Areas of Relative Susceptibility to Elevated Radon in Groundwater in North Carolina

Explanation of overlay symbols: Philip J. Bradley, Division of Energy, Mineral and Land Resources - North Carolina Geological Survey Ted Campbell, Division of Water Resources, Water Quality Regional Operations Section Radon susceptibility extrapolated to areas without groundwater data. Extrapolation assumes similar rock types will yield similar Rn concentrations. Outlier points that exceed predicted susceptibilty* **Preliminary - Draft** n = 144 analyses groundwater sample location with Radon 10,000 pci/L or greater U.S. EPA proposed MCL for community water supplies = 300 pCi/L Version 2: 2/3/2015 U.S. EPA proposed alternate MCL = 4,000 pCi/L groundwater sample location with Radon 4,000 - 9999 pci/L groundwater sample location with Radon 300 - 3999 pci/L LLEGHANY ASHE *Outlier data points that exceed predicted Rn susceptibility may be due to: RTHAMPTON SURRY ROCKINGHAM CASWELL PERSON 1) mapping limitations (e.g. unmapped felsic intrusive bodies may "infest" low Rn potential rocks; contacts may not be mapped accurately at the scales being investigated; and the subsurface orientation of high dis-Rn bodies may HERTFORD influence whether or not a well penetrates the unit at depth), and (or) 2) current or historic flowpath geochemistry HÄLIFAX that can move radium from its original source to distant locations (Ra-226 half life = 1622 y). Inconsistencies also WATAUGA **WILKES** may be due to factors that have not been properly understood or measured (construction **FORSYTH** GUILFORD ALAMANCE ORANGE DURHAM FRANKLIN **BERTIE** Dataset used contains 2,072 analyses CALDWELLALEXANDER YANCEY DAVIE EDGECOMBE MARTIN WASHINGTON TYRRELL MADISON IREDELI DAVIDSON WAKE BURKE RANDOLPH WILSON **CHATHAM** CATAWBA BUNCOMBE MEDOWELL ROWAN PITT **SWAIN JOHNSTON** RUTHERFORD LINCOLN **BEAUFORT** GREENE LEE CABARRUS GRAHAM CLEVELAND GASTON HENDERSON STANLYMONTGOMERY HARNETT WAYNE JACKSON TRANSYLVANIA MECKLENBURG LENOIR **CRAVEN PAMLICO** HOKE CUMBERLAND **JONES** UNION **EICHMOND** SAMPSON **DUPLIN** Relative susceptibility to elevated Radon in groundwater and SCOTLAND

extrapolated Radon concentration in groundwater

high susceptibility to elevated radon in groundwater:

Rn > 300 pCi/L in 97 percent of available analyses

moderate susceptibility to elevated radon in groundwater:

Of 248 available analyses in moderate susceptibility area:

Rn > or = 10,000 pCi/L in 5 percent of available analyses

Rn > 4,000 pCi/L in 27 percent of available analyses Rn > 300 pCi/L in 96 percent of available analyses

Rn < 300 pCi/L in 4 percent of available analyses

low to moderate susceptibility to elevated radon in groundwater:

Of 1,369 available analyses in low to moderate susceptibility area:

Rn > or = 10,000 pCi/L in 2 percent of available analyses

Rn > 4,000 pCi/L in 10 percent of available analyses Rn > 300 pCi/L in 83 percent of available analyses

Rn < 300 pCi/L in 17 percent of available analyses

Of 385 available analyses in high susceptibility area:

Rn > or = 10,000 pCi/L in 25 percent of available analyses

Rn > 4,000 pCi/L in 64 percent of available analyses

Rn < 300 pCi/L in 3 percent of available analyses

relatively low susceptibility to elevated radon in groundwater:

BRUNSWICK

BLADEN

COLUMBUS

Of 70 available analyses in low susceptibility area: Rn > or = 10,000 pCi/L in 1 percent** of available analyses

Rn > 4,000 pCi/L in 11 percent of available analyses

ROBESON

Rn > 300 pCi/L in 40 percent of available analyses

Rn < 300 pCi/L in 60 percent of available analyses

**Location is within extreme up-dip Coastal Plain in southern Wake County. Well likely penetrates Coastal Plain



CURRITUCK

DARE

CAMDEN

HYDE

PASQUOTANK

PERQUIMANS

CARTERET

ONSLOW

PENDER

NEW HANOVER

CHOWAN



100 Miles

Radon in Groundwater Data Source: Compiled database from Ted Campbell - DWR Additional vendor data was georeferenced and provided by Kyle Messier, PhD candidate, UNC Chapel Hill Base Map Data Source: Modified from Hibbard et al., 2006