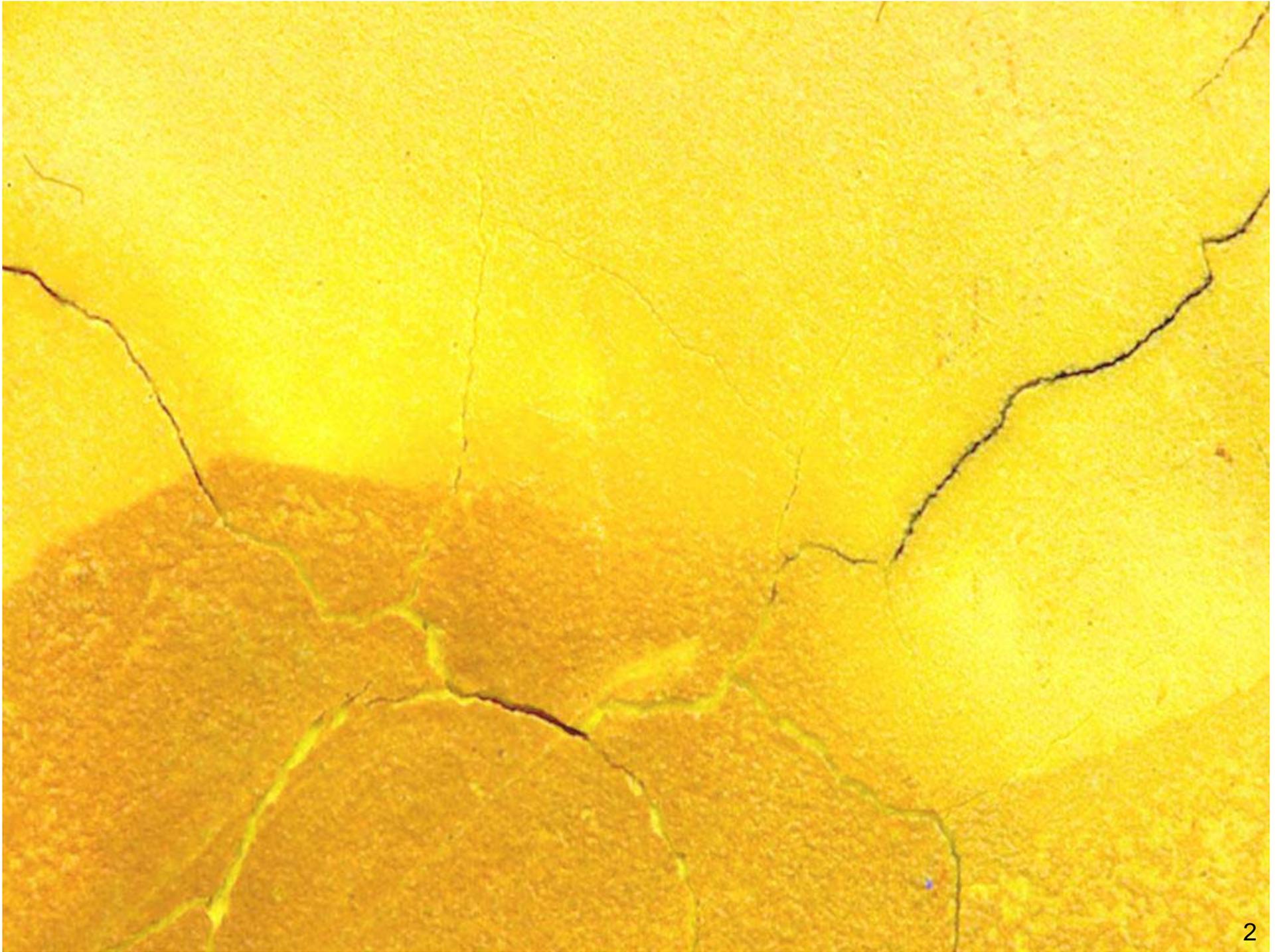


**UNIVERSIDAD DEL TURABO**  
**Environmental Sciences Doctoral Program**

**Lung Cancer Related to Radon Detection in  
Puerto Rico**

**Medical Geology**  
**November 14 -18, 2005**

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# Project Objective

- Determine whether different levels of exposure to radon (Rn) can affect the human population health in three different municipalities, one in the coast and two other in the center of the Puerto Rico.

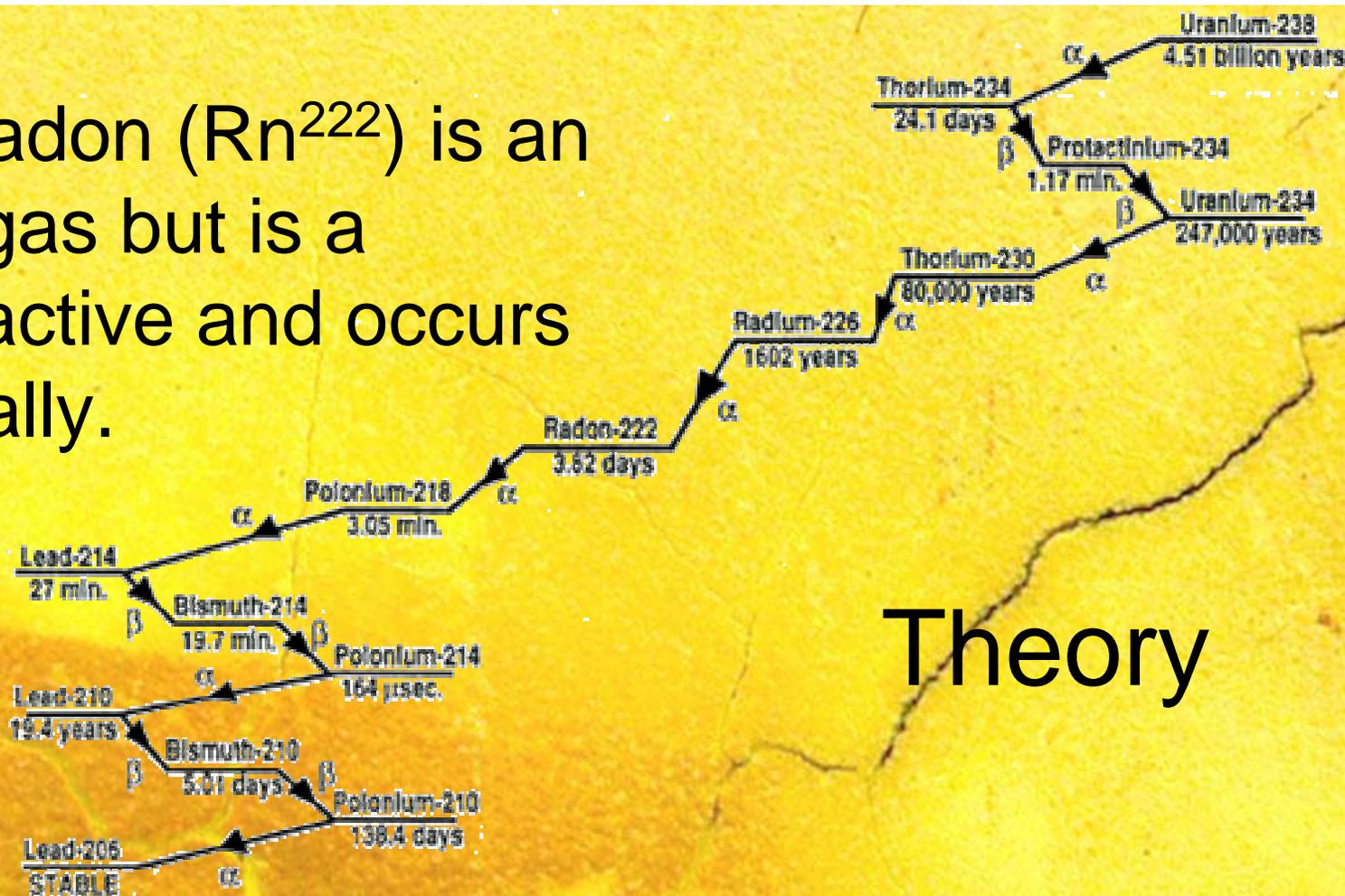
# Hypothesis

- Exposure to radon concentrations equal or greater to 4 pCi/L increase the incidence of lung cancer.

# Project Justification

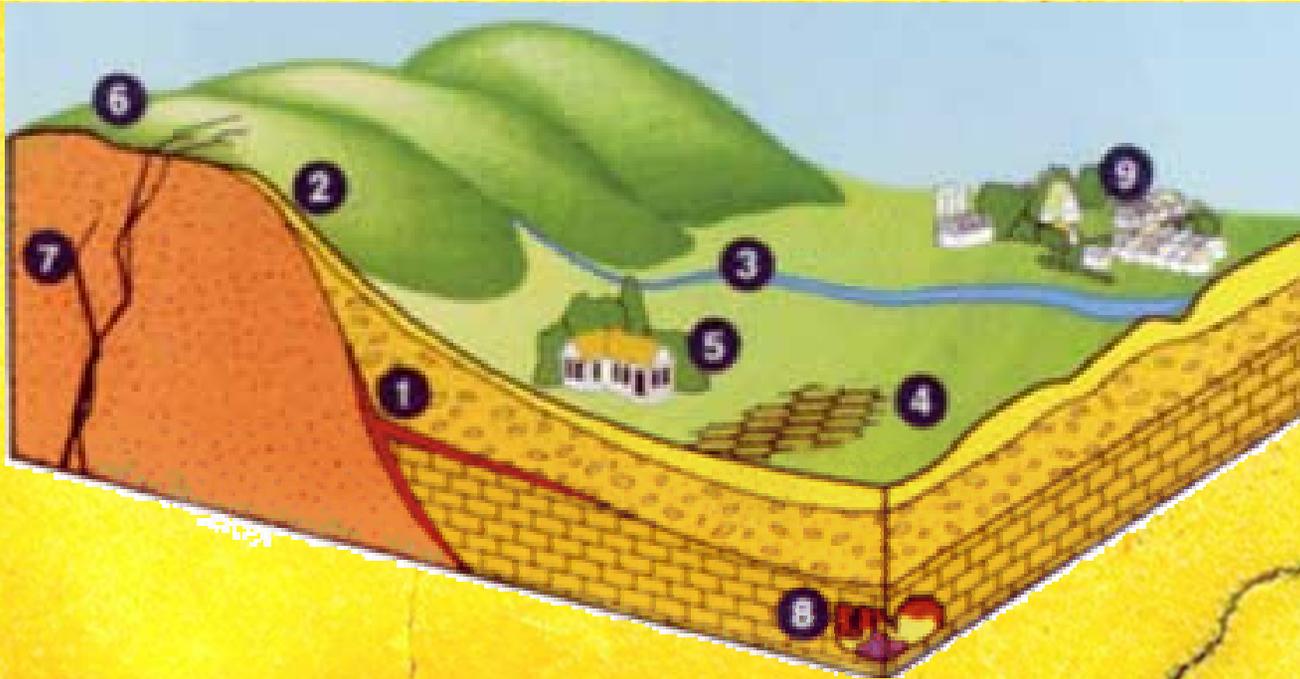
- The main hazard is from inhalation of the element and its decay products which are collected on dust in the air.
- In the United States the radon is the second cause of lung cancer after cigarettes smoking.
- Recently, radon buildup in homes from the surrounding soil and rocks has become a safety issue and some areas around the world test homes for radon gas. It is the heaviest known gas. Radon is present in some spring waters.

- The radon ( $\text{Rn}^{222}$ ) is an inert gas but is a radioactive and occurs naturally.



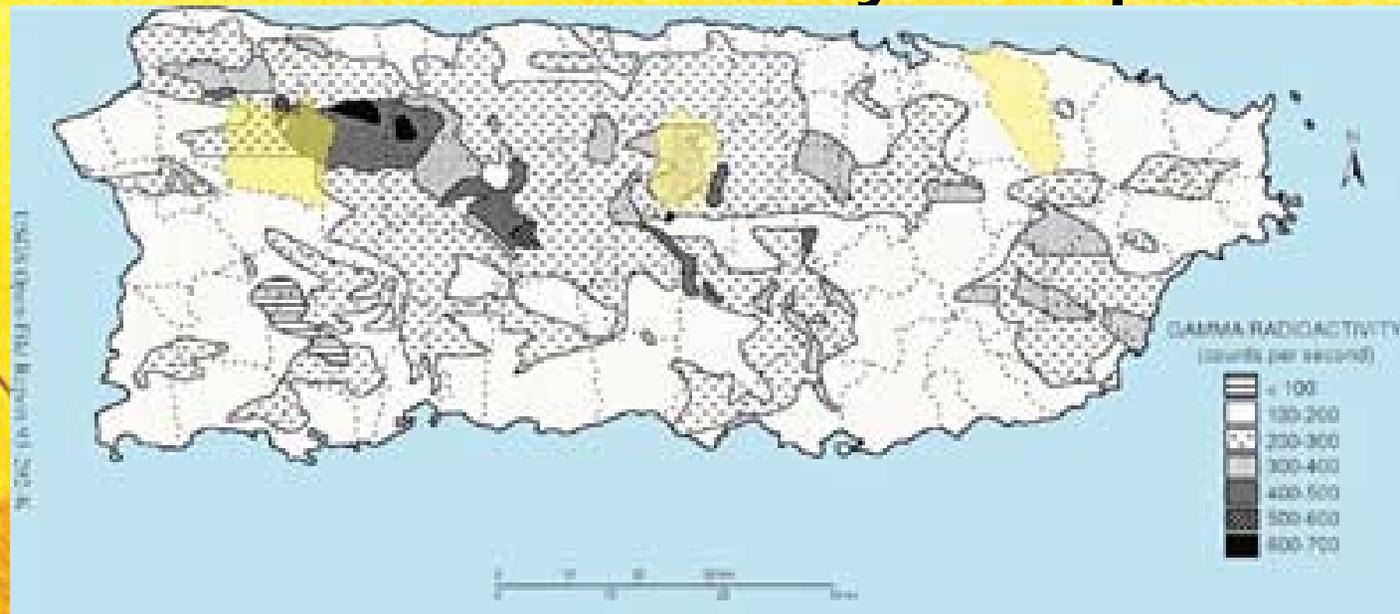
Theory

- Is a direct product of the radioactive weakness of radio ( $\text{Ra}^{226}$ ), and the same time, is a product from a chain of radioactive weakness that start with uranium ( $\text{U}^{238}$ ).



- 1. Uranium-rich rocks occurs in the area.
- 2. Highly permeable soils are present.
- 3. Soils are well-drained or dry most of the year.
- 4. Soils form deep cracks during dry times of the year.
- 5. The site is located on a hill or slope.
- 6. The soils are thin and bedrock is close to the surface.
- 7. Underlying rocks are fractured.
- 8. The underlying rock contains limestone caverns.
- 9. High levels of indoor radon have been reported in the county or neighborhood.

# Radioactivity Map



- A total gamma-ray aeroradioactivity survey covering the island of Puerto Rico was conducted in 1961 as part of the aerial of the Aerial Radiological Measurement Survey program of the U.S. Atomic Energy Commission. Most of the natural-produced gamma radiation comes from a combination of uranium, thorium and potassium.

# Study Locations



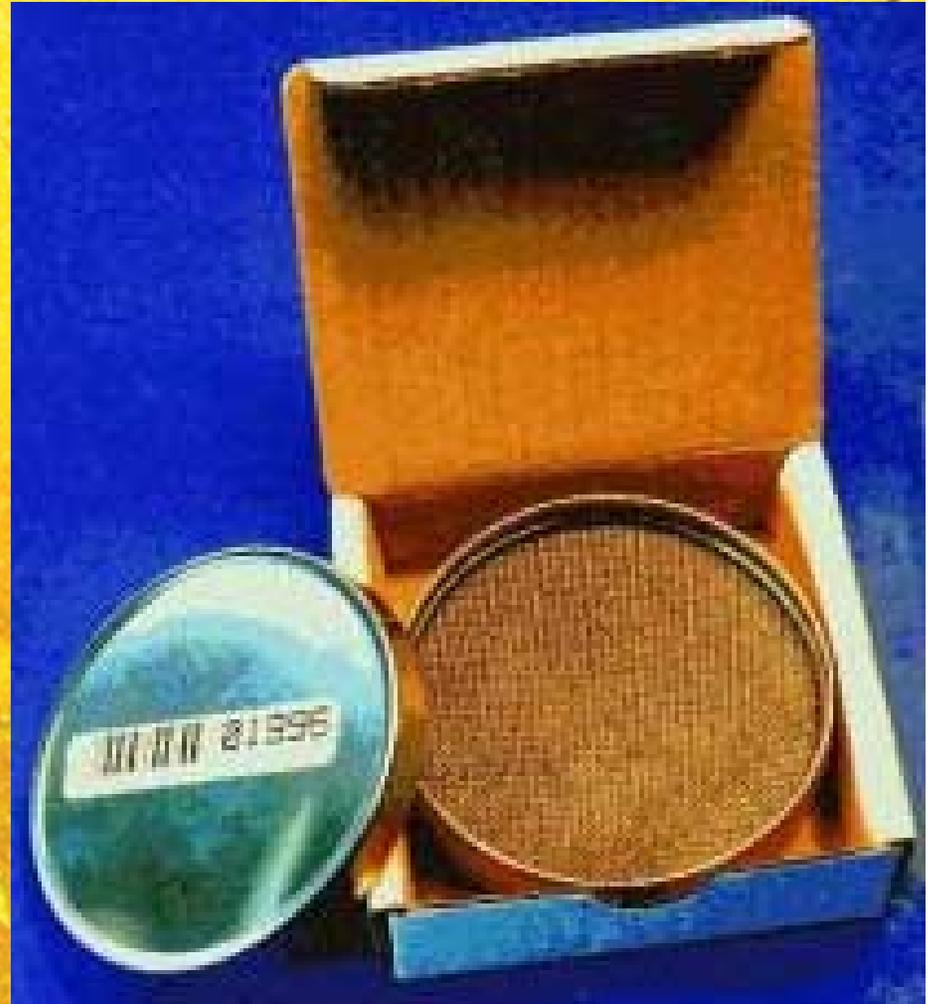
	Maximum pCi/L	%>4 pCi/L	%>20 pCi/L	Aerial radioactivity (counts per second)	Area km <sup>2</sup>	District
San Sebastian	6.9	15	0	100 - 600	184	25
Morovis	38.3	5	5	200 - 400	100	14
Carolina	0.1	0	0	100 - 200	123	13

# Methodology

- Homeowner interview with structured questionnaire.
- Data will be analyzed for biological factors (age, sex, health status, nutritional status) socioeconomic factors (occupation) and environmental factors (history of respiratory disease, smoker).

# Equipment

- Alpha Track detector is a small piece of special plastic or film inside a small container.
- Air being tested diffuses through a filter covering a hole in the container.



# Detection Methodology

- A passive short-term testing with Alpha Track Detection Kit for determination of Rn presence in the homes, leaving it in homes for 50 days. At the end of the test the container is sealed and returned to the laboratory
- Soil and water testing will be perform using alternative methods for detection of Rn.



**Thanks**