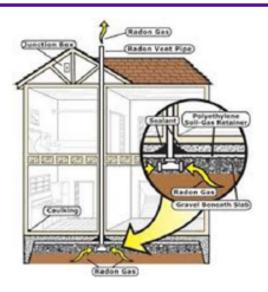


Questions/Discussion

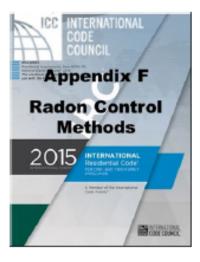




June 11 Webinar #2



Agenda - Webinar #2 Radon Resistant Building Codes Creating Capacity and Engaging the Process June 11



Prepping for webinar #2

Review resource materials and questions We will send the presentation from today We are ready to respond to your questions Additional resources you might need?



Contact Information

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https://sosradon.org/Resources-for-RRNC-Code-Adoption

