STATE OF OREGON
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
BRAD AVY, STATE GEOLOGIST
www.oregongeology.org

Radon Potential in Oregon

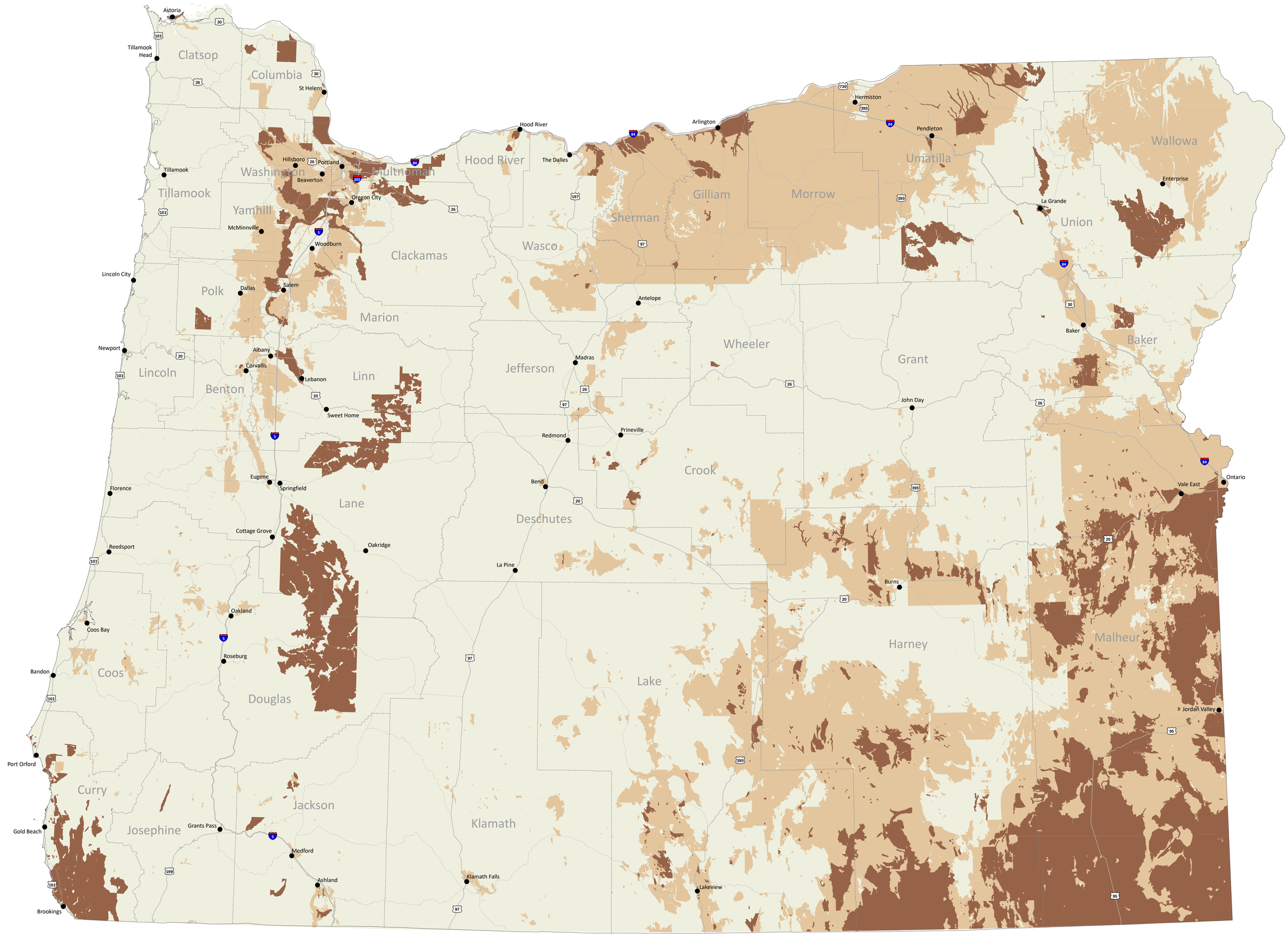
2018

OPEN-FILE REPORT O-18-01
Radon Potential in Oregon

by Jon J. Franczyk, Clark A. Niewendorp, and Jason D. McClaughry

Funding for this project was provided by the Oregon Geographic Information Council (OGIC)
(Interagency Agreement 106099)

SHEET 1



Explanation

Radon is a colorless and odorless gas, a radioactive byproduct of radium. This gas becomes a human health concern when radon makes its way from the ground into structures. If the gas builds up to high concentrations in indoor air, radon and its decay products can get trapped in lungs through inhalation exposure. As the particles continue to decay, they release small bursts of energy (alpha emission) that can damage lung tissue. Long-term exposure to high radon levels may lead to lung cancer in some people. The only way to determine radon levels accurately in buildings is by making measurements of indoor air. **All residences regardless of location should be tested for radon.**

High-risk areas of indoor radon can, however, be identified using different approaches: by measuring radon concentration in a sufficiently large sample of existing buildings, by studying the geological factors influencing indoor radon levels; or by a combination of indoor radon measurements and knowledge about geology and building characteristics. To map radon potential, this study combined indoor radon measurements, geological factors, and knowledge about the geology.

There are four sources of data for the radon potential map, listed in order of importance, starting with most important source data: (1) Uranium host rock data (Mineral Information Layer for Oregon release 2 [MILO 2], Niewendorp and Geitgey, 2010); (2) Indoor radon measurements shared by test kit manufacturers with the Oregon Health Authority (OHA). The Oregon Department of Geology and Mineral Industries (DOGAMI) has a confidentiality understanding with OHA not to share the radon testing data; (3) Aeroradiometric data from the National Uranium Resource Evaluation project (NURE) (Hill and others, 2009); (4) Statewide geologic mapping (Oregon Geology Data Compilation release 6 [OGDC 6]; Smith and Rowe, 2010).

In 2015, the Oregon Geographic Information Council (OGIC) funded DOGAMI (Interagency Agreement 106099) to assess the radon potential statewide. Radon is part of the Natural Occurring Hazardous Materials (NOHM) element of the Hazard Framework Implementation Team.

One of the key products of this project is the geodatabase for the Radon Potential Map in Oregon. This geodatabase can serve as a regional guide for identification of areas needing further indoor radon testing, and, through that, as a basis for proactive decision-making. DOGAMI considers this radon potential study as a starting place for the future and a step toward accurately mapping Oregon's radon potential.

The reader is referred to the companion report to this map, Open-file report O-18-01, for methodology and processing steps used to construct this map.

Source Data and References:
The Oregon Geologic Data Compilation-Release 6 (OGDC-6, Smith and Roe, 2015) and the Mineral Information Layer for Oregon-Release 2 (MILO-2, Niewendorp and Geitgey, 2010), are from the Oregon Department of Geology and Mineral Industries (DOGAMI). Oregon aerial radiometric data from the National Uranium Resource Evaluation (NURE, Hill and others, 2009) are from U.S. Geological Survey (downloaded 8/31/2016). Indoor air radon test measurements are confidential data from the Oregon Health Authority (OHA).

Smith, R.A., and Roe, W.P., compilers, 2015, Oregon Geologic Data Compilation [OGDC], release 6 (statewide): Oregon Department of Geology and Mineral Industries, Digital Data Series, OGDC-6, geodatabase. http://www.oregongeology.org/pubs/dds/p-OGDC-6.htm

Niewendorp, C.A., and Geitgey, R.H., 2010, Mineral Information Layer for Oregon, release 2 (MILO-2): Oregon Department of Geology and Mineral Industries. http://www.oregongeology.org/pubs/dds/p-MILO-2.htm

Hill, P.L., Kucks, R.P., and Ravat, D., 2009, Aeromagnetic and aeroradiometric data for the conterminous United States and Alaska from the National Uranium Resource Evaluation (NURE) Program of the U.S. Department of Energy: U.S. Geological Survey Open-File Report 2009-1129. https://pubs.usgs.gov/of/2009/1129/state/nure_or.htm

Projection:
Oregon Statewide Lambert Conformal Conic, Unit: International Feet, Horizontal Datum: NAD 1983 HARN.

Software:
Esri™ ArcMap® 10.5.1, ArcGIS Pro® 2.0.0

Cartography:
Jon J. Franczyk

Explanation of Symbols

Radon Potential
- High
- Moderate
- Low

- Cities
- Counties

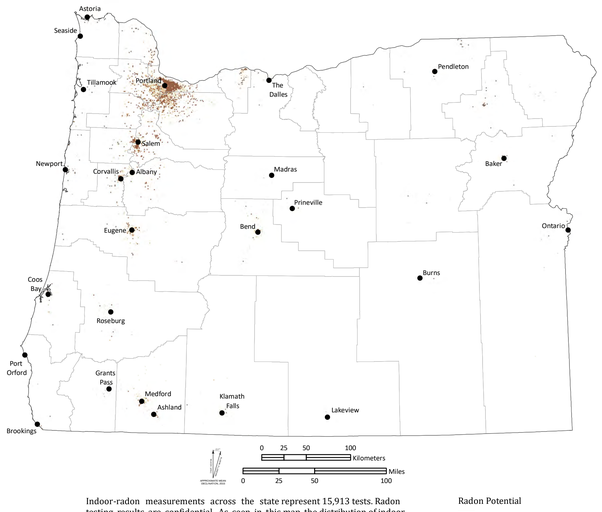
SCALE 1:750,000

0 25 50 100 Miles
0 25 50 100 Kilometers

APPROXIMATE MEAN DECLINATION, 2015

Location Map

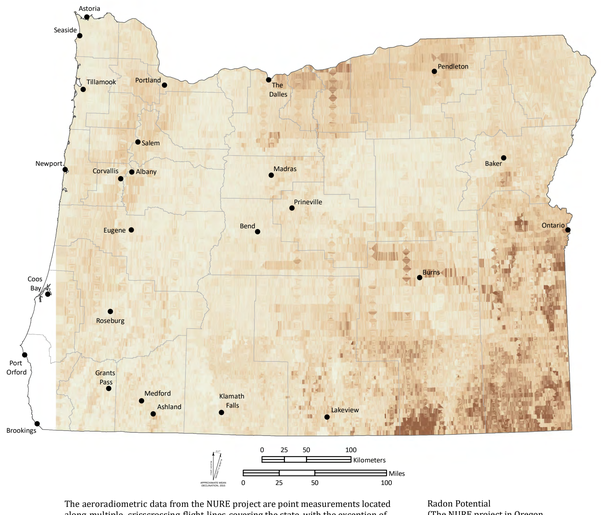
Indoor Radon Testing



Indoor-radon measurements across the state represent 15,913 tests. Radon testing results are confidential. As seen in this map, the distribution of indoor radon data in Oregon corresponds to populated areas next to or within cities and towns. Test results that fell below 2.0 pCi/L (picocuries per liter of air) were assigned a rank of 1, a result from 2.0 to 4.0 pCi/L was assigned a rank of 2, and results greater than 4.0 pCi/L were assigned a rank of 3. Indoor radon measurements are greatly influenced by other factors, including housing ventilation and construction, and testing methodology, and may not reflect overall risk.

Radon Potential
- High
- Moderate
- Low

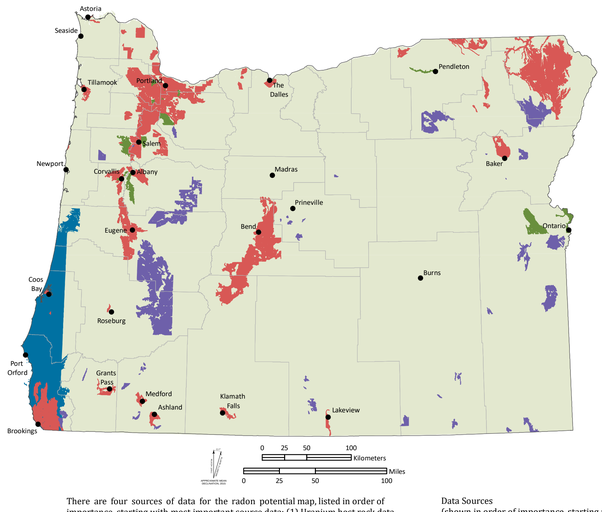
NURE Measurements



The aeroradiometric data from the NURE project are point measurements located along multiple, crisscrossing flight lines covering the state, with the exception of the southwestern coastal region. Spacing of the flight lines varied from ~3 to ~10 km (3 to 6 mi). Each point along the flight line is calculated rather than measured directly using gamma-ray data from bismuth-214, one of the uranium-238 daughter elements. Each airborne measurement samples an area of several thousand square meters in bedrock, soil, and surficial deposits to a depth of about 30 cm. This map shows an interpolated surface generated from the point measurements across the state, which introduces value estimations in areas where there are no measurements.

Radon Potential
(The NURE project in Oregon did not include the SW coastline)
- High
- Low

Data Sources



There are four sources of data for the radon potential map, listed in order of importance, starting with most important source data: (1) Uranium host rock data (Mineral Information Layer for Oregon release 2 [MILO 2]); (2) Indoor radon measurements shared by test kit manufacturers with OHA. (DOGAMI has a confidentiality understanding with OHA not to share the radon testing data); (3) Aeroradiometric data from the National Uranium Resource Evaluation project (NURE); and (4) Statewide geologic mapping (Oregon Geology Data Compilation release 6 [OGDC 6]).

Data Sources
(shown in order of importance, starting at top)
- MILO
- NURE eU > Indoor-radon
- Indoor-radon test kit results
- NURE eU
- OGDC-6 geologic conditions