

RADIOLOGICAL SAFETY PLAN

FOR

Name of Mitigation Specialist: _____

Signature: _____

Date: _____

Table of Contents

<u>Section</u>	<u>Page</u>
A. Purpose	
B. Radon	
C. Radon Risk	
D. Radiation Safety Practices	
E. Radiation Safety Training	
F. Radon Exposure Tracking	

A. Purpose

This document was created to be utilized as a reference for affiliates to follow and to use when questions or concerns arise regarding radiation safety during radon mitigation work practices. This document will be kept on file by the business and available at all times and will be used by the business for training purposes.

All individuals will receive this document when first becoming affiliated, and thereafter annually and whenever the business revises the plan to change the procedures affiliates must follow. Awareness of the radiological risk factors associated with radon will help to keep the radon exposure of all affiliates as low as reasonably achievable.

B. Radon

Radioactivity is the process whereby an unstable nucleus spontaneously disintegrates or decays by emitting particles or waves in an effort to get rid of excess energy. The energy that is emitted and transmitted through matter is called radiation. A radioactive substance emits radiation.

Radon is a naturally occurring, chemically inert, invisible, and odorless radioactive gas. It travels easily through small crevices between particles of soil and rock. Radon-222 decays in several steps to form radioactive isotopes with short half-lives. These isotopes are commonly referred to as Radon Decay Products (RDPs), also known as radon progeny or radon daughters. Radon has a half-life of 3.8 days. As such, it has enough time to move from the uranium source, where it is produced, into buildings where the concentration of radon and some of its RDPs can build up, be inhaled, and deliver a dose of radiation to the lung tissues.

The RDPs are short lived (all less than 30 minutes), have static electric charges, are chemically reactive, and are solid particles (rather than in the gaseous form). These properties mean that RPDs easily attach themselves to solid objects such as dust, smoke, walls, floors, and clothing. Radon and RDPs release radioactive energy in the form of alpha particles that can damage lung tissue and can initiate the lung cancer process. Radon gas concentration is expressed in picocuries per liter (pCi/L). This is a measure of how much radiation is in a liter of air; a liter is about the size of a quart.

C. Radon Risk

RDPs are measured in Working Levels (WLs). If the WL is known, a good rule of thumb is to multiply the WL by 200 to get the estimated measure in pCi/L.

There is no “safe” level of radon since lung cancer can result from very low exposures to radon; however, the risk decreases as the radon concentration decreases. The more radon that one is exposed to, and the longer the exposure, the greater the risk of developing lung cancer. Radon is the second leading cause of lung cancer in the United States resulting in an estimated 21,000 deaths/year.

The main health concern for workers and affiliates is the risk caused from exposure to radon and RDPs while working in places with potentially high radon levels. The best way to minimize exposure to radon at a work site is to follow the radiation safety practices.

D. Radiation Safety Practices

The radiation safety practices that each affiliate entering a building must follow for radon mitigation work, including:

1. Knowing the pre-mitigation radon test result.
2. Ventilating building areas where mitigation work is being performed.
3. Limiting the time spent in areas with potentially high radon concentrations.
4. Taking work breaks/lunches away from elevated radon areas.
5. Allowing in the building only the number of persons necessary to carry out mitigation work.
6. Not smoking in buildings being mitigated.

E. Radiation Safety Training

Radiation safety training will be provided prior to affiliating with a certified individual or individual with an acknowledgement notice. The training will be based upon the information provided in this radiological safety plan.

Prospective affiliates are required to pass a radiation safety examination. The examination has a pre-determined passing score. If the prospective affiliate does not pass the examination, additional training will be provided to the individual and the examination will be re-administered. The safety training examination results will be kept on file for five years and will be immediately available during a site inspection or other records request.

F. Radon Exposure Tracking

Radon exposure is calculated in Working Level Months (WLM) and may be tracked by requiring each individual to wear a passive long-term detector while working for at least three consecutive months, OR by estimating it using the highest pre-mitigation radon test result obtained by any affiliate and the maximum total time spent by any affiliate in buildings while conducting mitigations for the past year. Certified mitigators should not exceed two Working Level Months (WLM) per year. The following equations are used to determine WLMs:

First convert radon concentration to Working Levels (WL), using the following equation:

$$\frac{^{222}\text{Rn concentration (pCi/L)} \times \text{Equilibrium Ratio (ER)}}{100} = \text{WL}$$

If the ER is unknown, it is assumed to be 100 percent, which means that the ER = 1.0.

Therefore,

$$\text{WL} = \frac{^{222}\text{Rn concentration (pCi/L)}}{100}$$

$$\text{WLM per year} = \frac{\text{WL} \times \text{hours exposed per year}}{170^*}$$

*Assumes one month of work = 170 hours

A new business can estimate radon exposure at six months and one year during the first year of certification.

The business will encourage affiliates to follow this radiological safety plan in order to ensure that their exposure does not exceed two WLMs per year. An affiliate will be notified when their actual exposure or the estimated exposure exceeds two WLM per year and they will be informed that they will not be assigned mitigation work in higher radon level buildings on a continuing basis.

The radiation exposure records will be kept on file for five years and will be immediately available during a site inspection or other records request.