



**COLORADO**

**Department of  
Regulatory Agencies**

Colorado Office of Policy, Research &  
Regulatory Reform

# 2019 Sunrise Review

Radon Measurement & Mitigation Specialists



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October 15, 2019



**COLORADO**

**Department of  
Regulatory Agencies**

Executive Director's Office

October 15, 2019

Members of the Colorado General Assembly  
c/o the Office of Legislative Legal Services  
State Capitol Building  
Denver, Colorado 80203

Dear Members of the General Assembly:

The General Assembly established the sunrise review process in 1985 as a way to determine whether regulation of a certain profession or occupation is necessary before enacting laws for such regulation and to determine the least restrictive regulatory alternative consistent with the public interest. Since that time, Colorado's sunrise process has gained national recognition and is routinely highlighted as a best practice as governments seek to streamline regulation and increase efficiencies.

Section 24-34-104.1, Colorado Revised Statutes, directs the Department of Regulatory Agencies to conduct an analysis and evaluation of proposed regulation to determine whether the public needs, and would benefit from, the regulation.

The Colorado Office of Policy, Research and Regulatory Reform (COPRRR), located within my office, is responsible for fulfilling these statutory mandates. Accordingly, COPRRR has completed its evaluation of the sunrise application for the regulation of radon measurement and mitigation specialists and is pleased to submit this written report.

The report discusses the question of whether there is a need for regulation in order to protect the public from potential harm, whether regulation would serve to mitigate the potential harm, and whether the public can be adequately protected by other means in a more cost-effective manner.

Sincerely,

A handwritten signature in black ink that reads "Patty Salazar".

Patty Salazar  
Executive Director



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## Background

Consistent, flexible, and fair regulatory oversight assures consumers, professionals and businesses an equitable playing field. All Coloradans share a long-term, common interest in a fair marketplace where consumers are protected. Regulation, if done appropriately, should protect consumers. If consumers are not better protected and competition is hindered, then regulation may not be the answer.

As regulatory programs relate to individual professionals, such programs typically entail the establishment of minimum standards for initial entry and continued participation in a given profession or occupation. This serves to protect the public from incompetent practitioners. Similarly, such programs provide a vehicle for limiting or removing from practice those practitioners deemed to have harmed the public.

From a practitioner perspective, regulation can lead to increased prestige and higher income. Accordingly, regulatory programs are often championed by those who will be the subject of regulation.

On the other hand, by erecting barriers to entry into a given profession or occupation, even when justified, regulation can serve to restrict the supply of practitioners. This not only limits consumer choice, but can also lead to an increase in the cost of services.

There are also several levels of regulation.

## Licensure

Licensure is the most restrictive form of regulation, yet it provides the greatest level of public protection. Licensing programs typically involve the completion of a prescribed educational program (usually college level or higher) and the passage of an examination that is designed to measure a minimal level of competency. These types of programs usually entail title protection - only those individuals who are properly licensed may use a particular title(s) - and practice exclusivity - only those individuals who are properly licensed may engage in the particular practice. While these requirements can be viewed as barriers to entry, they also afford the highest level of consumer protection in that they ensure that only those who are deemed competent may practice and the public is alerted to those who may practice by the title(s) used.

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## Certification

Certification programs offer a level of consumer protection similar to licensing programs, but the barriers to entry are generally lower. The required educational program may be more vocational in nature, but the required examination should still measure a minimal level of competency. Additionally, certification programs typically involve a non-governmental entity that establishes the training requirements and owns and administers the examination. State certification is made conditional upon the individual practitioner obtaining and maintaining the relevant private credential. These types of programs also usually entail title protection and practice exclusivity.

While the aforementioned requirements can still be viewed as barriers to entry, they afford a level of consumer protection that is lower than a licensing program. They ensure that only those who are deemed competent may practice and the public is alerted to those who may practice by the title(s) used.

## Registration

Registration programs can serve to protect the public with minimal barriers to entry. A typical registration program involves an individual satisfying certain prescribed requirements - typically non-practice related items, such as insurance or the use of a disclosure form - and the state, in turn, placing that individual on the pertinent registry. These types of programs can entail title protection and practice exclusivity. Since the barriers to entry in registration programs are relatively low, registration programs are generally best suited to those professions and occupations where the risk of public harm is relatively low, but nevertheless present. In short, registration programs serve to notify the state of which individuals are engaging in the relevant practice and to notify the public of those who may practice by the title(s) used.

## Title Protection

Finally, title protection programs represent one of the lowest levels of regulation. Only those who satisfy certain prescribed requirements may use the relevant prescribed title(s). Practitioners need not register or otherwise notify the state that they are engaging in the relevant practice, and practice exclusivity does not attach. In other words, anyone may engage in the particular practice, but only those who satisfy the prescribed requirements may use the enumerated title(s). This serves to indirectly ensure a minimal level of competency - depending upon the prescribed preconditions for use of the protected title(s) - and the public is alerted to the qualifications of those who may use the particular title(s).

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Licensing, certification and registration programs also typically involve some kind of mechanism for removing individuals from practice when such individuals engage in enumerated proscribed activities. This is generally not the case with title protection programs.

## Regulation of Businesses

Regulatory programs involving businesses are typically in place to enhance public safety, as with a salon or pharmacy. These programs also help to ensure financial solvency and reliability of continued service for consumers, such as with a public utility, a bank or an insurance company.

Activities can involve auditing of certain capital, bookkeeping and other recordkeeping requirements, such as filing quarterly financial statements with the regulator. Other programs may require onsite examinations of financial records, safety features or service records.

Although these programs are intended to enhance public protection and reliability of service for consumers, costs of compliance are a factor. These administrative costs, if too burdensome, may be passed on to consumers.

## Sunrise Process

Colorado law, section 24-34-104.1, Colorado Revised Statutes (C.R.S.), requires that individuals or groups proposing legislation to regulate any occupation or profession first submit information to the Department of Regulatory Agencies (DORA) for the purposes of a sunrise review. The intent of the law is to impose regulation on occupations and professions only when it is necessary to protect the public health, safety or welfare. DORA's Colorado Office of Policy, Research and Regulatory Reform (COPRRR) must prepare a report evaluating the justification for regulation based upon the criteria contained in the sunrise statute:<sup>1</sup>

(I) Whether the unregulated practice of the occupation or profession clearly harms or endangers the health, safety, or welfare of the public, and whether the potential for the harm is easily recognizable and not remote or dependent upon tenuous argument;

(II) Whether the public needs, and can reasonably be expected to benefit from, an assurance of initial and continuing professional or occupational competence;

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<sup>1</sup> § 24-34-104.1(4)(b), C.R.S.

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- (III) Whether the public can be adequately protected by other means in a more cost-effective manner; and
- (IV) Whether the imposition of any disqualifications on applicants for licensure, certification, relicensure, or recertification based on criminal history serves public safety or commercial or consumer protection interests.

Any professional or occupational group or organization, any individual, or any other interested party may submit an application for the regulation of an unregulated occupation or profession. Applications must be accompanied by supporting signatures and must include a description of the proposed regulation and justification for such regulation.

## Methodology

During the sunrise review process, COPRRR staff performed a literature search; contacted and interviewed the sunrise applicant; reviewed laws in other states; and interviewed radon specialists, regulators in other states, government officials and other stakeholders. To determine the number and types of complaints filed against radon specialists in Colorado, COPRRR staff contacted the Attorney General's Office, Consumer Protection Section; the Better Business Bureau (BBB) serving Greater Denver and Central Colorado, the BBB serving Northern Colorado and Wyoming and the BBB serving Southern Colorado; and the Colorado Department of Public Health and Environment.

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## Profile of the Profession

Radon is an invisible, odorless gas that is created when uranium in soil or rock breaks down. Radon can enter a building through openings, such as cracks in the foundation, and it may be found in single-family and multifamily homes, schools, day cares and other large buildings.<sup>2</sup>

The U.S. Environmental Protection Agency (EPA) recommends fixing homes that have elevated levels of radon. The current action level set by the EPA is four picocuries per liter (pCi/L) of air, but the EPA suggests fixing homes that have levels between two and four pCi/L.<sup>3</sup>

There are several methods of reducing the level of radon in a home.<sup>4</sup> Typically, radon is reduced by sealing cracks and other openings in the floors and walls. While sealing reduces the level of radon entering a home, it may also be necessary to take additional steps, such as installing a radon mitigation system. The type of mitigation system used to reduce radon levels depends on the design of the home.<sup>5</sup>

The purpose of a mitigation system is to create a pathway for the gas to safely move through and out of the home. For example, a home with a crawl space may require a mitigation system using high-density polyethylene sheeting to cover the soil, polyvinyl chloride pipes and an exhaust fan to collect and remove the radon through a system of pipes and an external vent.<sup>6</sup>

A mitigation system may cost anywhere from \$800 to \$2,500 to install, and the average cost is about \$1,200.<sup>7</sup>

The only way to determine the level of radon in a building is to test for it.<sup>8</sup>

Anyone can purchase a radon test kit online or from a hardware store.<sup>9</sup> The test kits are simple and inexpensive. Once a test has been completed, the consumer seals the

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<sup>2</sup> *Sunrise Review Application*, Rocky Mountain Association of Radon Scientists and Technologists (2018), pp. 7-8.

<sup>3</sup> American Lung Association. *Radon*. Retrieved December 21, 2018, from <https://www.lung.org/our-initiatives/healthy-air/indoor/indoor-air-pollutants/radon.html>

<sup>4</sup> American Lung Association. *Radon*. Retrieved December 21, 2018, from <https://www.lung.org/our-initiatives/healthy-air/indoor/indoor-air-pollutants/radon.html>

<sup>5</sup> Kansas State University: National Radon Program Services. *Radon Mitigation*. Retrieved December 21, 2018, from <https://sosradon.org/mitigation>

<sup>6</sup> Kansas State University: National Radon Program Services. *Mitigation Details 101*. Retrieved December 27, 2018, from <https://sosradon.org/Mitigation-details-101>

<sup>7</sup> Consumer Reports. *Radon Test Kit Buying Guide*. Retrieved July 9, 2019, from <https://www.consumerreports.org/cro/radon-test-kits/buying-guide/index.htm>

<sup>8</sup> American Lung Association. *Radon*. Retrieved December 21, 2018, from <https://www.lung.org/our-initiatives/healthy-air/indoor/indoor-air-pollutants/radon.html>

<sup>9</sup> U.S. Environmental Protection Agency. *Basic Radon Facts: July 2016*. Retrieved December 21, 2018, from <https://www.epa.gov/radon/basic-radon-facts>



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test kit in an envelope and sends it to a laboratory for analysis. The analysis is usually included in the cost of the test kit.<sup>10</sup> Test kits may be purchased for about \$15.

Alternatively, a consumer may choose to hire a professional measurement specialist to do the testing.<sup>11</sup>

There are several different types of radon testing devices that a professional measurement specialist may use:<sup>12</sup>

- Passive devices, such as charcoal canisters, alpha tracking detectors, charcoal liquid scintillation devices and electret ion chamber devices, do not require power to function. The measurement specialist simply exposes the devices to the air in the building for a period of time and sends the device to a laboratory for analysis.
- Active devices, such as continuous radon monitors and continuous working monitors, require power to function. These continuously measure and record the levels of radon in the air, and they provide more reliable results.

To find a qualified radon specialist to conduct a test or to mitigate elevated levels of radon, a consumer may contact the Colorado Department of Public Health and Environment (CDPHE), which maintains a list of privately certified radon specialists, or check online for a radon specialist.<sup>13</sup> Consumers may also be referred to radon specialists by home inspectors, builders or real estate agents.<sup>14</sup> A professional radon test may cost anywhere from \$150 to \$250. A mitigation specialist is also qualified to test for radon.

CDPHE also offers a radon mitigation grant program for low-income homeowners, and other funding sources are also available.<sup>15</sup>

There are two organizations that credential radon measurement and mitigation specialists: the American Association of Radon Scientists and Technologists, National Radon Proficiency Program (AARST-NRPP) and the National Radon Safety Board (NRSB).

AARST-NRPP offers the following credentials for radon specialists:<sup>16</sup>

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<sup>10</sup> American Lung Association. *Radon*. Retrieved December 21, 2018, from <https://www.lung.org/our-initiatives/healthy-air/indoor/indoor-air-pollutants/radon.html>

<sup>11</sup> U.S. Environmental Protection Agency. *Basic Radon Facts: July 2016*. Retrieved December 21, 2018, from <https://www.epa.gov/radon/basic-radon-facts>

<sup>12</sup> *Home Buyer's and Seller's Guide to Radon*, U.S. Environmental Protection Agency (March 2018), pp. 11-12.

<sup>13</sup> U.S. Environmental Protection Agency. *Basic Radon Facts: July 2016*. Retrieved December 21, 2018, from <https://www.epa.gov/radon/basic-radon-facts>

<sup>14</sup> *Sunrise Review Application*, Rocky Mountain Association of Radon Scientists and Technologists (2018), p. 8.

<sup>15</sup> Colorado Department of Public Health and Environment. *Testing and mitigating your home for radon*. Retrieved December 28, 2018, from <https://www.colorado.gov/pacific/cdphe/testing-your-home-radon>

<sup>16</sup> National Radon Proficiency Program. *NRPP Certification*. Retrieved December 27, 2018, from <http://aarst-nrpp.com/wp/certification/>

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- **Residential Measurement Provider: Standard Services**—requires knowledge of specific standards for the placement and retrieval of radon test devices and competency in the interpretation of results;
  - **Residential Measurement Provider: Analytical Services**—in addition to the ability to place and retrieve radon test devices and properly interpret test results obtained in residential settings, this credential requires the ability to characterize trends in radon concentration and determine unusual conditions arising from influences like weather changes or occupant-tampering of a test; and
  - **Residential Mitigation Provider**—requires knowledge of radon mitigation techniques for residential structures.

AARST-NRPP also has advanced certification for multifamily homes and new construction.<sup>17</sup>

In order to obtain a Residential Measurement Provider: Standard Services certificate, an individual must take the following steps:<sup>18</sup>

- Complete an entry-level measurement course approved by AARST-NRPP, and
- Pass the AARST-NRPP Measurement Examination.

The certification fee is \$225.<sup>19</sup>

In order to obtain a Residential Measurement Provider: Analytical Services certificate, an individual must complete the above steps and also complete a Device Performance Test.<sup>20</sup> The fee for this certification is \$300.<sup>21</sup>

In order to obtain a Residential Mitigation Provider certificate, an individual must take the following steps:<sup>22</sup>

- Complete an entry-level measurement course approved by AARST-NRPP,
- Complete an entry-level mitigation course approved by AARST-NRPP, and
- Pass the AARST-NRPP Mitigation Examination.

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<sup>17</sup> National Radon Proficiency Program. *NRPP Certification*. Retrieved December 27, 2018, from <http://aarst-nrpp.com/wp/certification/>

<sup>18</sup> National Radon Proficiency Program. *How to Become Certified*. Retrieved December 28, 2018, from <http://aarst-nrpp.com/wp/certification/how-to-become-certified/>

<sup>19</sup> National Radon Proficiency Program. *Frequently Asked Questions: How Much Does Certification Cost?* Retrieved December 28, 2018, from <http://aarst-nrpp.com/wp/certification/faqs/>

<sup>20</sup> National Radon Proficiency Program. *How to Become Certified*. Retrieved December 28, 2018, from <http://aarst-nrpp.com/wp/certification/how-to-become-certified/>

<sup>21</sup> National Radon Proficiency Program. *Frequently Asked Questions: How Much Does Certification Cost?* Retrieved December 28, 2018, from <http://aarst-nrpp.com/wp/certification/faqs/>

<sup>22</sup> National Radon Proficiency Program. *How to Become Certified*. Retrieved December 28, 2018, from <http://aarst-nrpp.com/wp/certification/how-to-become-certified/>

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The certification fee is \$225.<sup>23</sup>

Entry-level measurement courses are 16 contact hours. Each course must cover topics necessary to prepare students to pass the AARST-NRPP Measurement Examination. For example, the Radon Measurement Proficiency Course at Rutgers University, which is approved by AARST-NRPP, covers the following topics:

- Selection, placement and operation of measurement devices;
- Calculation of radon levels and conducting quality assurance tests;
- Making mitigation referrals for high levels of radon; and
- Entry and movement of radon through buildings.

This course also covers:

- Radioactive decay,
- Types of radiation, and
- Health risks related to radon.

Only one vendor in Colorado offers a classroom-based entry-level measurement course that is approved by AARST-NRPP. However, there are several vendors that offer online or home-study courses. This is also the case for mitigation courses.

The entry-level mitigation courses approved by AARST-NRPP are 24 contact hours. Each course must cover topics necessary to prepare students to pass the AARST-NRPP Mitigation Examination. For example, the Radon Mitigation Proficiency Course at Rutgers University covers the following topics:

- How air pressure affects ventilation,
- How fan sizes affect air flow and operation costs,
- How radon moves through water, and
- Why safety precautions are important.

This course also covers:

- Mitigation theory,
- Radon diagnosis and mitigation techniques,
- Mitigation techniques for new construction, and
- Mitigation system design.

Courses are available in classrooms, through home study or online.<sup>24</sup> The cost of each course depends on the vendor.

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<sup>23</sup> National Radon Proficiency Program. *Frequently Asked Questions: How Much Does Certification Cost?* Retrieved December 28, 2018, from <http://aarst-nrpp.com/wp/certification/faqs/>

<sup>24</sup> National Radon Proficiency Program. *Entry-Level Courses*. Retrieved December 28, 2018, from <http://aarst-nrpp.com/wp/entry-level-courses/>

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If a course is taken in a classroom, the AARST-NRPP certification test may be taken after the class ends. Otherwise, both examinations are offered at PSI testing centers. The cost of each examination is \$135.<sup>25</sup>

Testing centers in Colorado that offer the AARST-NRPP examinations are located in:

- Broomfield,
- Centennial,
- Colorado Springs,
- Durango,
- Englewood,
- Fort Collins,
- Grand Junction,
- Lakewood,
- Pueblo, and
- Steamboat Springs.

AARST-NRPP certificate holders must complete 16 hours of continuing education every two years in order to maintain certification.

The other organization that credentials radon specialists is the NRSB. The credentials offered by the NRSB include:<sup>26</sup>

- **Radon Measurement Technician**—requires a basic understanding of radon and its health risks and a thorough knowledge of measurement techniques and testing protocols;
- **Radon Measurement Specialist**—in addition to basic training in radon measurement, requires basic knowledge of radiation physics, an understanding of risk assessment, the epidemiological evidence of radon health risks and the differences between various devices and techniques for measuring radon and radon decay products; and
- **Radon Mitigation Specialist**—requires working knowledge of radon measurement techniques and a broad knowledge of all aspects of residential radon mitigation.

In order to obtain certification through the NRSB, an individual must:<sup>27</sup>

- Complete a training course approved by the NRSB, and
- Pass the NRSB examination.

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<sup>25</sup> National Radon Proficiency Program. *Entry-Level Courses*. Retrieved December 28, 2018, from <http://aarst-nrpp.com/wp/entry-level-courses/>

<sup>26</sup> National Radon Safety Board. *Types of Certifications*. Retrieved December 27, 2018, from <http://www.nrsb.org/for-professionals/types-of-certifications/>

<sup>27</sup> National Radon Safety Board. *How to Become Certified*. Retrieved December 28, 2018, from <http://www.nrsb.org/for-professionals/how-to-get-certified/>

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The certification fee through the NRSB is \$100 a year or \$160 for two years.<sup>28</sup> In order to renew certification, each certificate holder must complete continuing education as follows:<sup>29</sup>

- Radon Measurement Technician—four hours a year,
- Radon Measurement Specialist—eight hours a year, and
- Radon Mitigation Specialist—eight hours a year.

Many of the educational courses that are approved by AARST-NRPP in order to qualify for certification through that organization are also approved courses for the NRSB.

NRSB examinations may be proctored by a member of the teaching faculty or educational administrator of any university, college or school in Colorado. The total cost of an NRSB examination is \$135.<sup>30</sup>

In Colorado, there are 137 measurement specialists and 106 mitigation specialists certified through AARST-NRPP,<sup>31</sup> and there are 9 measurement specialists and no mitigation specialists certified through the NRSB.<sup>32</sup>

It is unknown how many uncertified radon specialists are located in Colorado.<sup>33</sup> However, it is estimated that there may be about 25 to 30 individuals without certification operating in the state.

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<sup>28</sup> National Radon Safety Board. *National Radon Safety Board Fee List*. Retrieved December 28, 2018, from <http://www.nrsb.org/wp-content/uploads/2018/10/ApplicationFees-fillin.pdf>

<sup>29</sup> National Radon Safety Board. *Renew Your Certification*. Retrieved December 28, 2018, from <http://www.nrsb.org/for-professionals/renew-your-certification/>

<sup>30</sup> National Radon Safety Board. *Examination Information and Ordering*. Retrieved December 28, 2018, from <http://www.nrsb.org/exams/exam-information/>

<sup>31</sup> *Sunrise Review Application*, Rocky Mountain Association of Radon Scientists and Technologists (2018), p. 3.

<sup>32</sup> National Radon Safety Board. *Find a Professional*. Retrieved December 28, 2018, from <http://www.nrsb.org/find-a-pro/#searchdiv>

<sup>33</sup> *Sunrise Review Application*, Rocky Mountain Association of Radon Scientists and Technologists (2018), p. 3.

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## Proposal for Regulation

The Rocky Mountain American Association of Radon Scientists and Technologists (Applicant) submitted a sunrise application to the Colorado Office of Policy, Research and Regulatory Reform (COPRRR) in the Department of Regulatory Agencies for review consistent with the provisions of section 24-34-104.1, Colorado Revised Statutes.

The application identifies licensure as the appropriate level of regulation necessary to protect the public. The Applicant proposes that only those who hold certification through the American Association of Radon Scientists and Technologists, National Radon Proficiency Program or the National Radon Safety Board qualify for a license.

According to the Applicant, licensure would protect the health and safety of consumers since the improper placement of a measurement device and incorrect mitigation installation can give consumers a false sense of security. Improper testing could lead to incorrect radon measurement results, and incorrect mitigation can fail to decrease radon levels or even increase levels by drawing radon back into the home.

The Applicant states that plumbers and builders without radon training are installing mitigation systems in new construction, and it estimates that, nationwide, approximately 50 percent of these installations are insufficient because of improper installation. The Applicant suggests that licensure will help to eliminate these problems.

According to the Applicant, requiring licensees to maintain certification would also keep radon specialists informed of the current standards and newest technology since licensees would be required to participate in continuing education.

As required by statute, the Applicant submitted an application for mandatory continuing education.

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## Summary of Current Regulation

### Federal Laws and Regulations

In 1988, the U.S. Congress established the Federal Indoor Radon Abatement Act. The purpose of the law was to reduce the levels of radon so that the air indoors is as free from radon as the air outside.<sup>34</sup> Among other things, it created a federal grant program to assist states in establishing state radon assessment and mitigation programs,<sup>35</sup> and additional funds were set aside for the U.S. Environmental Protection Agency (EPA) to provide technical assistance to states.<sup>36</sup>

The Indoor Radon Abatement Act created a program to examine radon specialists in order to ensure proficiency. This program is no longer in operation;<sup>37</sup> however, the EPA does require states that receive indoor radon grants to maintain and publish a public list of qualified radon specialists. The list may include those with credentials through a state regulator, such as a licensing program, or through one of two private, national radon proficiency organizations:<sup>38</sup>

- The American Association of Radon Scientists and Technologists, National Radon Proficiency Program (AARST-NRPP), and
- The National Radon Safety Board (NRSB).

Additionally, the U.S. Department of Housing and Urban Development has established requirements related to multifamily housing development and public housing.

### The Colorado Regulatory Environment

State law ranks indoor radon to be one of the most serious environmental health problems, and it directs the Colorado Department of Public Health and Environment (CDPHE) to establish a radon education and awareness program, which entails:<sup>39</sup>

- Providing information and education about radon to the public,
- Collaborating with radon contractors to answer questions about radon mitigation systems, and
- Collaborating with local governments to provide information on best practices related to radon mitigation strategies.

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<sup>34</sup> 15 U.S. Code § 2661

<sup>35</sup> 15 U.S. Code § 2666

<sup>36</sup> 15 U.S. Code § 2665

<sup>37</sup> Kansas State University: National Radon Program Services. *Radon Mitigation*. Retrieved December 21, 2018, from <https://sosradon.org/mitigation>

<sup>38</sup> U.S. Environmental Protection Agency. *Find a Radon Test Kit or Measurement and Mitigation Professional*. Retrieved December 21, 2018, from <https://www.epa.gov/radon/find-radon-test-kit-or-measurement-and-mitigation-professional>

<sup>39</sup> §§ 25-11-114(1)(c) and (2), C.R.S.

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CDPHE is also required to provide funds to help low-income individuals install mitigation systems in their homes.<sup>40</sup> By rule, CDPHE requires schools and child care facilities to test for radon and to keep the test results on file.<sup>41</sup>

Finally, it is a violation of the Consumer Protection Act and a deceptive trade practice to knowingly make a false representation as to the results of a radon test or the need for radon mitigation.<sup>42</sup>

The Colorado Real Estate Commission requires a seller in a real estate transaction to disclose the existence of radon, if it is known.<sup>43</sup>

Some local jurisdictions in Colorado, such as Parker and Erie, require a permit to install a radon mitigation system and conduct an inspection upon installation.

## Regulation in Other States

At least 14 other states require radon measurement and mitigation specialists to be licensed, certified or registered by the state.<sup>44</sup> Four additional states and the District of Columbia require radon measurement and mitigation specialists to obtain private, professional certification through AARST-NRPP or the NRSB.<sup>45</sup>

As part of this sunrise review, staff in the Colorado Office of Policy, Research and Regulatory Reform (COPRRR) surveyed regulatory programs in 14 other states. Twelve states responded to the survey. However, Kansas provided licensing data but was unable to provide a breakdown of the complaint and disciplinary actions. Kentucky did not have any data to provide since the program is delayed due to an injunction. Maine only provided very rough estimates of licensing activity, so the data were not included in the report. Minnesota provided licensing data but did not have any complaint and disciplinary data to provide since the program has only been active since January 2019. Pennsylvania provided licensing data and disciplinary actions, but did not have any complaints to report. Indiana and Rhode Island failed to respond to the survey.

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<sup>40</sup> § 25-11-114(3), C.R.S.

<sup>41</sup> 6 CCR 1010-6 § 6.8.1(E)(2), Rules and Regulations Governing Schools in the State of Colorado and 6 CCR 1010-7 § 7.14.2(H), Rules and Regulations Governing the Health and Sanitation of Child Care Facilities in the State of Colorado.

<sup>42</sup> § 6-1-105(1)(II), C.R.S.

<sup>43</sup> Colorado Real Estate Commission, *Seller's Property Disclosure Form (Residential)* p. 6, and *Seller's Property Disclosure Form (Commercial)* p. 6.

<sup>44</sup> States that regulate radon specialists are: Florida, Illinois, Indiana, Iowa, Kansas, Kentucky, Maine, Minnesota, Nebraska, New Jersey, Ohio, Pennsylvania, Rhode Island and West Virginia.

<sup>45</sup> States that require private, professional certification are: California, Connecticut, New Hampshire and Virginia.



Table 1 provides the number of licensed, certified or registered radon specialists and radon laboratories in each state that responded to the survey.

**Table 1  
Licensing Activity**

State Name	Measurement Providers	Mitigation Providers	Radon Companies	Radon Laboratories
Florida	414	515	64	n/a*
Illinois	381	142	n/a	19
Iowa	226	126	n/a	13
Kansas	252	91	71	13
Minnesota	169	87	22	13
Nebraska	270	108	182	12
New Jersey	871	48	30	8
Ohio	578	199	116	13
Pennsylvania	490	136	141	17
West Virginia	62	19	12	13

\*Florida licenses radon laboratories as companies.

Most of these states regulate both individuals and companies, and all of these states also regulate radon laboratories. Some states have separate license types for measurement and mitigation technicians and specialists. Those license types have been combined into Measurement Providers and Mitigation Providers in the above table in order to simplify the data.

Table 2 illustrates the number of complaints filed against radon specialists in each state that provided data for calendar years 2017 and 2018.

**Table 2  
Complaint Activity  
Calendar Years 2017 and 2018**

State Name	Failing to Report	Falsifying Tests	Violating Industry Standards	Unlicensed Practice
Florida	7	0	0	4
Illinois	0	0	52	0
Iowa	0	0	4	4
Nebraska	0	0	6	2
New Jersey	0	0	9	0
Ohio	0	2	2	7
West Virginia	0	0	0	1

Florida requires radon specialists to report certain information to the state, such as each mitigation system installed and all radon test results, including pre-mitigation and post-mitigation test results.

Regulation of radon specialists varies from state to state. However, states that responded to COPRRR’s survey reported a total of 73 complaints related to industry standards and two complaints related to falsifying tests. Illinois, which is an outlier, reported 52 complaints related to industry standards.

Since not all states rely on complaints for enforcement purposes, the complaint data may be somewhat misleading. Some states may require companies to submit quality assurance plans and reports. States may also inspect business records and conduct inspections of mitigation systems to ensure they meet state standards, and violations of these requirements may not be considered complaints by the reporting states. Pennsylvania, for example, did not report any complaints, but it reported significant disciplinary activity.

Table 3 shows the disciplinary activity in the states that responded to the survey.

**Table 3  
Disciplinary Activity  
Calendar Years 2017 and 2018**

State Name	Civil Penalties	Suspensions	Revocations	Notices of Violation	Cease and Desist Orders
Florida	0	0	0	7	4
Illinois	0	0	0	0	0
Iowa	0	0	0	0	4
Nebraska	7	0	1	0	0
New Jersey	0	0	0	9	0
Ohio	0	1	2	6	0
Pennsylvania	39	0	0	127	0
West Virginia	0	0	0	2	0

In total, eight states reported the following disciplinary actions: 151 notices of violation, 76 civil penalties, one suspension and three revocations. Ohio revoked two licenses and suspended one, and Nebraska revoked one license. Over a two-year period, Pennsylvania issued 127 notices of violation and 39 civil penalties related to unlicensed activities and failure to calibrate testing devices. Florida, Ohio, New Jersey and West Virginia also issued notices of violation, and Nebraska issued seven civil penalties.

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Illinois and Iowa both required corrective actions, and, according to these states, all radon specialists were compliant with the required corrective actions so no disciplinary actions were necessary.

Cease and desist orders are typically issued to individuals or companies who are providing services without a license. Only Florida and Iowa reported issuing cease and desist orders. As other states reported unlicensed activity, it may be that these states simply brought unlicensed radon specialists into compliance without issuing formal orders.

Overall, the complaint and disciplinary activity was inconsistent from state to state, but the activity demonstrates that overall the problems in the industry stem primarily from failure to meet industry standards. Only two cases were related to fraud.

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## Analysis and Recommendations

### Public Harm

The first sunrise criterion asks:

Whether the unregulated practice of the occupation or profession clearly harms or endangers the health, safety, or welfare of the public, and whether the potential for harm is easily recognizable and not remote or dependent on tenuous argument.

In order to determine whether the regulation of radon measurement and mitigation specialists is necessary, the Colorado Office of Policy, Research and Regulatory Reform (COPRRR) requested that the Rocky Mountain American Association of Radon Scientists and Technologists (Applicant) provide specific examples of harm to the public.

The Applicant submitted 36 cases of harm. COPRRR also obtained cases of harm from other sources. In total, 48 cases of harm were received, including the following types of harm:

- Lung cancer,
- Fraudulent radon measurement,
- False advertising related to radon measurement,
- Improperly installed radon mitigation systems, and
- Fraudulent mitigation systems.

COPRRR reviewed each case of harm, and uncovered numerous cases in which consumers were harmed. A description of the cases with the analysis is outlined in Appendix A. The consumer harm identified by COPRRR included cases in which:

- Homeowners were financially harmed when they installed unnecessary mitigation systems after receiving inaccurate or inflated test results.
- Homeowners were defrauded when radon specialists reported false test results in an attempt to demonstrate that their mitigation systems were working.
- Homeowners were harmed by a radon company that was making false claims regarding free radon testing.
- Homeowners were financially harmed when they paid for mitigation systems, but the mitigation systems did not meet industry standards and were not effectively mitigating the radon in the homes and, in several of these cases, may have actually increased the indoor radon levels in the homes. The

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existence of mitigation systems also provided the homeowners with a false sense of security.

- Homeowners were financially harmed when they paid for mitigation systems, but the mitigation systems caused property damage.
- Homeowners were financially harmed when they paid for mitigation systems that were fraudulent and, consequently, did not work at all. The existence of the mitigation systems also provided the homeowners with a false sense of security.

The Colorado Department of Public Health and Environment (CDPHE) has a radon program in which it offers grants and information to the public related to indoor radon. While CDPHE does hear complaints from consumers regarding radon measurement and mitigation, it does not have any enforcement authority and was unable to provide COPRRR with any complaint data.

COPRRR staff also contacted the Colorado Consumer Protection Section of the Attorney General's Office, but, despite having a law in the Consumer Protection Act specifically related to radon measurement, it had not received any complaints or engaged in any litigation against radon specialists.

Finally, in an attempt to identify harm in other states, COPRRR staff surveyed 14 states that regulate radon specialists. Overall, the complaint and disciplinary activity was inconsistent from state to state. However, seven states reported 73 complaints for violating industry standards and two complaints related to falsifying tests, and eight states reported taking disciplinary actions, including 151 notices of violation, 76 civil penalties, one suspension and three revocations.

The regulatory activity in other states demonstrates that the problems in the industry primarily stem from failure to meet industry standards. This is consistent with the harm reported by the Applicant and various other sources.

Overall, COPRRR staff utilized a variety of sources in an attempt to identify instances in which unregulated radon specialists were harming consumers. A comprehensive review of the information revealed many cases in which consumers were harmed by radon measurement and mitigation specialists who provided substandard services, and in a few cases, fraudulent services.

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## Need for Regulation

The second sunrise criterion asks:

Whether the public needs and can reasonably be expected to benefit from an assurance of initial and continuing professional or occupational competence.

COPRRR uncovered over 30 cases of harm related to the substandard measurement of radon and installation of radon mitigation systems.

When consumers pay for radon measurement or mitigation and it is not done according to industry standards, consumers may be financially harmed. They may install a mitigation system that is unnecessary if the radon test was done incorrectly, or they may install a mitigation system that does not work well or that does not work at all.

There is substantial evidence that mitigation systems are being installed in Colorado by individuals who either do not know the industry standards or do not care to apply them.

Few homeowners have sufficient knowledge about radon measurement and mitigation to know whether the providers they hire are qualified and whether the services they provide are legitimate.

Radon is a colorless and odorless gas, so without conducting a test after a mitigation system has been installed, a homeowner would have no way of knowing whether a mitigation system is working as intended. In at least two of the cases in which fraudulent mitigation systems were installed, the homeowners did not discover that they were not working for many years (see Case 33 and Case 35 in Appendix A).

If a radon specialist does not verify that the mitigation system is working through a valid post-mitigation test, the consumer cannot know whether the radon levels in the home are sufficiently low.

The public would benefit from a regulatory program that assures radon specialists have some basic knowledge of indoor radon and the standards and protocols necessary to effectively measure and reduce the presence of indoor radon.

Prior to introducing a bill requiring mandatory continuing education (MCE), section 24-34-901, Colorado Revised Statutes (C.R.S.), requires information concerning the need for the requirement to be submitted to the Executive Director of the Department of Regulatory Agencies (Executive Director and DORA, respectively).

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Upon receiving an MCE application, the Executive Director must:

- Conduct an analysis and evaluation of any proposal to impose mandatory continuing education on a given profession or occupation, and
- Present a written report to the General Assembly that addresses whether the proposed continuing education requirement would likely protect the public.

COPRRR, located within the Office of the Executive Director of DORA, is responsible for fulfilling this statutory mandate. During the sunrise review, COPRRR received an application related to MCE for radon specialists, as required, and conducted an evaluation of the proposal to impose continuing education requirements on radon specialists.

The information provided in the MCE application provides insufficient evidence that continuing education is necessary for public protection.

## Alternatives to Regulation

The third sunrise criterion asks:

Whether the public can be adequately protected by other means in a more cost-effective manner.

Private certification is available and could serve as an alternative to regulation by the state. The radon industry has two certifying bodies, the American Association of Radon Scientists and Technologists, National Radon Proficiency Program (AARST-NRPP) and the National Radon Safety Board (NRSB). Both entities have the authority to revoke or suspend certification of anyone who has violated industry standards. This is similar to the enforcement authority that a state licensing office may provide.

CDPHE publishes a list of certified radon specialists, and it provides guidance to consumers who have questions and complaints related to radon measurement and mitigation. Despite providing this service to the public, problems with improper or fraudulent radon measurement and mitigation specialists persist. Further, CDPHE does not have any enforcement authority.

Neither AARST-NRPP nor the NRSB have the ability to regulate uncertified radon specialists, and they cannot prevent anyone without certification from providing radon measurement or mitigation services. While radon specialists who lose their certification may find themselves at a disadvantage from their competitors since they cannot legitimately advertise themselves as certified radon specialists, they may still offer and provide radon services to the public. Also, when individuals have a history of violating the standards, the certifying bodies may not have the resources to decertify them.

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It is questionable whether private, professional certification is sufficient to protect consumers. Considering the potential for harm, the public may be better served by a state regulatory program for radon specialists.

## Collateral Consequences

The fourth sunrise criterion asks:

Whether the imposition of any disqualifications on applicants for licensure, certification, relicensure, or recertification based on criminal history serves public safety or commercial or consumer protection interests.

The Applicant has proposed the following disqualifications based on criminal history:

- A felony conviction within the previous seven years,
- A serious misdemeanor conviction within the previous 10 years, and
- A conviction related to domestic violence.

COPRRR uncovered several cases related to fraud, both in radon measurement and radon mitigation cases.<sup>46</sup> COPRRR also uncovered one case related to false advertising<sup>47</sup> and, in another case, a consumer's life was threatened.<sup>48</sup>

Electricians and plumbers may be disqualified for a license if they are convicted of a felony. Radon specialists, like electricians and plumbers, enter into people's homes and may be alone with vulnerable individuals.

Considering this, if the state chooses to regulate radon specialists, disqualifications related to criminal history may be appropriate.

## Conclusion

The sunrise application states that licensure is necessary because radon is the second leading cause of lung cancer, causing approximately 21,000 deaths a year in the United States. In Colorado, high levels of radon are found in all counties, and about 500 deaths are attributed to radon-induced lung cancer each year. Data collected by the Colorado Department of Public Health and Environment indicate that approximately 50 percent of homes in Colorado have levels of radon that are above the level set by the U.S. Environmental Protection Agency (EPA) at which homeowners should take action to reduce the levels of radon in their homes.

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<sup>46</sup> See Case 5, Case 6, Cases 33-36 and Case 48 in Appendix A.

<sup>47</sup> See Case 7 in Appendix A.

<sup>48</sup> See Case 6 in Appendix A.



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The EPA, the Surgeon General and the state health department strongly recommend that all homebuyers, sellers, homeowners, schools and day cares have their homes or buildings tested for the presence of indoor radon, according to the Applicant.

The Applicant is proposing that the state require radon measurement and mitigation specialists to obtain a license in order to practice. Licensure is the most stringent form of regulation, requiring anyone who wishes to practice and use the corresponding title to meet specific education and examination requirements.

Without licensure, the Applicant asserts that people are at risk of inaccurate testing and substandard mitigation system installation, which increases the risk of developing lung cancer. With licensure, all radon specialists would be required to follow national standards.

Since the qualifications required for entry are more vocational in nature, other forms of regulation, such as state certification, are less stringent and may be more appropriate. Regulation varies from state to state. Some states have established registration programs and others have certification or licensure programs. A few states simply require private, professional certification.

During the sunrise review, COPRRR found many cases of consumers being harmed by substandard installation of mitigation systems. Most of the cases presented in this report relate to consumer harm in Colorado. Consumers may conduct their own tests to determine if mitigation systems are working. However, as the cases of harm demonstrate, consumers often have a false sense of security when mitigation systems are installed, and they may not discover for several years that the systems are not working. This often happens when they attempt to sell their homes and find that their radon levels are especially high.

In fact, COPRRR uncovered several cases in which radon tests were falsified or fraudulent mitigation systems were installed. While COPRRR staff is not qualified to opine on the science underlying radon mitigation, there does seem to be a correlation between indoor radon and lung cancer. Considering this, falsifying radon tests or installing fake mitigation systems seems especially callous.

The majority of the cases of harm, however, relate to substandard practice.

The purpose of a mitigation system is to create a pathway for the gas to safely move through and out of the home. In order to do this, a radon service provider must understand the basic science and protocols necessary to build a mitigation system appropriate to the building being mitigated. Without this basic knowledge, many things can go wrong.

While two national certifying organizations exist that can assure minimum competency, they cannot prevent an individual who is not certified from providing radon services.

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The public would be better protected if minimum qualifications were required to ensure that all radon specialists have the skills and knowledge to effectively measure and mitigate indoor radon. However, at this time, there is insufficient evidence that mandatory continuing education is necessary for public protection.

The public would also likely benefit from a program that could investigate consumer complaints, bring radon specialists who fail to meet state standards into compliance and remove from the marketplace those who are harming consumers.

As there were several cases related to fraud, it would be reasonable to expect the state to examine applicants' criminal history, especially since it is relatively easy and inexpensive to enter into the trade. This would help to eliminate unscrupulous individuals who enter into the business simply to make money quickly and move on to other fraudulent schemes.

Creating such a regulatory program would provide a level of consumer protection appropriate to the industry. Only those who are deemed competent would be able to practice, and the public would have confidence that those who hold a state credential understand the fundamentals of measuring and mitigating indoor radon. Moreover, when consumers are harmed, the state would have the ability to take action.

**Recommendation - Regulate radon measurement and mitigation specialists.**

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## Appendix A - Cases of Harm

The following are the individual cases of harm submitted to the Colorado Office of Policy, Research and Regulatory Reform (COPRRR) by the Rocky Mountain American Association of Radon Scientists and Technologists (Applicant); the Better Business Bureau (BBB) serving Greater Denver and Central Colorado, the BBB serving Northern Colorado and Wyoming and the BBB serving Southern Colorado; and the Minnesota Department of Health. COPRRR's analysis follows the descriptions of the cases.

The Applicant submitted three cases involving lung cancer. Since these cases are similar, the analysis follows the three case summaries.

### **Case 1 - Lung Cancer**

A Boulder woman was diagnosed with lung cancer in 2013 and later found that the level of radon in her home was over 16 picocuries per liter (pCi/L) of air, which is four times the U.S. Environmental Protection Agency (EPA) action level.<sup>49</sup> She worked in her basement for 10 years. While she had never smoked, the type of cancer she had, small-cell lung cancer, is commonly referred to as smoker's cancer.

### **Case 2 - Lung Cancer**

A self-employed man from the Denver area worked out of his basement for 15 years and died of lung cancer. Later, the man's wife tested the basement after learning about radon from a neighbor and found that the basement had high levels of radon. Her husband never smoked.

### **Case 3 - Lung Cancer**

A woman from Wellington passed away after fighting lung cancer. She never smoked, but when her home was tested, the radon level was 16 pCi/L. The doctors said her cancer was likely caused by radon. She did not know that the home had high levels of radon; it was only tested after she was diagnosed with lung cancer.

### **Analysis**

*The homeowners, in all three cases, did not test their homes for radon until after lung cancer was diagnosed. For this reason, these cases do not provide evidence of harm related to the unregulated practice of radon measurement and mitigation. However, they do demonstrate a possible correlation between indoor radon and lung cancer in individuals who have never smoked and the potential danger of living in a home with high levels of indoor radon.*

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<sup>49</sup> The EPA recommends fixing homes that have elevated levels of radon. The current action level set by the EPA is four pCi/L, but the EPA suggests fixing homes that have levels between two and four pCi/L.

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The Applicant also submitted four cases of harm related to radon measurement.

**Case 4 - Financial Harm, Substandard Measurement**

When testing a home for radon during a real estate transaction, a home inspector set the radon monitor 12 inches off the floor, but the standards require measurement devices to be placed a least 20 inches above the floor. The device was also placed within 12 inches of a heat register, another violation of the standards. These violations can cause test results to be inaccurate. After doing some research, the homeowner hired a certified radon measurement specialist to perform an additional test. The radon level reported by the home inspector was above the EPA action level while the radon level reported by the certified measurement specialist was well below the EPA action level.

***Analysis***

*The homeowner in this case was not harmed since he had another test performed. However, this case does provide an example of the potential harm of radon measurement by an unqualified provider. If the homeowner had not sought a second opinion, the homeowner may have unnecessarily installed a radon mitigation system, which costs as much as \$2,500.*

**Case 5 - Financial Harm, Fraudulent Measurement**

A radon mitigation company installed a mitigation system in a home and then tested the radon level to ensure it was below the EPA action level. The mitigation technician left the test kit with the homeowners and told them to mail it to a laboratory after the weekend. The homeowners mailed the test kit on the following Monday. About a week later, the homeowners received a call from the radon company stating they had received the results from the test kit and the radon levels in the home were 1.6 pCi/L. Later that day, the test kit that had been mailed was returned for insufficient postage. The homeowners then called the mitigation company and requested a written copy of the test results. A week later, they received the report by mail stating that the radon level in their home was 1.7 pCi/L. When the homeowners contacted the testing laboratory, they found that the test kit they had mailed had a different identifying number on it than the report they received from the company. However, the radon laboratory confirmed that the name, address and handwriting on both test kits were the same. The homeowners also later discovered that their mitigation system was not installed according to industry standards.

***Analysis***

*The analysis follows the next case.*

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### **Case 6 - Financial Harm, Fraudulent Measurement**

A radon mitigation company installed a mitigation system in a home and then tested the radon level. The company had trouble getting the radon level down below the EPA action level and had to return to the home to fix the mitigation system. The mitigation company then tested the radon level in the home and reported to the homeowners that the level was 1.8 pCi/L. The homeowners later checked the radon level with a test kit they bought themselves and found that the level was 10.3 pCi/L. The homeowners then called the laboratory to get the previous test results for their home. The laboratory reported that the radon level reported by the mitigation company was incorrect and that the correct radon level was 7.4 pCi/L, well above the EPA action level. When one of the homeowners reported the radon specialist who conducted the work on the home to the certifying body, the respondent threatened to kill the complainant. The radon specialist, who had a previous criminal history and was using an alias, was later arrested for harassment related to this incident.

#### ***Analysis***

*In the two cases reported above, it appears that the homeowners were defrauded by radon specialists when they reported false test results in an attempt to demonstrate that their mitigation systems were working.*

### **Case 7 - False Advertising**

A radon company offered free radon tests by flyer, in which the company made false claims about high levels of radon in a Denver neighborhood and promised to report the test results to the EPA and to *The Denver Post*. Neither the EPA nor *The Denver Post* record radon test results of private homes.<sup>50</sup> Moreover, according to state and federal officials, the radon levels in the neighborhood were not “substantially high” as reported in the flyer.

#### ***Analysis***

*In the last case, the radon company was making false claims regarding free radon testing in an apparent attempt to grow its mitigation business. Scare tactics like this may harm consumers by making consumers more likely to purchase services they do not need, and when these claims are later found to be false, it may result in consumers who are less likely to take action when real environmental hazards are a problem.*

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<sup>50</sup> Michael Booth, “Radon flier’s claims questioned,” *The Denver Post*, March 8, 2001.

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The Applicant also submitted 24 cases of harm related to improperly installed mitigation systems. Since many of these cases are very similar, they are grouped together and the analysis follows the descriptions.

**Case 8 - Financial Harm, Improperly Installed System**

A mitigation system that was installed in a home violated industry standards and was likely ineffective at reducing the levels of radon in the home. The pipe had loops in it, which traps the gas in the pipe and increases the levels of radon in the home. Also, the mitigation system did not vent through or above the roof.

**Case 9 - Financial Harm, Improperly Installed System**

A mitigation system was installed in a home. However, the mitigation system did not properly vent through the roof, which is a violation of industry standards because it causes concentrated radon to be dumped into the home.

**Case 10 - Financial Harm, Improperly Installed System**

In another mitigation system, the fan was installed in the basement and the sump pit was not sealed. Sump pits are sealed in mitigation systems since they are a point of entry for radon gas. These are both violations of industry standards because they increase the levels of radon in the home.

**Case 11 - Financial Harm, Improperly Installed System**

A mitigation system that was installed in a home was designed with loops, which are ineffective at mitigating radon because the gas becomes trapped in the loops. Also, the mitigation system vented to an outdoor deck, which increases radon exposure in the home.

**Case 12 - Financial Harm, Improperly Installed System**

The fan in a mitigation system was installed at an angle, which decreases its effectiveness at drawing the radon out of the home. The external vent was also installed near the ground, which can cause concentrated levels of radon to recycle back into the home.

**Case 13 - Financial Harm, Improperly Installed System**

A mitigation system that was installed in a home used a fan and a vent in the basement. This design actually increases the level of radon in the home. It is the industry standard to place a fan either outside or in an attic or garage, where no one is living. If the fan loses efficiency or burns out, then it will no longer pull the radon out of the home, causing radon to leak into the home. Also, a vent should be installed outside of the home, preferably above the eave, so that the radon dissipates into the outside air. Otherwise it is dumping concentrated levels of radon back into the home.

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**Case 14 - Financial Harm, Improperly Installed System**

In another mitigation system, the fan was installed in the basement. If the fan stops working, radon may leak into the home. The sump pit was also sealed with foam, which makes it difficult to access the sump in case it needs to be serviced.

**Case 15 - Financial Harm, Improperly Installed System**

A mitigation system that was installed in a home had a fan that was installed sideways in the ground, which decreases its efficiency and causes it to burn out more quickly. It is also unlikely that this mitigation system was effectively mitigating radon in the home.

**Case 16 - Financial Harm, Improperly Installed System**

A fan was installed sideways in a mitigation system which is a violation of industry standards. Also, the radon service provider used metal ducting pipe that was nailed together and it did not have a coupling to seal the pipe to the fan. This design is ineffective because it leaks radon into the home.

**Case 17 - Financial Harm, Improperly Installed System**

A mitigation system was installed with a vent under the deck, near two windows that open, which is ineffective at mitigating radon because it recycles the gas back into the home, thereby increasing the levels of radon in the home.

**Case 18 - Financial Harm, Improperly Installed System**

A man in Louisville had a mitigation system installed during a real estate transaction. The company, which was recommended by his real estate agent, sent an inexperienced technician to install the mitigation system. The technician did not treat the crawl space, and the mitigation system was placed in the middle of the only finished bedroom on the ground floor. The crawl space had exposed dirt that was emitting radon from the soil. To effectively mitigate radon, the crawl space must be sealed with a vapor barrier and a perforated pipe must be placed under the plastic seal that leads to a pipe outside of the home. The mitigation system did not work properly and had to be replaced by a different company, which cost \$1,245. Since the real estate agent recommended the first company, she paid for the second mitigation system to be installed.

**Case 19 - Financial Harm, Improperly Installed System**

A couple had a mitigation system installed by the seller when they purchased a home. They later discovered that the mitigation system did not effectively reduce the levels of radon in their home. The home had four foundation levels and only one foundation level was treated. In order to effectively mitigate radon, a mitigation system must treat each foundation level. Moreover, the piping was shoved into the dirt, with no plenum to provide a suction point for the slab that it was supposed to be treating. The existing mitigation system had

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to be removed and rebuilt in order to get the radon levels below the EPA action level. The cost of the new mitigation system was over \$1,000.

**Case 20 - Financial Harm, Improperly Installed System**

A fan was installed in a basement with metal ducting that was not airtight. Also, the fan was placed in the basement and it was not connected to a pipe with a coupling. This design leaks concentrated radon into the home.

**Case 21 - Financial Harm, Improperly Installed System**

A mitigation system was installed with a vent that did not extend above the eave and was within 10 feet of the master bedroom window. This can cause concentrated levels of radon to enter through the window. The vent should have been placed further away from the window and above the eave so that the radon may disperse into the outside air.

**Case 22 - Financial Harm, Improperly Installed System**

A mitigation system was installed in a home in a retirement community. The vent was located at knee level which is not the industry standard because it causes concentrated radon to be recycled back into the home.

**Case 23 - Financial Harm, Improperly Installed System**

A mitigation system was installed and it was found that the vent was directing radon toward the mother-in-law suite. In this case, it is unknown if the mother-in-law suite was added before or after the mitigation system was installed, so it is unclear whether this, in and of itself, is evidence of substandard work. However, the vent was not placed high enough on the building to allow the radon to dissipate properly, which is a violation of industry standards.

**Case 24 - Financial Harm, Improperly Installed System**

A mitigation system was installed with a vent near the ground, next to an air conditioning unit, which does not meet industry standards. This causes the radon to be recycled back into the home. The fan was located in the basement, which is also a violation of industry standards.

**Case 25 - Financial Harm, Improperly Installed System**

In another mitigation system, the vent and the pipe were located within 10 feet of the windows, which draws the concentrated radon back into the home. The vent should have been extended above the second level of the home and the pipe should have been placed away from the windows.

**Case 26 - Financial Harm, Improperly Installed System**

A mitigation system was installed with a vent that was placed close to the ground. Since radon is a heavy gas, without proper ventilation it will fall back into the ground and recycle into the home. The pipe should have been extended up the side of the home and vented above the eave so the radon would disperse.



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**Case 27 - Financial Harm, Improperly Installed System**

A mitigation system was installed with pipe that is too thin for outdoor use. In this case, the pipe had deteriorated and radon was leaking and being recycled back into the home.

**Case 28 - Financial Harm, Improperly Installed System**

In another mitigation system, a vent was not placed according to industry standards, and the crawl space was not sealed. The plenum below the slab was also not built according to industry standards. Despite having a mitigation system, high levels of radon persisted in the home.

**Case 29 - Financial Harm, Improperly Installed System**

A radon fan was installed on a timer and the fan was placed inside the home, which is a violation. There was also no vent on the exterior of the house, and the view port on the sump lid did not provide visual access to the sump pit. In order to effectively mitigate radon, a radon fan should be running continuously and the mitigation system should vent outdoors. The radon service provider should have also replaced the lid to the sump pit in order to provide visual access in case there was an issue with water.

**Case 30 - Financial Harm, Improperly Installed System**

A mitigation system was poorly installed in a townhouse. Since it did not have a manometer, which is required according to industry standards, there was no way to check the airflow to see if the mitigation system was working properly. The fan was working, but when the home was tested, it had a radon level of 4.6 pCi/L, which is above the EPA action level.

**Case 31 - Financial Harm, Improperly Installed System**

In this case, a mitigation system was installed with metal ducting, which is ineffective at mitigating radon because it leaks, and the system did not pull from below the slab. Instead, it pulled conditioned air from the basement space, which was vented at the ground level onto the back porch. High levels of radon persisted in the home.

***Analysis***

*The homeowners in all of these cases were likely financially harmed since they paid for mitigation systems to be installed, but the mitigation systems did not meet industry standards and were likely not effectively mitigating the radon in the homes and, in several of these cases, may actually have increased the levels of indoor radon. The existence of mitigation systems in these cases also provided the homeowners with a false sense of security.*

The Applicant also submitted two cases of improperly installed mitigation systems that caused property damage. Since these cases are fairly similar, the analysis follows the details of the two cases.

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### **Case 32 - Property Damage, Improperly Installed System**

A mitigation system was installed improperly in a home, causing water damage to the home. The condensate bypass was not installed above the fan, so condensation was leaking into the fan, which led to the water damage.

### **Case 33 - Property Damage, Improperly Installed Systems**

There were at least 500 homes in a housing development in Parker with incorrectly installed mitigation systems that were installed during construction. The wiring was done incorrectly. The fans were leaking water into the attics. Many joints were not properly sealed, which is a violation of industry standards because this results in radon leaking into the home rather than being drawn out of the home. The sumps were also not properly sealed, which can lead to increased levels of radon in the home. The builder installed fans that were not industry standard for radon mitigation, and these were also not properly sealed. There was also mold growing under the fans in the attics.

#### ***Analysis***

*The homeowners in these cases were financially harmed since they paid for mitigation systems to be installed, but the mitigation systems did not meet industry standards and did not effectively mitigate radon in the homes. Because these systems were improperly installed, they also caused water damage and mold problems to the properties.*

The Applicant submitted three cases of harm related to mitigation systems that were fraudulent. Since these cases are very similar, the analysis follows the details of all four cases.

### **Case 34 - Financial Harm, Fraudulently Installed System**

During a real estate transaction in Littleton, the seller agreed to install a mitigation system. Years later, the homeowner called a different company to replace the fan and discovered the system was a fake. It consisted of a piece of pipe that was stubbed into the ground on the exterior of the home with an attached fan. It did not connect to anything and it did not pull any gas from under the home's foundation. The levels in his home were found to be at 6.2 pCi/L in the basement and 7.6 pCi/L in the upper level, both above the EPA action level. It cost the homeowner \$1,475 to replace the system.

### **Case 35 - Financial Harm, Fraudulently Installed System**

In one case, a radon service provider installed a fake mitigation system in a home, which consisted of a pipe that was placed on the cement floor of a basement and sealed up. This design does nothing to mitigate radon since the pipe is simply attached to the basement floor. Instead, a hole should have been bored through the cement floor and a pit should have been dug out below the cement to create a plenum. Then the pipe should be sealed around the hole. The pipe should be as straight as possible and be attached to a fan that would vent above the eave of the house. This design would create a pressure field

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and a pathway for the radon to go, bringing it up and out of the home and dissipating the radon into the air outside.

**Case 36 - Financial Harm, Fraudulently Installed System**

Homeowners lived in the home for five years under the impression that they had a mitigation system that worked. When they put their home on the market, they discovered their radon level was at 17 pCi/L, which is over four times the EPA action level. After an inspection, it was found that the suction point in the system did not go below the ground or into the drain tile system. This is an example of a fake mitigation system.

***Analysis***

*The homeowners in all of these cases were financially harmed since they paid for mitigation systems that were fraudulent and, consequently, did not work at all. The existence of the systems also provided the homeowners with a false sense of security.*

COPRRR also contacted the Better Business Bureau (BBB) serving Greater Denver and Central Colorado, the BBB serving Northern Colorado and Wyoming and the BBB serving Southern Colorado and uncovered six complaints.

**Case 37 - Financial Harm, Improperly Installed System**

A mitigation system was installed in a home that did not vent above the eave according to industry standards and the system was noisy. When the consumer complained to the company, the company was nonresponsive.

***Analysis***

*The consumer was likely harmed when a mitigation system was installed that violated industry standards. The system should vent above the eave. Otherwise, it may not effectively lower the level of radon in the home. Also, a poorly designed system can result in excessive noise.*

**Case 38 - Financial Harm, Improperly Installed System**

After a mitigation system was installed in a home, the consumer mailed the test kit to the laboratory. However, the test results came back inconclusive. The consumer called the owner, and the radon specialist agreed to drop off another test kit when convenient. The consumer waited a month for a second test kit to arrive and it never did. The house was for sale and, without the test results, the consumer was concerned that the mitigation system might not be working properly. The company denied providing poor service and reported that the test results were inconclusive because the test kit did not arrive at the laboratory within 11 days. The company states the consumer could have ordered another test kit from the laboratory but declined to do so.

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**Analysis**

*The consumer may have been harmed in this case since the company said it would drop off a test kit, but failed to do so in a timely manner. Without post-mitigation test results, the mitigation specialist would have no way of validating whether the mitigation system was working.*

**Case 39 - Financial Harm, Improperly Installed System**

A homeowner in northern Colorado hired a company to service an existing mitigation system. The workers drilled a hole in an already established mitigation pipe and installed a small fan in the attic. It reportedly took them 15 to 20 minutes and they charged \$500. The company failed to provide an invoice detailing the work done. The company claims it addressed the issues within the complaint but the consumer remained dissatisfied.

**Analysis**

*Without seeing the mitigation system and the work done by the company, it is unknown if the work was legitimate and whether the consumer was harmed. However, there is no indication of a radon test being performed before or after the work was completed to see if the mitigation system was working. Without testing the home, there is no way to validate whether the radon levels are safe. If the state regulated radon mitigation specialists, it could investigate a complaint and take action if it found the work to be substandard.*

**Case 40 - Property Damage, Negligent Installation**

After a mitigation system was installed in a Denver home, the homeowners discovered that the sump pump had not been plugged in after the installation was complete, which caused the basement to flood. Sump pits are sealed in mitigation systems since they are a point of entry for radon gas. They may also form part of the system itself. The company admitted to having problems with this in the past, but they did not admit to any wrongdoing in this case and refused to accept liability. The technician took a picture of the completed work showing that the pump was plugged in. The homeowner disputed this since the work was not completed for another half hour. The homeowner had to pay another company to clean up the basement.

**Analysis**

*The homeowner may have been financially harmed if the technician negligently failed to plug in the sump pump after installing a mitigation system, causing the home's basement to flood. If a state regulatory program were created, it could investigate this case and determine whether the company's work was, in fact, substandard.*

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### **Case 41 - Property Damage, Negligent Installation**

A company installed a radon mitigation system in a Littleton home. After the basement flooded, the homeowner found that the sump pump had not been plugged in after the installation was complete. The company would not admit to any wrongdoing in this case and refused to accept liability. The company failed to provide a picture of the completed work showing the sump pump was plugged in. The homeowner's insurance covered \$5,000 and the homeowner paid \$1,000 out of pocket.

#### ***Analysis***

*The homeowner was likely financially harmed since the technician was negligent when installing the mitigation system and failed to plug in the sump pump, causing the home's basement to flood. It should be noted that the company that did the work in Case 40, involving the same problem, was the same company that did the work in this case.*

### **Case 42 - Property Damage, Improperly Installed System**

A company installed a radon mitigation system in a Colorado Springs home. The homeowner alleges that the installation caused electrical problems in their home. At first the company refused to assume liability for the damage. It later, however, sent an electrician to fix the damage to the home since a technician from the company stated that the problem was caused by the installation and promised to fix it.

#### ***Analysis***

*The consumer may have been harmed by a radon system that was improperly installed. If the consumer had not filed a complaint with the BBB, he would have had to pay for the electrical work to be done. However, it is unclear whether the problem was caused by the homeowner or by the individual who installed the system. If the state regulated radon specialists, it could conduct an investigation to determine whether the company violated industry standards, causing damage to the home's electrical system.*

In order to obtain additional cases of harm related to measurement, COPRRR contacted the Minnesota Department of Health, which regulates radon specialists and uncovered the following cases of harm. While these cases all occurred in Minnesota, they provide examples of the potential for harm when radon measurement is not done properly.

### **Case 43 - Financial Harm, Substandard Measurement**

In 2016, a mitigation specialist was contracted to install a radon system in a home in Minnesota. A home inspector had already tested the home with an approved continuous radon monitor and reported a radon level of 6.2 pCi/L. The mitigation specialist then installed a system in the home and the home

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inspector was brought in to conduct a post-mitigation radon test. The post-mitigation result was 4.9 pCi/L, which is above the EPA action level.

The mitigation specialist was skeptical, so he left behind three radon monitors to test the home alongside the home inspector's radon monitor. The home inspector's result was 5.0 pCi/L, but the radon specialist's radon monitors all showed levels below 0.5 pCi/L. The radon specialist then asked for the previous radon test results and a certificate of calibration from the home inspector. The calibration of the device was fine. However, all of the radon test reports showed the same original hourly radon data. This is an indication that the monitor was never properly reset or the memory cleared prior to the next test. The monitor will only report the first 90 hours of hourly data but will continue to average the radon it detects moving forward in perpetuity. Once the memory is cleared, the monitor will erase all the existing data and start again.

The home inspector was unaware of this problem and agreed to pay for the cost of the mitigation system when it was brought to his attention since a radon system may not have been necessary after all.

### ***Analysis***

*This case demonstrates the potential for harm when radon measurement is done by an unqualified individual. While the home inspector covered the cost of the radon system, it is unknown how many other homeowners installed unnecessary mitigation systems after receiving inaccurate test results from the home inspector. If the state regulated radon measurement specialists, it could require some minimum qualifications so that measurement specialists are knowledgeable about testing equipment and protocols. Moreover, a state agency could investigate such a case and require corrective action if appropriate.*

The following cases are all very similar, so they have been grouped together with the analysis following the details of all the cases.

### **Case 44 - Financial Harm, Substandard Measurement**

A home was being tested for radon in Minnesota, and the radon test was placed in a crawl space. This is a violation of industry standards, which require a radon test to be placed in the lowest level of the home that may be lived in.

### **Case 45 - Financial Harm, Substandard Measurement**

In another home in Minnesota, a radon test was placed on a five-gallon bucket. It is the industry standard to place the radon test at least 20 inches above the floor, and a five-gallon bucket is only 13 inches high. This may cause an inaccurate test result.

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### **Case 46 - Financial Harm, Substandard Measurement**

A home inspector in Minnesota placed a radon monitor on top of the sump basket lid and then placed a box over that. The reported radon level was over 18 pCi/L. A sump basket may be a major contributor to radon in the home, so placing a monitor on top of one and covering it with a box is a good way to inflate the test results.

### **Case 47 - Financial Harm, Substandard Measurement**

An unapproved radon device was being used by a home inspector. The device was placed on the floor and only ran for 30 minutes. It is the industry standard to place a device at least 20 inches above the floor and run the test for at least 48 hours. Using unapproved devices or improper placement can lead to incorrect test results and unnecessary repair costs for homeowners.

#### ***Analysis***

*These cases demonstrate harm since the homeowners paid for radon tests that were done improperly, leading to results that were likely inflated. This can result in homeowners unnecessarily installing mitigation systems which can cost as much as \$2,500.*

The following case was reported by *The Denver Post*.

### **Case 48 - New Construction, Fraudulent Installation**

152 residents of West Virginia sued a homebuilder after it was discovered that the homes, which were sold with the representation that mitigation systems were included, were built with mitigation systems that were defective, fake and, in some cases, did not exist at all. In one home, the mitigation system consisted of a vent on the roof with a pipe that led to nowhere. Other systems had similar problems.<sup>51</sup>

#### ***Analysis***

*The homeowners in this case may have been harmed when they purchased homes with the understanding that mitigation systems were already installed, and they were not installed or they did not work as intended. However, the outcome of the case is unknown to COPRRR at this time.*

COPRRR staff contacted the American Association of Radon Scientists and Technologists, National Radon Proficiency Program (AARST-NRPP) for evidence of harm, and it provided several complaints against certified radon measurement and mitigation specialists in Colorado and in other states. COPRRR also spoke to several radon companies, and one of these companies provided cases of harm in Colorado. COPRRR staff reviewed all of these cases and took them into consideration during the analysis of public harm. However, the cases of harm that have been compiled in this

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<sup>51</sup> Margaret Jackson, "MDC sued over radon issue," *The Denver Post*, October 23, 2008.

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report likely provide sufficient evidence of harm to warrant regulation, so the additional cases of harm provided by AARST-NRPP and the radon company have not been incorporated into the report.