Chrysalis Center

CT Private Well Conference: April 23, 2019

Naturally Occurring Radioactive Contaminants in Groundwater

CT Department of Public Health:

Environmental Health Section

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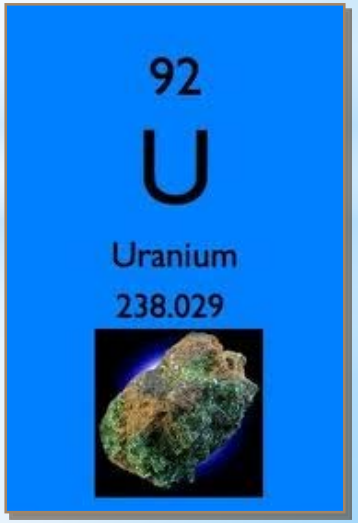
Tiziana Shea, Private Well Program

Uranium Health Effects

- Health concern from uranium exposure is from chemical toxicity NOT radiation (ATSDR)
- Kidney is the target organ for Uranium exposure
- Uranium is poorly absorbed by the body
- Uranium is not classified as a carcinogen (EPA, ATSDR, IARC)



Uranium Exposure

- Food and drinking water are primary sources of Uranium exposure for general public

- Drinking Water Exposure
  - Ingestion is route of concern
  - Uranium NOT well absorbed by skin
  - Uranium NOT inhalation concern for showering

Uranium Medical Tests

- Uranium can be measured in blood, urine, hair and body tissues… BUT
  - Specialized tests
  - Tests do not identify source of uranium exposure
  - Cannot equate uranium level in body with health effect
- If exposure is very high: renal function test… BUT
  - Not specific to uranium exposure

Uranium Exposure Case Study

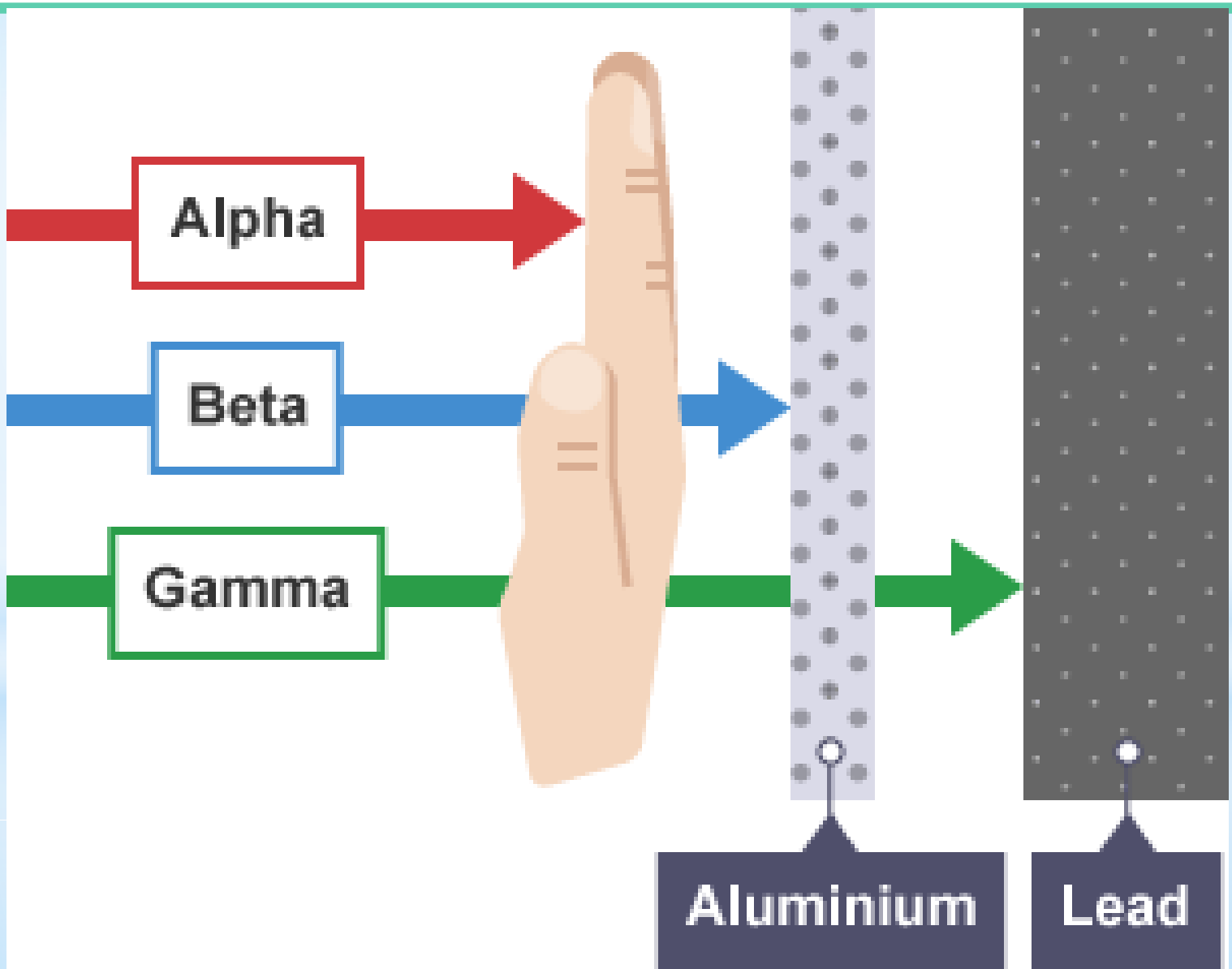
- Family (2 adults, 5 children aged 3 to 12 yrs) in NW Connecticut
- Uranium in well water = 866 ug/L and 1,160 ug/L
- Consumption duration ~ 3 years
- Clinical Assessment
  - Uranium in urine elevated in 6 of 7 family members
  - Measure of kidney damage elevated in 3-year old
  - Kidney function normal 3 months after water consumption stopped

SOURCE: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1940075/

Radium Health Effects

- Naturally-Occurring Radium in water
  - Ra-226 and Ra-228
- Exposure to high levels of Radium linked with
  - Bone cancer
  - Broken teeth, cataracts, anemia

Radiation Types



Radium Exposure

- Food and drinking water are primary sources of Radium exposure for general public

- Drinking Water Exposure
  - Ingestion is route of concern
  - Radium NOT well absorbed by skin
  - Radium NOT inhalation concern for showering

- Can be measured in urine but not predictive of health effects or levels of exposure.

Radon Health Effects

- Radioactive gas
- Known human carcinogen
- When inhaled over a long time, increased risk of lung cancer
- Cigarette smoking with radon exposure greatly increases lung cancer risk (more than additive)

Radon Exposure

- Primary sources of Radon exposure in general public
  - Indoor air
  - Drinking water

- Drinking Water Exposure
  - Inhalation during showering, kitchen water uses are primary concern
  - Ingestion not a significant health concern

Private Well Conference:

Chrysalis Center, Training & Conference Center
April 23, 2019

RADON in Your Air & Water

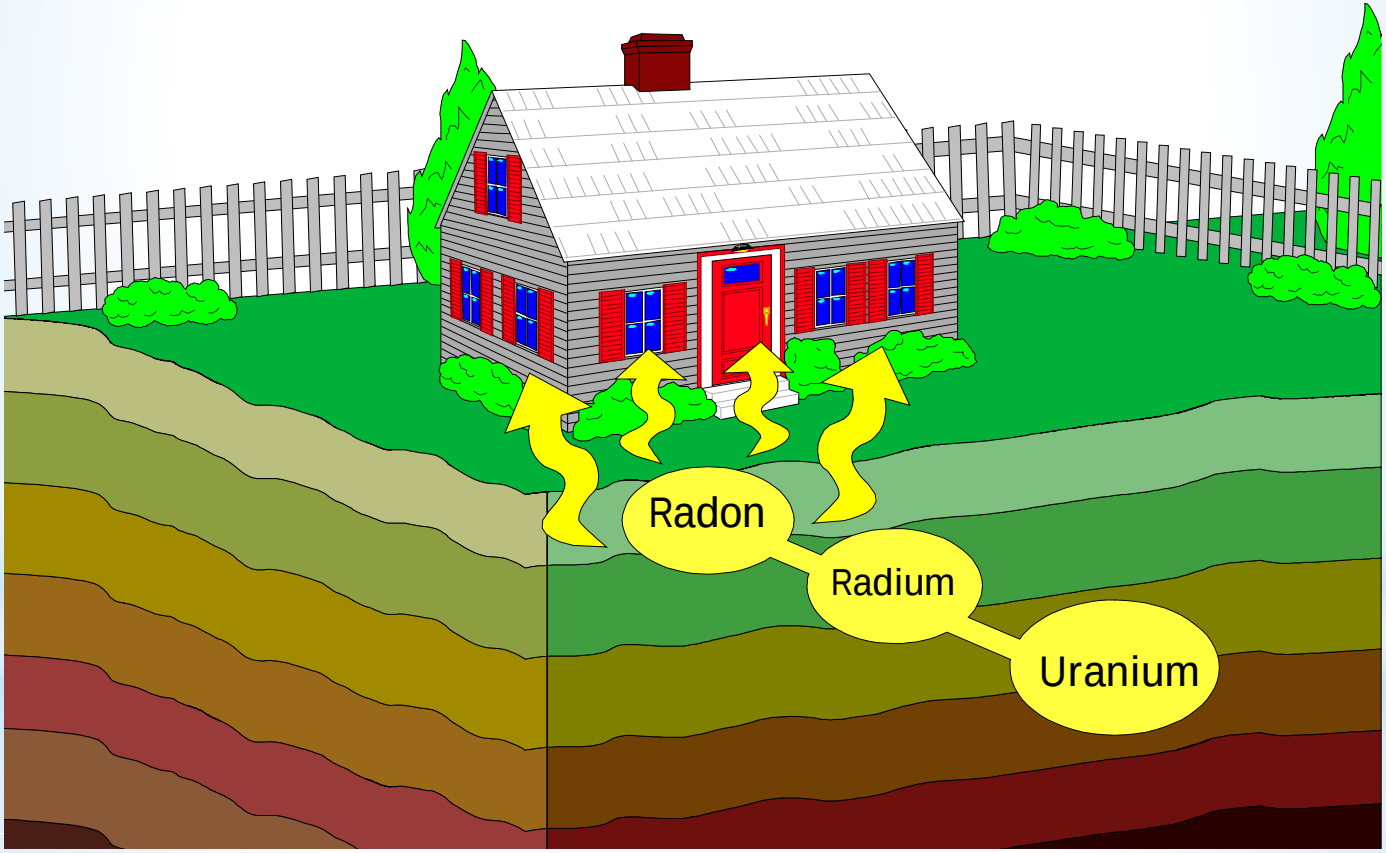
Allison Perry Sullivan
Environmental Health Section
Radon Program

What is radon?

Radon is:

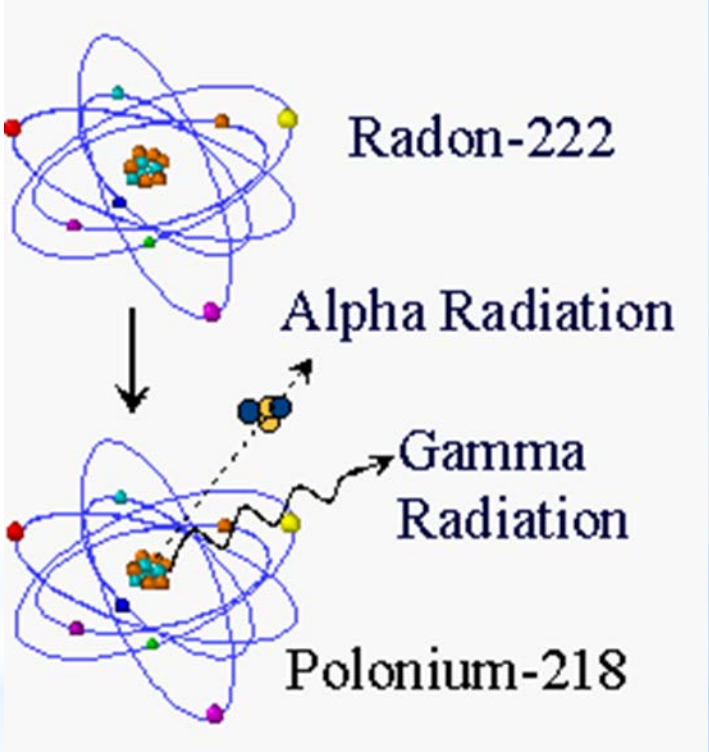
- Naturally-occurring
- A radioactive gas that comes from the natural breakdown of uranium in the ground
- Tasteless, colorless and odorless
- Carcinogen
- Causes no symptoms

Uranium Decay Chart

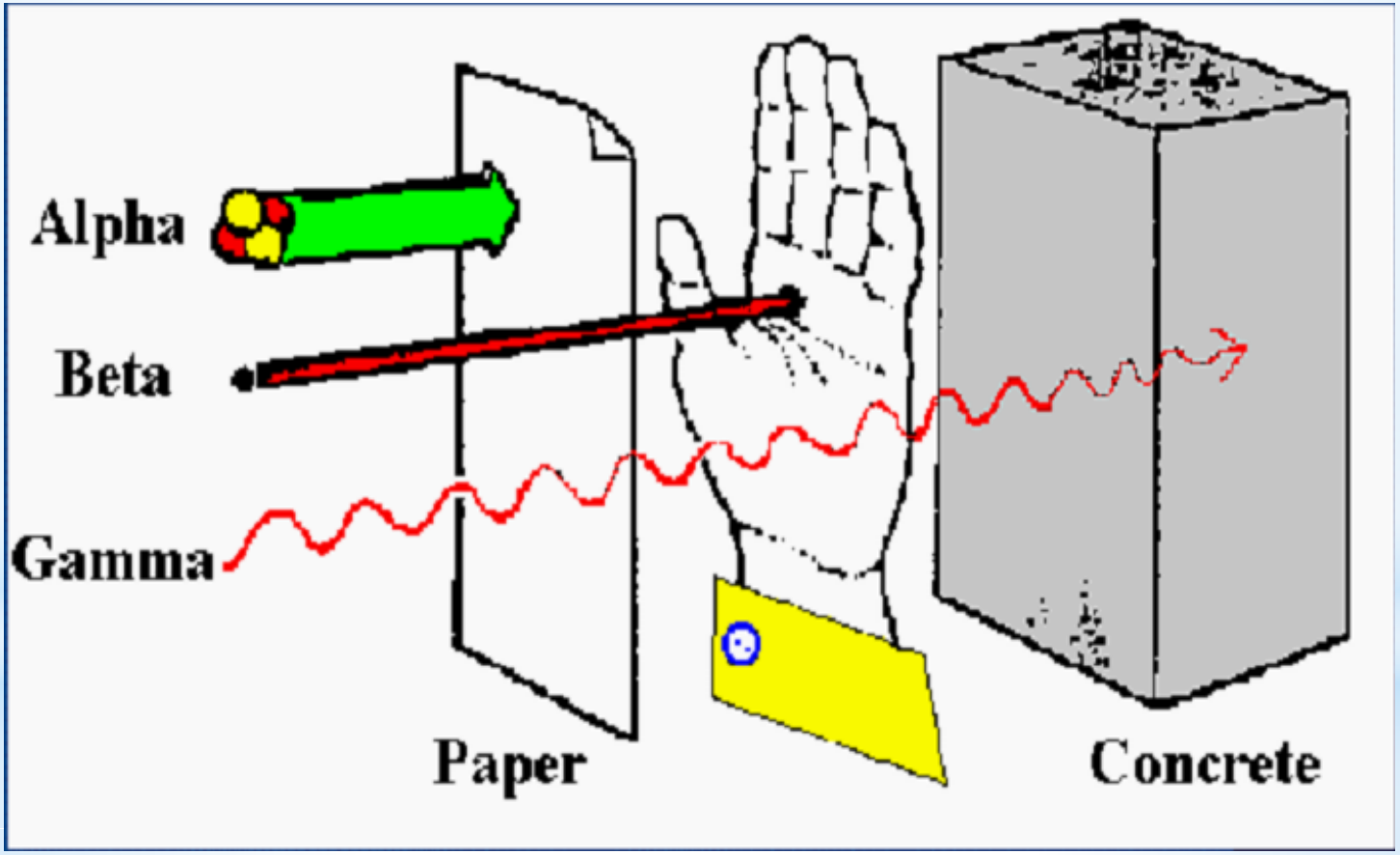


Radon's Decay

- Decay products are inhaled into lungs and remain stuck to sensitive tissue
- As radon breaks down, it emits radiation
- Half-life of 3.8 days (the time it takes for half of the atoms to decay
- Alpha particles strike cells causing damage
  - Cell can die, repair itself, or get misrepaired causing an abnormal cell that can clone & grow

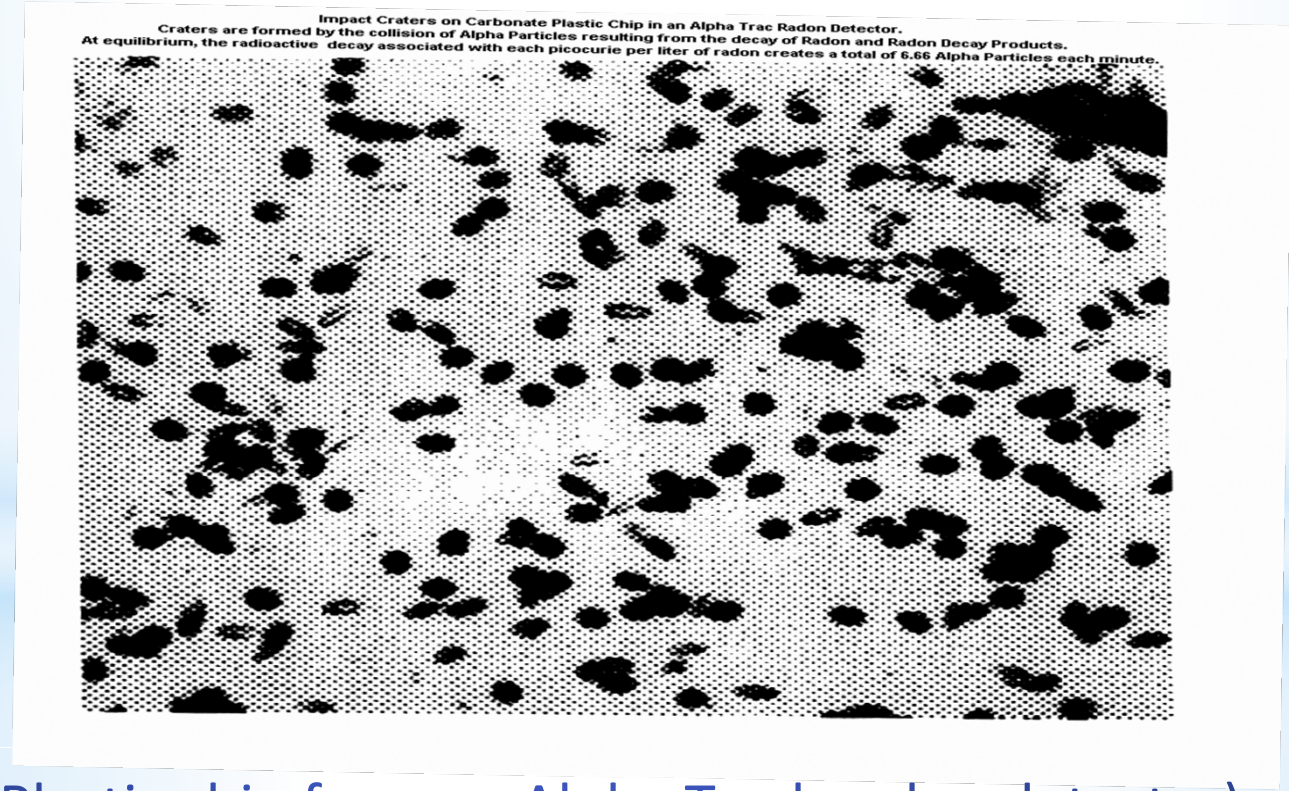


Radiation Types



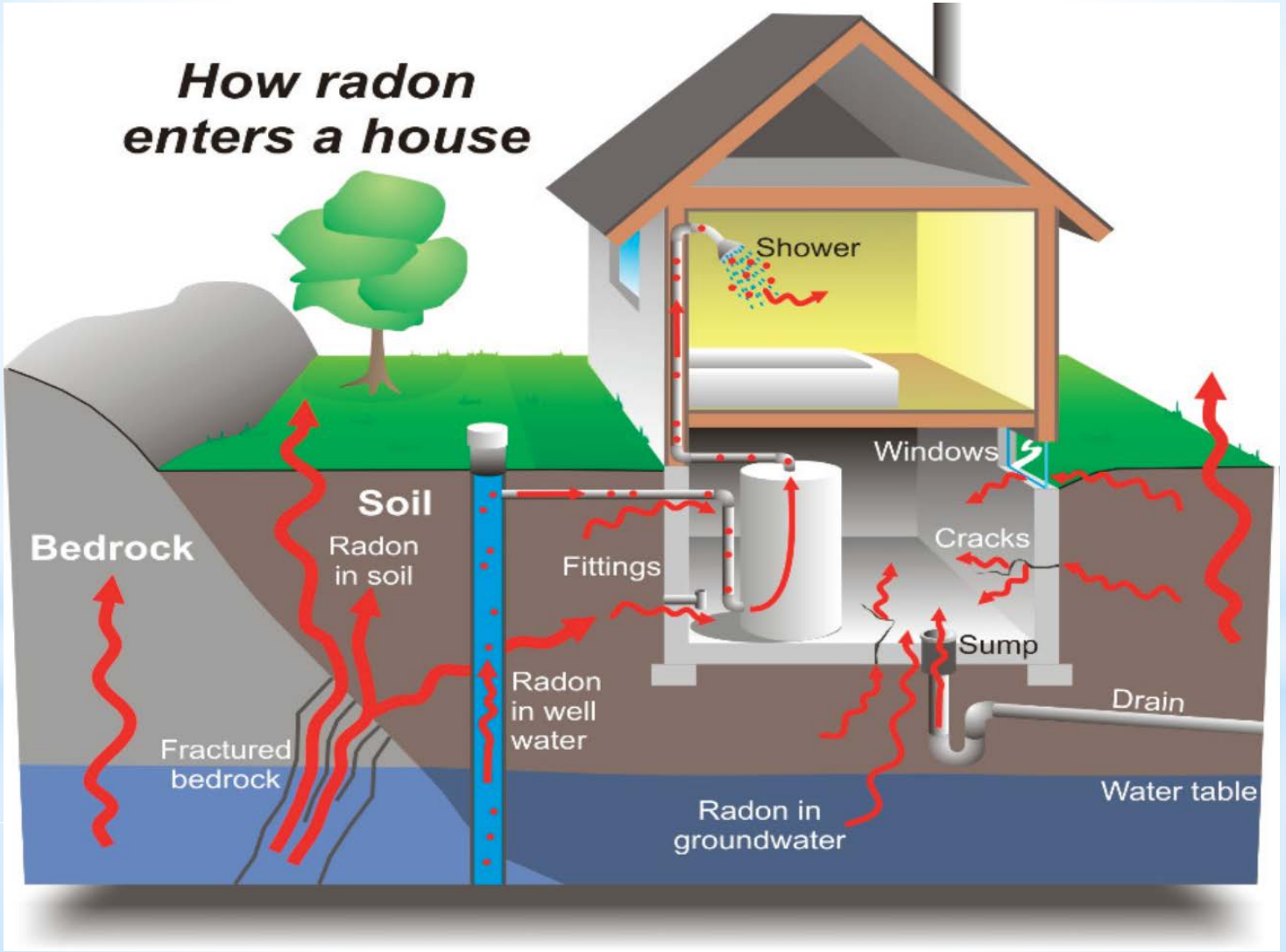
Visual Proof of Damage

- Alpha particles are strong enough to pit plastic.
- Imagine what they do to sensitive lung tissue…

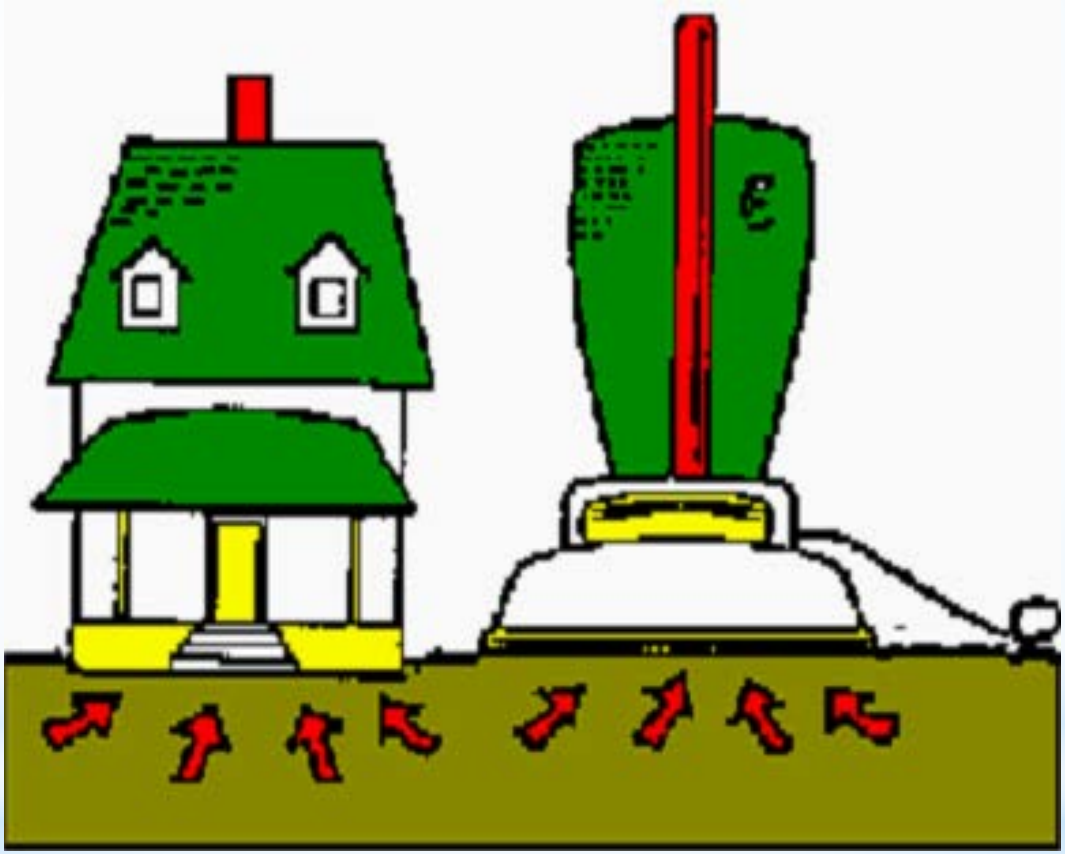


(Plastic chip from an Alpha Track radon detector)

Radon Entry Routes



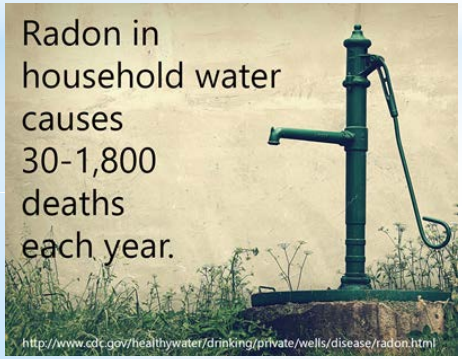
Why Radon enters a Home

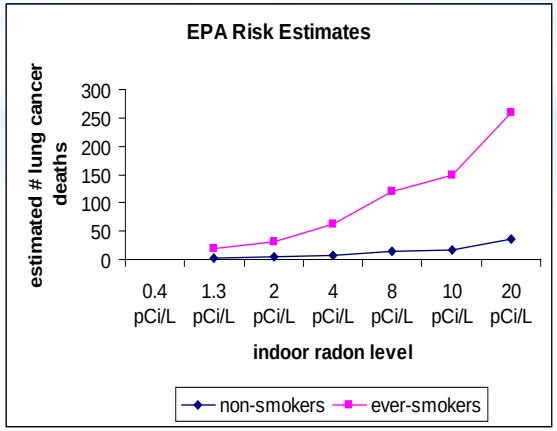


A home acts like a vacuum-drawing gases inside
The driving force is due to negative pressure

Why is radon a health concern?

- If you breathe in air with radon, your risk of lung cancer increases.
- If you smoke and are exposed to radon, your risk of lung cancer is even greater.
- If you drink water with elevated radon, you can increase your risk of stomach cancer.
- Research shows the risk of lung cancer from breathing radon is far greater than the risk of stomach cancer from drinking water with radon.





EPA Radon Risk

Lifetime Risk of Lung Cancer Death (Per Person) From Radon Exposure in Homes

RADON LEVEL (pCi/L)	NEVER SMOKERS	CURRENT SMOKERS	GENERAL POPULATION
20	36 out of 1,000	26 out of 100	11 out of 100
10	18 out of 1,000	15 out of 100	56 out of 1,000
8	15 out of 1,000	12 out of 100	45 out of 1,000
4	73 out of 10,000	62 out of 1,000	23 out of 1,000
2	37 out of 10,000	32 out of 1,000	12 out of 1,000
1.25	23 out of 10,000	20 out of 1,000	73 out of 10,000
0.4	73 out of 100,000	64 out of 10,000	23 out of 10,000

Estimated Risks at the EPA Action Level (4 pCi/L)

Never Smokers 7/1000 | Smokers 6/100

How can radon get into my water?

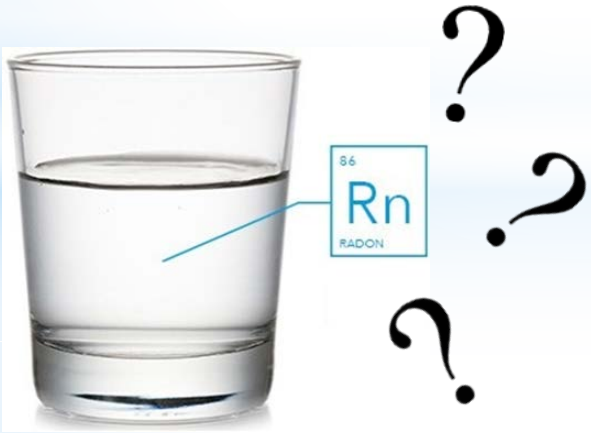
- Radon can dissolve and build up in water from underground sources.
- If your water comes from a well, it could contain radon.
- Radon can off-gas into the air during household water use, especially when it is heated.
- Radon levels in the air will increase for a short period of time when you use your:





Should I test my water for radon?

- CT DPH recommends testing for radon in your water if your water supply comes from a well.
- It is possible to have elevated radon levels in your water even if the radon in indoor air is low and vice versa.
- The only way to know for sure is to test for radon in both air and water.



Should I test my indoor air for radon?

- CT DPH highly recommends testing in all homes for radon in the air
  - New or old homes
  - Homes on slab or with basements and/or crawlspaces
  - Townhouses or apartments
- Testing is easy and low cost
- Elevated radon levels in indoor air poses the greatest health risk for lung cancer.

Radon: 18-20% of lung cancer deaths →

> *Radon is estimated to cause about 21,000 lung cancer deaths per year, according to EPA's 2003 Assessment of Risks from Radon in Homes (EPA 402-R-03-003), making it one of the top 10 causes of cancer mortality in the United States.*

Leading Environmental Cause of Cancer Mortality in U.S.

Cancer Mortality 2016	
Cancer Type	Estimated U.S. Deaths in 2016
1. Lung and Bronchus	158,080
2. Colon and Rectum	49,190
3. Pancreas	41,780
4. Breast	40,890
5. Liver and Intrahepatic Bile Duct	27,170
6. Prostate	26,120
7. Leukemia	24,400
8. Lymphoma	21,270
>>>>> Radon	21,100
9. Urinary Bladder	16,390
10. Esophagus	15,690
11. Ovary	14,240
12. Kidney and Renal Pelvis	14,240
13. Myeloma	12,650
14. Stomach	10,730

When should I consider reducing radon in my water?

- Radon laboratory results are reported in picocuries per liter (pCi/L), a unit of measure for radioactivity.
- CT DPH has established a recommended guidance level of 5,000 pCi/L for radon in water (a health based standard).
- Reduce radon in the water if the average radon level of two water samples (drawn simultaneously from the same location) is at or over 5,000 pCi/L.
    - MA-10,000 pCi/L, NH-2,000 pCi/L
    - VT- 4,000 pCi/L, ME- 4,000 pCi/L
- Radon concentrations in water vary from one test to another.
    - Water usage
    - Seasonal variation in the water table
- You may want to test your water more than just once.

Connecticut Department of Public Health
Environmental Health Section
Radon Program
410 Capitol Avenue, MS# 21 RAD
Hartford, CT 06106
Phone: 860-509-7299

Radon in Your Well Water

Radon in your water can increase your risk of developing cancer.
Read this fact sheet for information on radon in drinking water.

What is radon?

Radon is:

- a natural element found in soil and rocks all over the world
- a radioactive gas formed from the decay of uranium, another natural element
- colorless, odorless and tasteless
- the leading cause of lung cancer in nonsmokers

Why is radon a health concern?

If you breathe in air with radon, your risk of lung cancer increases. If you smoke and are exposed to radon, your risk of lung cancer is even greater. Radon in the water you drink can also increase your risk of stomach cancer. However, research has shown that your risk of lung cancer from breathing radon in air is much larger than your risk of developing stomach cancer from drinking water with radon in it.

How can radon get into my water?

Radon can dissolve and build up in water from underground sources. If your water comes from a well, it may contain radon. Radon in the water dissolves and escapes into the air during household water use, especially when it is heated. Radon levels in the air will increase for a short period of time when you use your dishwasher, washing machine, shower and bath.

Should I test my water for radon?

The Connecticut Department of Public Health (CT DPH) recommends testing for radon in your water if your home is served by well water. It is possible to have elevated radon levels in your water even if the radon level in your indoor air is low. The only way to know for sure is to test for radon in both air and water.

Should I test my indoor air for radon?

The CT DPH recommends that all homes in Connecticut be tested for radon in the air. The most common source of radon in a home comes from soil and rock surrounding a building's foundation. Elevated radon levels in indoor air are usually a greater health risk than radon levels in water. Refer to the CT DPH Basic Radon Facts publication for information on radon in indoor air.

Radon from your water can enter the air you breathe.

March 2017

When should I consider reducing the level of radon in my water?

Radon laboratory results are reported in picocuries per liter (pCi/L), a unit of measure for radioactivity. The CT DPH has established a recommended action level of 5,000 pCi/L for radon in water. Take action to reduce radon in your water if the average radon level of two water samples (drawn simultaneously from the same location) is equal to or above 5,000 pCi/L. Radon concentrations in water vary from one test to another due to many reasons including water usage and seasonal fluctuations in the water table. Therefore, you may choose to test your water more than once.

How can I reduce radon in my water?

There are two types of systems to reduce radon levels in your water. If the average radon test result is 5,000 pCi/L or higher, one of the following systems is recommended. The CT DPH recommends hiring a nationally certified radon mitigation professional to install a system to reduce radon in your water.

• Granular Activated Carbon (GAC) System

GAC systems reduce radon effectively when levels are below 10,000 pCi/L. These systems contain a fiberglass tank filled with granular activated carbon, a fine material that traps radon as the water passes through it. The carbon also captures other contaminants, which is beneficial, but it shortens the life of the carbon. The carbon eventually becomes saturated and can no longer trap radon. Replacement of the carbon is essential for the GAC system to effectively reduce radon. Service periods vary based on the amount of carbon, household water usage, and radon level. Hire a nationally certified radon mitigation professional to replace the GAC system's carbon on a regular basis. The cost for a GAC system installation is between $1,500 and $3,000. For more information, please refer to DPH Private Well *Publication No.1: Activated Carbon Treatment of Private Drinking Water Systems*.

• Aeration System

Aeration systems are the only effective method for reducing radon levels that are at or above 10,000 pCi/L. These systems aerate or agitate water to allow radon to escape so it can be captured and vented to the outside away from your home. Other water quality issues, such as iron and manganese, need to be taken into account when considering installation of an aeration system. There are different models of aeration systems with varying specifications. A radon mitigation professional can help you decide which system is best for your home. The cost for an aeration system installation is between $3,500 and $5,000. For more information, please refer to DPH Private Well *Publication No.2: Aeration Treatment of Private Drinking Water Systems*.

How can I find qualified radon professionals?

The CT DPH maintains lists of nationally certified radon professionals on the Radon Program website. These individuals are trained in EPA protocols and maintain national certification in radon measurement or mitigation. Refer to the Measurement Professional list to find individuals who can collect water samples to submit to CT DPH Approved Laboratories for radon in water analysis. Refer to the Mitigation Professional list to find individuals who can install systems to reduce radon in your home.

For more information, visit the CT DPH Radon Program website: www.ct.gov/dph/radon
CT DPH Private Well Program website: www.ct.gov/dph/privatewells

If you require aid/accommodation to fully and fairly benefit from the contents of this document, please contact: 860-509-7293

Labs Approved for Rn in H2O Analysis

- Radon Labs that analyze for radon in water MUST be approved by the CT DPH Lab Cert. Program
  - Per CGS Sec 19a-29 and RCSA Sec
  - Recognizes and approves labs using the liquid scintillation counting method (i.e., Method 7500Rn B from *Standard Methods for the Examination of Water and Wastewater*, 20th ed., APHA-AWWA-WEF).

Town	State	Lab Name
Greenwich	CT	Greenwich Health Department Laboratory
Hebron	CT	RSA Laboratories, Inc.
New Milford	CT	Hydro-Technologies
Newtown	CT	Aqua Environmental Lab
Windsor	CT	EnviroTech Laboratory
Woodbridge	CT	Aquatek Lab
Monrovia	CA	Eurofins Eaton Analytical, Inc
Golden	CO	Hazen Research, Inc.
South Bend	IN	Eurofins Eaton Analytical, Inc.
Medway	MA	AccuStar Labs
Elmsford	NY	Radon Testing Corporation of America
Pittsburgh	PA	PACE Analytical Services, Inc.
Charleston	SC	GEL Laboratories, LLC

Qualified Radon Mitigation Professional List

Nationally Certified Radon Mitigation Professionals

Connecticut Department of Public Health (CT DPH) Radon Program

List of Qualified Radon Mitigation Professionals

The CT Department of Public Health (CT DPH) is required under Connecticut General Statute §19a-14b, to "maintain a list of companies or individuals that are included in current lists of national radon proficiency programs."

The following list contains the names of individuals who have been trained according to the U.S Environmental Protection Agency (U.S. EPA) protocols for radon mitigation and maintain a certification in radon mitigation by one of the two National Radon Proficiency Programs: (1) The National Radon Proficiency Program (AARST-NRPP) or (2) the National Radon Safety Board (NRSB). In addition, these companies or individuals are registered as Home Improvement Contractors with the Connecticut Department of Consumer Protection (CT DCP).

The CT DPH cannot be responsible for the knowledge or experience of these individuals or companies, nor for their fees or business practices. Inclusion on this list does not constitute an endorsement or a recommendation of the individuals or companies. People are encouraged to take normal consumer precautions before selecting a professional and be certain that the selected professional obtains all necessary building permits before proceeding with any work. Radon Mitigation companies must utilize licensed electricians, plumbers, salespersons and other professionals for all applicable components of the work rendered. Consumers may verify a license for individuals and businesses at The State of CT e-Licensing website.

Overview of Radon Mitigation Professionals who Perform Radon Services in Connecticut

Under the Connecticut Home Improvement Act, an individual and/or business is required to register with the CT DCP if they are contracting with a consumer to perform work on residential property.

1. Individuals who enter into contracts with CT consumers to perform radon mitigation must be registered as Home Improvement Contractors (HIC) with the CT DCP. Any other individual who solicits and procures business for the LLC must be registered as a salesperson with the CT DCP.
   - Individuals who perform radon mitigation for **water** require a CT DCP Plumbing & Piping contractor license. A HIC registration is *not* required for a licensed P-1, P-3, or J-1 plumbing contractor who performs radon mitigation for water ONLY.
2. Companies offering to perform radon mitigation in Connecticut for air and/or water ***must also*** employ an individual who is nationally certified in radon mitigation by NRPP or NRSB. Contractors performing mitigation are working under the direction of the nationally certified individual.
3. Get a signed, detailed, and fully executed contract before any work begins. Keep a copy. By law, all home improvement contracts must be in writing, include all details of the job, and bear the contractor's name and registration number.

Overview of Radon in Air Mitigation Techniques

If you have confirmed your radon in air level to be 4 picocuries per liter (pCi/L) or higher based on the average of two tests, U.S. EPA suggests that your home be fixed. The most common radon mitigation system is subslab suction (Subslab Depressurization), which prevents radon from entering your home by drawing the radon from below the house and venting it through a pipe to the air above the house where it is quickly diluted. The cost of fixing a home generally ranges from $800 to $2500 with an average cost of $1,200. Refer to the U.S. EPA document, *Consumer's Guide to Radon Reduction*, for more information on radon mitigation systems.

Overview of Radon in Water Mitigation Techniques

If you have tested your private well and have confirmed your radon in water level to be 5,000 pCi/L or higher based on the average of two water samples, CT DPH recommends that your home be fixed. There are two options used to reduce radon levels in water: (1) the Granular Activated Carbon (GAC) System and (2) the Aeration System. Refer to the "Radon in Your Well Water" fact sheet for CT guidance on radon in private well water.

For more information about radon, visit the CT DPH Radon Program website at: www.ct.gov/dph/radon or call: 860-509-7299

www.ct.gov/dph/radon

Under:

"What is Radon?"

- Radon in Water

CT DPH List of Qualified Radon Mitiga

City/Town	ST	Mitigation Company	Individuals Certified by N
Amston	CT	MDT Residential Services, LLC	Michael Thibo
Andover	CT	A & R Environmental, LLC	Joshua Clark
Andover	CT	Connecticut Radon	Joshua Clark
Andover	CT	Energy Tech, LLC	Joshua Clark
Avon	CT	NE Radon Doctors (BBA, LLC DBA)	Edward Lewis
Bristol	CT	Radon Mitigation Across CT, LLC	Edward P. Pe
Brooklyn	CT	AdvantaClean of Windham (Smooth Call, Inc DBA)	Russell Harlo
Danbury	CT	Foley's Pump Service, Inc	Scott Usinger
Derby	CT	Greco and Haines, Inc.	Bill Ainsworth
Ellington	CT	Homestead Plumbing Heating Cooling Energy Water	Dale E. Gerbe
Granby	CT	Air & Water Environmental	Jeffrey Sherid
Madison	CT	Water-Flo, Inc. (Radon Solutions of CT)	Nick Sunday
Marlborough	CT	A. Douglas Thibodeau, LLC	A. Douglas Th
Milford	CT	Houseworks Home Services, Inc.	Stan Bajerski
New Milford	CT	Werner Well & Pump Service, LLC	Alan Werner,
Newtown	CT	Buzzano Contracting	Steve Nicolos
North Haven	CT	CJS Environmental, LLC	Chris J. Stella
Old Saybrook	CT	Accusystems for Radon & Water (DMI)	Donald Morris

Individuals Nationally Certified by NRPP/NRSB	Telephone	CT DCP Home Improvement Contractor Registration #	CT DCP Plumbing & Piping License #
Andrew James Hurlbut	203-431-6897 800-432-6897	----------	PLM 208979-J1
Kenneth J. Accashian	866-787-2366 203-910-7877	0582643.R	PLM.0285734-J1
Thomas Zickus	203-888-2726	0631056	PLM.0286044-J1
John Piatek	203-323-9968	600810	PLM.0281838-J1
Thomas M. Brady Matthew Bednarz Kevin Bednarz Rafael Colon	800-319-8867	0553462	PLM.0282824-J1
Fernando L. Alvarado	203-449-8508	0639071	
Jay R. Dockendorff	860-213-2982	0613677	
George Grela	860-583-3237	----------	PLM.0282016-J1
Reale D. Lemay	860-283-8822	0625727	PLM.0282534-J1
Sean Banning Chris Johnson	860-872-8077	0619620.RAD	PLM.0281776-J1
Michael Moskowitz	(860) 305-8075	0533461	
Gene Fercodini	203-228-7873	0638524	
Jeremiah J. Weid Richard Torres	203-879-9230	0621573	PLM.0282365-J1
David F. Konopelski	203-802-7539	0640261	PLM.0286324-J1
Lance Dorfi	800-525-3953	0600097	
Eric Schmitt Clyde R. Gould	800-667-2366	0635906	
Tanya Skorohod-Johnson Daryl J. Dorgan Lorrie Linton Darren Johnson	401-349-5100 866-723-6664	0602918	

Sampling Procedures for Radon in Water

Connecticut Department of Public Health
Environmental Health Section
Environmental. Laboratory Certification Program
410 Capitol Avenue
PO Box 304308, MS #51LAB
Hartford, CT 06134-0308

Sample Collection Protocol for Radon in Water

Sample Collection Containers

Glass containers sealed with TFE or foil-lined caps shall be used to collect samples of water for radon analysis using liquid scintillation. Samples are to be collected in duplicate with either two 20 ml or two 40 ml glass vials.

Transport & Sampling Holding Time

Samples need to be received at the laboratory within 24 to 48 hours of collection. Holding time from time of collection to when counting begins is **four days**. Samples are to be transported in a cooler at a temperature of between 4º-6º C.

Sample Collection Procedures

The home's distribution system must be **flushed** for an adequate amount of time (**approximately 15 minutes**) prior to sample collection. There are three procedures for collecting water samples for radon analysis using liquid scintillation. These three collection procedures are described below:

I. **The Immersion Technique** – *preferred collection procedure*

(For laboratories that supply vials for water collection that do not contain a scintillation cocktail).

1. **Remove aerator from indoor sink faucet.** A length of flexible plastic tubing or section of hose is attached to the spigot, tap or other non-aerated faucet connection. The free end of the delivery tube is placed at the bottom of a small bucket, bowl or 300-600 ml beaker. Make sure that the delivery tube does not let bubbles into the samples. An outside faucet with a hose attached can be used to fill sample containers in a bucket.
2. Fill the bucket, bowl or beaker slowly until the container overflows.
3. Fill one of the sample vials to prevent it from floating and let it sink to bottom of the container.
4. With water flow still on, place the delivery tubing two-thirds of the way into the vial (for outside faucet, place hose over vial opening) and fill the vial under water so that at least 50-100 ml of water is displaced (i.e., water volume is displaced around two to three times). This will ensure that the vial is flushed with fresh water.
5. After the glass vial has been flushed, the delivery tube is placed back on the bottom of the container.
6. Carefully place a TFE or foil-lined cap on the vial, sealing it ***while the vial is still submerged and with the water flow still on.***
7. Once the sealed vial is removed from the container, it is inverted and checked for bubbles that would indicate headspace.
   a. If there are visible bubbles, empty the container and repeat the sampling collection steps 3-7.
   b. If there are no visible air bubbles, the outside of the sealed bottle is wiped dry and the cap is sealed in place with electrical tape.
8. After the sample bottle is sealed, a second (duplicate) sample is collected in the same fashion from the same container.
9. Record the date and time of the sample collection for each vial.

II. **Alternate Immersion Technique**

(For laboratories that supply vials for water collection that do not contain a scintillation cocktail).

After the purging period, the sample is collected as follows to minimize the loss of radon from the sample collected:

1. An indoor sink faucet with the aerator removed is selected for a sampling source.
2. Prop up a large bowl under the faucet using an upturned bowl, pot or other container which is tall enough so that when the water is turned on and filling the bowl, the water level in the bowl is submersing the faucet outlet (refer to DIAGRAMS 1& 2).
3. Fill the bowl slowly until the container overflows. Keep the water flowing.
4. Fill one of the glass sample vials to prevent it from floating and let it sink to bottom of the container.
5. While the water is running into bowl and while the vial is submerged, invert vial to dump out contents and refill under water. Repeat inverting and refilling vial two to three more times. This will ensure that the vial is flushed with fresh water.
6. Carefully place a TFE or foil-lined cap on the glass vial, sealing it **while the vial is still submerged and with the water flow still on.**
7. Once the sealed vial is removed from the container, it is inverted and checked for bubbles that would indicate headspace.
   a. If there are visible bubbles, empty the container and repeat the sampling collection steps 4-7.
   b. If there are no visible air bubbles, the outside of the sealed bottle is wiped dry, and the cap is sealed in place with electrical tape.
8. After the vial is sealed, a second (duplicate) sample is collected in the same fashion.
9. Record the date and time of the sample collection for each vial.

Sampling Video

Let's see if you can figure out what is wrong with the method in this video…

https://m.youtube.com/watch?v=JyqZA8UJlul

CT DPH
Environmental Health Section
Radon Program

Allison Sullivan, Environmental Analyst 3
allison.sullivan@ct.gov
Program: (860) 509-7299
Direct: (860) 509-8140
www.ct.gov/dph/radon

Thanks for your time and attention

Periodic Table of the Elements

1																	18
1 H Hydrogen 1.008	2											13	14	15	16	17	2 He Helium 4.003
3 Li Lithium 6.941	4 Be Beryllium 9.012											5 B Boron 10.811	6 C Carbon 12.011	7 N Nitrogen 14.007	8 O Oxygen 15.999	9 F Fluorine 18.998	10 Ne Neon 20.180
11 Na Sodium 22.990	12 Mg Magnesium 24.305	3	4	5	6	7	8	9	10	11	12	13 Al Aluminum 26.982	14 Si Silicon 28.086	15 P Phosphorus 30.974	16 S Sulfur 32.066	17 Cl Chlorine 35.453	18 Ar Argon 39.948
19 K Potassium 39.098	20 Ca Calcium 40.078	21 Sc Scandium 44.956	22 Ti Titanium 47.867	23 V Vanadium 50.942	24 Cr Chromium 51.996	25 Mn Manganese 54.938	26 Fe Iron 55.845	27 Co Cobalt 58.933	28 Ni Nickel 58.693	29 Cu Copper 63.546	30 Zn Zinc 65.38	31 Ga Gallium 69.732	32 Ge Germanium 72.631	33 As Arsenic 74.922	34 Se Selenium 78.971	35 Br Bromine 79.904	36 Kr Krypton 84.798
37 Rb Rubidium 84.468	38 Sr Strontium 87.62	39 Y Yttrium 88.906	40 Zr Zirconium 91.224	41 Nb Niobium 92.906	42 Mo Molybdenum 95.95	43 Tc Technetium 98.907	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.906	46 Pd Palladium 106.42	47 Ag Silver 107.868	48 Cd Cadmium 112.414	49 In Indium 114.818	50 Sn Tin 118.711	51 Sb Antimony 121.760	52 Te Tellurium 127.6	53 I Iodine 126.90	54 Xe Xenon 131.294
55 Cs Cesium 132.905	56 Ba Barium 137.328	57-71 Lanthanides	72 Hf Hafnium 178.49	73 Ta Tantalum 180.948	74 W Tungsten 183.84	75 Re Rhenium 186.207	76 Os Osmium 190.23	77 Ir Iridium 192.217	78 Pt Platinum 195.085	79 Au Gold 196.967	80 Hg Mercury 200.592	81 Tl Thallium 204.383	82 Pb Lead 207.2	83 Bi Bismuth 208.980	84 Po Polonium [208.982]	85 At Astatine 209.98	86 Rn Radon 222.018
87 Fr Francium 223.020	88 Ra Radium 226.025	89-103 Actinides	104 Rf Rutherfordium [261]	105 Db Dubnium [262]	106 Sg Seaborgium [266]	107 Bh Bohrium [264]	108 Hs Hassium [269]	109 Mt Meitnerium [268]	110 Ds Darmstadtium [269]	111 Rg Roentgenium [272]	112 Cn Copernicium [277]	113 Nh Nihonium unknown	114 Fl Flerovium [289]	115 Mc Moscovium unknown	116 Lv Livermorium [298]	117 Ts Tennessine unknown	118 Og Oganesson unknown

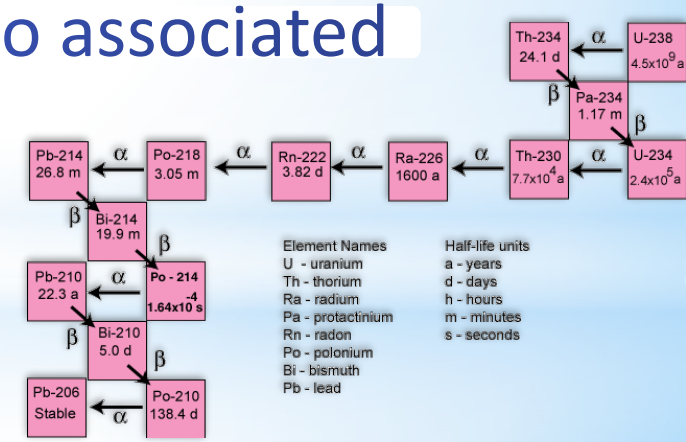
57 La Lanthanum 138.905	58 Ce Cerium 140.116	59 Pr Praseodymium 140.908	60 Nd Neodymium 144.243	61 Pm Promethium 144.913	62 Sm Samarium 150.36	63 Eu Europium 151.964	64 Gd Gadolinium 157.25	65 Tb Terbium 158.925	66 Dy Dysprosium 162.500	67 Ho Holmium 164.930	68 Er Erbium 167.259	69 Tm Thulium 168.934	70 Yb Ytterbium 173.055	71 Lu Lutetium 174.967
89 Ac Actinium 227.028	90 Th Thorium 232.038	91 Pa Protactinium 231.036	92 U Uranium 238.029	93 Np Neptunium 237.048	94 Pu Plutonium 244.064	95 Am Americium 243.061	96 Cm Curium 247.070	97 Bk Berkelium 247.070	98 Cf Californium 251.080	99 Es Einsteinium [254]	100 Fm Fermium 257.095	101 Md Mendelevium 258.1	102 No Nobelium 259.101	103 Lr Lawrencium [262]

Alkali Metal | Alkaline Earth | Transition Metal | Basic Metal | Semimetal | Nonmetal | Halogen | Noble Gas | Lanthanide | Actinide

Naturally Occurring Radioactive Contaminants in Groundwater

Uranium, Radon and Radium:

- Naturally occurring and can get into private well water from bedrock containing uranium
  (*found in bedrock, soil and water*)
- Uranium, radium and radon have no associated taste, odor, or color in water
- Radium & radon are 2 of uranium's many decay products



U: U^{234}, U^{235} & U^{238}; isotope U^{238} makes up about 99%

Ra: Most common groundwater forms, Ra-226 & Ra-228

Naturally Occurring Radioactive Contaminants in Groundwater

MCL for Uranium:

30 ug/L, or ppb

0.3 mg/L, or ppm

Primary health concern from water consumed

Guidance Level for Radon:

5,000p Ci/L

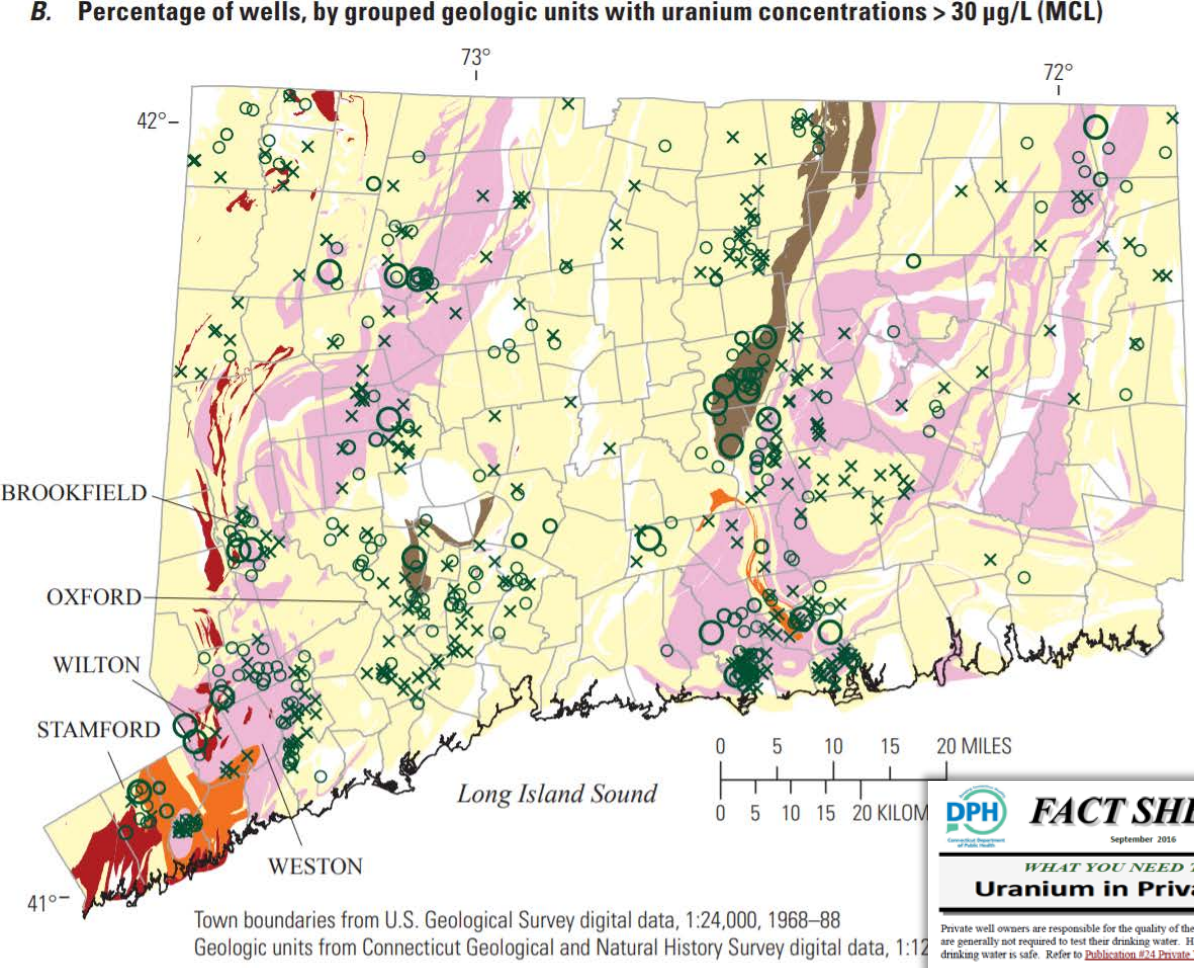
Primary health concern from off gas, inhalation

MCL for Radium:

combined Ra-226 & Ra-228

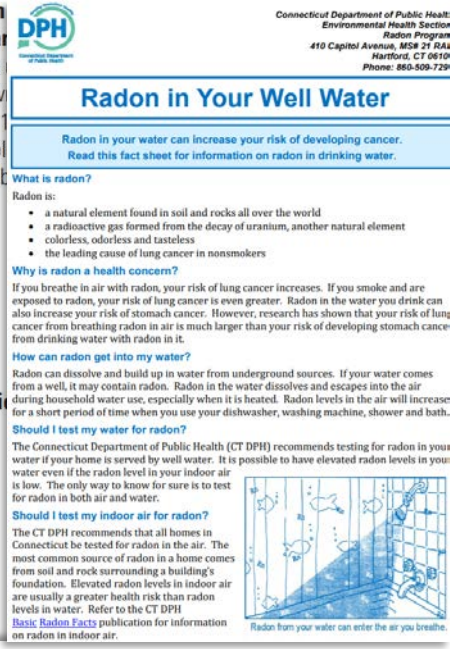
5 pCi/L

Primary health concern from water consumed



https://pubs.usgs.gov/of/2017/1046/ofr20171046.pdf

www.ct.gov/dph/privatewells



DPH

Connecticut Department of Public Health
Environmental Health Section
Radon Program
410 Capitol Avenue, MS# 21 RA
Hartford, CT 0610
Phone: 860-509-729

Radon in Your Well Water

Radon in your water can increase your risk of developing cancer.
Read this fact sheet for information on radon in drinking water.

What is radon?

Radon is:

- a natural element found in soil and rocks all over the world
- a radioactive gas formed from the decay of uranium, another natural element
- colorless, odorless and tasteless
- the leading cause of lung cancer in nonsmokers

Why is radon a health concern?

If you breathe in air with radon, your risk of lung cancer increases. If you smoke and are exposed to radon, your risk of lung cancer is even greater. Radon in the water you drink can also increase your risk of stomach cancer. However, research has shown that your risk of lung cancer from breathing radon in air is much larger than your risk of developing stomach cancer from drinking water with radon in it.

How can radon get into my water?

Radon can dissolve and build up in water from underground sources. If your water comes from a well, it may contain radon. Radon in the water dissolves and escapes into the air during household water use, especially when it is heated. Radon levels in the air will increase for a short period of time when you use your dishwasher, washing machine, shower and bath.

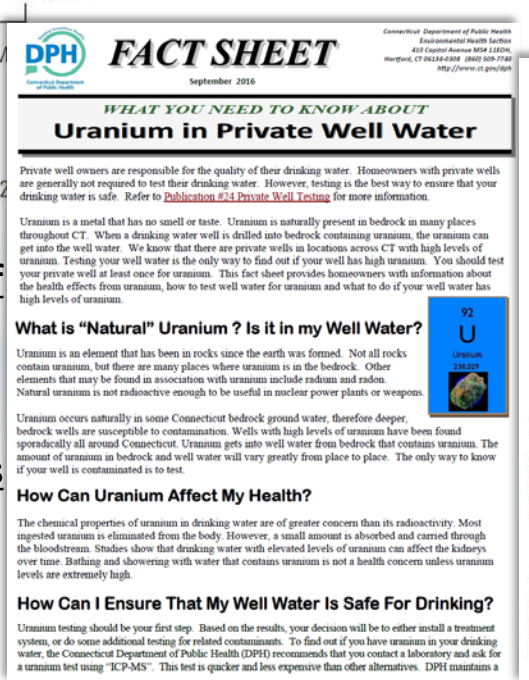
Should I test my water for radon?

The Connecticut Department of Public Health (CT DPH) recommends testing for radon in your water if your home is served by well water. It is possible to have elevated radon levels in your water even if the radon level in your indoor air is low. The only way to know for sure is to test for radon in both air and water.

Should I test my indoor air for radon?

The CT DPH recommends that all homes in Connecticut be tested for radon in the air. The most common source of radon in a home comes from soil and rock surrounding a building's foundation. Elevated radon levels in indoor air are usually a greater health risk than radon levels in water. Refer to the CT DPH Basic Radon Facts publication for information on radon in indoor air.

Radon from your water can enter the air you breathe.



DPH

Connecticut Department of Public Health
Environmental Health Section
410 Capitol Avenue MS# 11EOH,
Hartford, CT 06134-0308 (860) 509-7740
http://www.ct.gov/dph

FACT SHEET

September 2016

WHAT YOU NEED TO KNOW ABOUT

Uranium in Private Well Water

Private well owners are responsible for the quality of their drinking water. Homeowners with private wells are generally not required to test their drinking water. However, testing is the best way to ensure that your drinking water is safe. Refer to Publication #24 Private Well Testing for more information.

Uranium is a metal that has no smell or taste. Uranium is naturally present in bedrock in many places throughout CT. When a drinking water well is drilled into bedrock containing uranium, the uranium can get into the well water. We know that there are private wells in locations across CT with high levels of uranium. Testing your well water is the only way to find out if your well has high uranium. You should test your private well at least once for uranium. This fact sheet provides homeowners with information about the health effects from uranium, how to test well water for uranium and what to do if your well water has high levels of uranium.

What is "Natural" Uranium ? Is it in my Well Water?

Uranium is an element that has been in rocks since the earth was formed. Not all rocks contain uranium, but there are many places where uranium is in the bedrock. Other elements that may be found in association with uranium include radium and radon. Natural uranium is not radioactive enough to be useful in nuclear power plants or weapons.

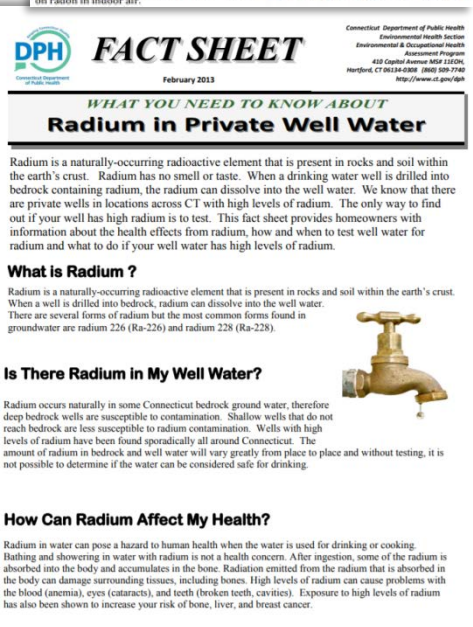
Uranium occurs naturally in some Connecticut bedrock ground water, therefore deeper, bedrock wells are susceptible to contamination. Wells with high levels of uranium have been found sporadically all around Connecticut. Uranium gets into well water from bedrock that contains uranium. The amount of uranium in bedrock and well water will vary greatly from place to place. The only way to know if your well is contaminated is to test.

How Can Uranium Affect My Health?

The chemical properties of uranium in drinking water are of greater concern than its radioactivity. Most ingested uranium is eliminated from the body. However, a small amount is absorbed and carried through the bloodstream. Studies show that drinking water with elevated levels of uranium can affect the kidneys over time. Bathing and showering with water that contains uranium is not a health concern unless uranium levels are extremely high.

How Can I Ensure That My Well Water Is Safe For Drinking?

Uranium testing should be your first step. Based on the results, your decision will be to either install a treatment system, or do some additional testing for related contaminants. To find out if you have uranium in your drinking water, the Connecticut Department of Public Health (DPH) recommends that you contact a laboratory and ask for a uranium test using "ICP-MS". This test is quicker and less expensive than other alternatives. DPH maintains a



DPH

Connecticut Department of Public Health
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Environmental & Occupational Health
Assessment Program
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http://www.ct.gov/dph

FACT SHEET

February 2013

WHAT YOU NEED TO KNOW ABOUT

Radium in Private Well Water

Radium is a naturally-occurring radioactive element that is present in rocks and soil within the earth's crust. Radium has no smell or taste. When a drinking water well is drilled into bedrock containing radium, the radium can dissolve into the well water. We know that there are private wells in locations across CT with high levels of radium. The only way to find out if your well has high radium is to test. This fact sheet provides homeowners with information about the health effects from radium, how and when to test well water for radium and what to do if your well water has high levels of radium.

What is Radium ?

Radium is a naturally-occurring radioactive element that is present in rocks and soil within the earth's crust. When a well is drilled into bedrock, radium can dissolve into the well water. There are several forms of radium but the most common forms found in groundwater are radium 226 (Ra-226) and radium 228 (Ra-228).

Is There Radium in My Well Water?

Radium occurs naturally in some Connecticut bedrock ground water, therefore deep bedrock wells are susceptible to contamination. Shallow wells that do not reach bedrock are less susceptible to radium contamination. Wells with high levels of radium have been found sporadically all around Connecticut. The amount of radium in bedrock and well water will vary greatly from place to place and without testing, it is not possible to determine if the water can be considered safe for drinking.

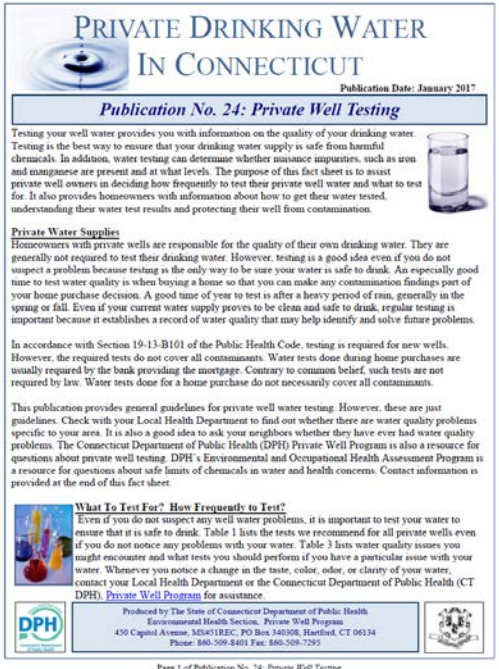
How Can Radium Affect My Health?

Radium in water can pose a hazard to human health when the water is used for drinking or cooking. Bathing and showering in water with radium is not a health concern. After ingestion, some of the radium is absorbed into the body and accumulates in the bone. Radiation emitted from the radium that is absorbed in the body can damage surrounding tissues, including bones. High levels of radium can cause problems with the blood (anemia), eyes (cataracts), and teeth (broken teeth, cavities). Exposure to high levels of radium has also been shown to increase your risk of bone, liver, and breast cancer.

Testing Private Well Water: CT

CT Department of Public Health recommendations for private well testing:

Publications #24 & #24a



PRIVATE DRINKING WATER IN CONNECTICUT

Publication Date: January 2017

Publication No. 24: Private Well Testing

Testing your well water provides you with information on the quality of your drinking water. Testing is the best way to ensure that your drinking water supply is safe from harmful chemicals. In addition, water testing can determine whether nuisance impurities, such as iron and manganese are present and at what levels. The purpose of this fact sheet is to assist private well owners in deciding how frequently to test their private well water and what to test for. It also provides homeowners with information about how to get their water tested, understanding their water test results and protecting their well from contamination.

Private Water Supplies

Homeowners with private wells are responsible for the quality of their own drinking water. They are generally not required to test their drinking water. However, testing is a good idea even if you do not suspect a problem because testing is the only way to be sure your water is safe to drink. An especially good time to test water quality is when buying a home so that you can make any contamination findings part of your home purchase decision. A good time of year to test is after a heavy period of rain, generally in the spring or fall. Even if your current water supply proves to be clean and safe to drink, regular testing is important because it establishes a record of water quality that may help identify and solve future problems.

In accordance with Section 19-13-B101 of the Public Health Code, testing is required for new wells. However, the required tests do not cover all contaminants. Water tests done during home purchases are usually required by the bank providing the mortgage. Contrary to common belief, such tests are not required by law. Water tests done for a home purchase do not necessarily cover all contaminants.

This publication provides general guidelines for private well water testing. However, these are just guidelines. Check with your Local Health Department to find out whether there are water quality problems specific to your area. It is also a good idea to ask your neighbors whether they have ever had water quality problems. The Connecticut Department of Public Health (DPH) Private Well Program is also a resource for questions about private well testing. DPH's Environmental and Occupational Health Assessment Program is a resource for questions about safe limits of chemicals in water and health concerns. Contact information is provided at the end of this fact sheet.

What To Test For? How Frequently to Test?

Even if you do not suspect any well water problems, it is important to test your water to ensure that it is safe to drink. Table 1 lists the tests we recommend for all private wells even if you do not notice any problems with your water. Table 3 lists water quality issues you might encounter and what tests you should perform if you have a particular issue with your water. Whenever you notice a change in the taste, color, odor, or clarity of your water, contact your Local Health Department or the Connecticut Department of Public Health (CT DPH), Private Well Program for assistance.

Produced by The State of Connecticut Department of Public Health
Environmental Health Section, Private Well Program
450 Capitol Avenue, MS#51REC, PO Box 340308, Hartford, CT 06134
Phone: 860-509-8401 Fax: 860-509-7295

Page 1 of Publication No. 24: *Private Well Testing*

Table 1. Recommended Test for All Private Wells

Type of Test	When?	Why?
Basic Indicators *(See table 2 below)*	**Every Year** Also test after repair or replacement of your well, pump or water pipes.	Provides a general indication of water quality. Required for all new wells. Some basic indicators above their acceptable limit are associated with health concerns.
Lead *(2 samples; a first draw sample and a flushed sample should be collected when testing for lead in drinking water)*	**At Least Once** Also when planning a pregnancy or have a child under 6 years old in the home. *If your water is considered corrosive, test every 3-5 years.*	Lead can leach from your home's plumbing (pipes, faucets, valves, etc.) system. Corrosive water leaches lead more readily. Lead above the acceptable limit is associated with health concerns. Young children are especially susceptible to harmful effects from lead exposure.
Arsenic, Uranium, Radon	**At Least Once** Ideally, repeat test every 5 years	Arsenic, uranium and radon are naturally occurring in groundwater in some areas of CT and are associated with health concerns above their acceptable limit. Private wells with high levels have been found sporadically around CT, and levels may fluctuate.
Volatile Organic Compounds (VOCs)	**At Least Once** More often if a problem is identified or suspected	Gasoline, oil, solvents or industrial chemicals spilled or leaked on the ground could get into your well water. VOCs above their acceptable limit are associated with health concerns.
Fluoride	**Every 5 years when a child under 12 is present**	Fluoride can occur naturally in wells throughout CT. A child's permanent teeth can become discolored from excess fluoride. Too little fluoride can increase risk of tooth decay. Your child's dentist will likely ask you about the fluoride level in your well water.

*Some drinking water standards are based on aesthetics and some are based on health risk. If your water exceeds a drinking water standard, contact your Local Health Department or CT DPH for assistance. For more information refer to the types of drinking water standards hyperlinked below.

DRINKING WATER STANDARD TYPES:

CT DPH Action Levels
US EPA Maximum Contaminant Levels (MCLs)
US EPA Secondary MCLs

For More Information Contact:

Health related: CT DPH, Environmental & Occupational Health Assessment Program, (860) 509-7740

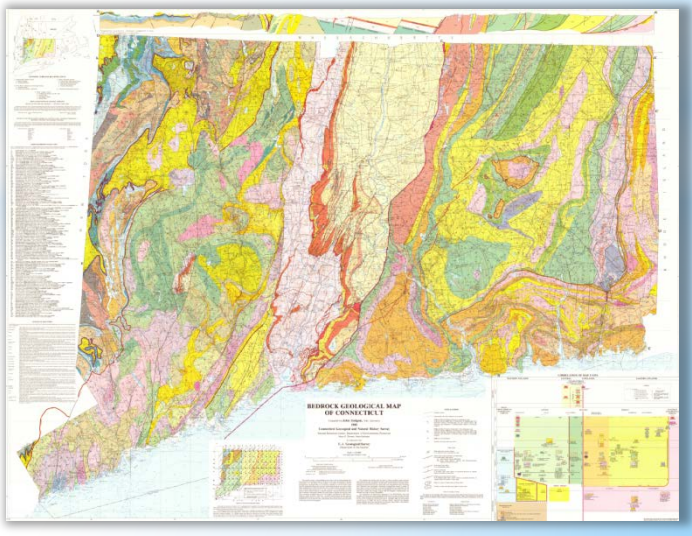
All other questions (i.e., testing, treatment, etc.): CT DPH, Private Well Program, (860) 509-8401

Table 2. Basic Indicators Test

Parameter	Applicable Drinking Water Standard*
Total Coliform Bacteria	None Present
Nitrate-Nitrogen	10 milligrams/liter (mg/L)
Nitrite-Nitrogen	1 mg/L
pH	6.4 - 8.5 standard units (SU)
Odor	Less than 2
Chloride	250 mg/L
Hardness	150 mg/L
Apparent Color	Less than 15 SU
Sulfate	250 mg/L
Turbidity	Less than 5 SU
Iron	0.3 mg/L
Manganese	0.05 mg/L (Aesthetic based) 0.5 mg/L (Health based)

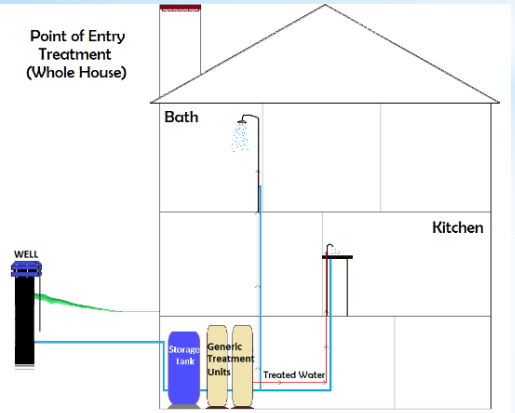
U, Rn & Ra in Private Well Water: CT

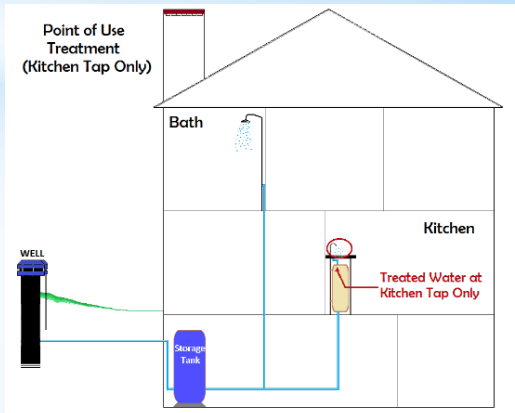
- Bottom line, all private well owners should test for uranium and radon **at least once**!
  Regardless of what the probability map may say…
- Just because neighbors have a high level in their water, doesn't necessarily mean everyone will. **But**, we must consider, when to inform neighbors!
  - ✓ Well depth
  - ✓ Geology



Options: Radioactive Contaminants in Private Well Water

- **Alternate Sources,** temporary use of bottled water, connection to a public water supply (*if available*), replacement well (?)
- **Treatment**, Point of Use vs. Whole House…
  - ✓ things to consider





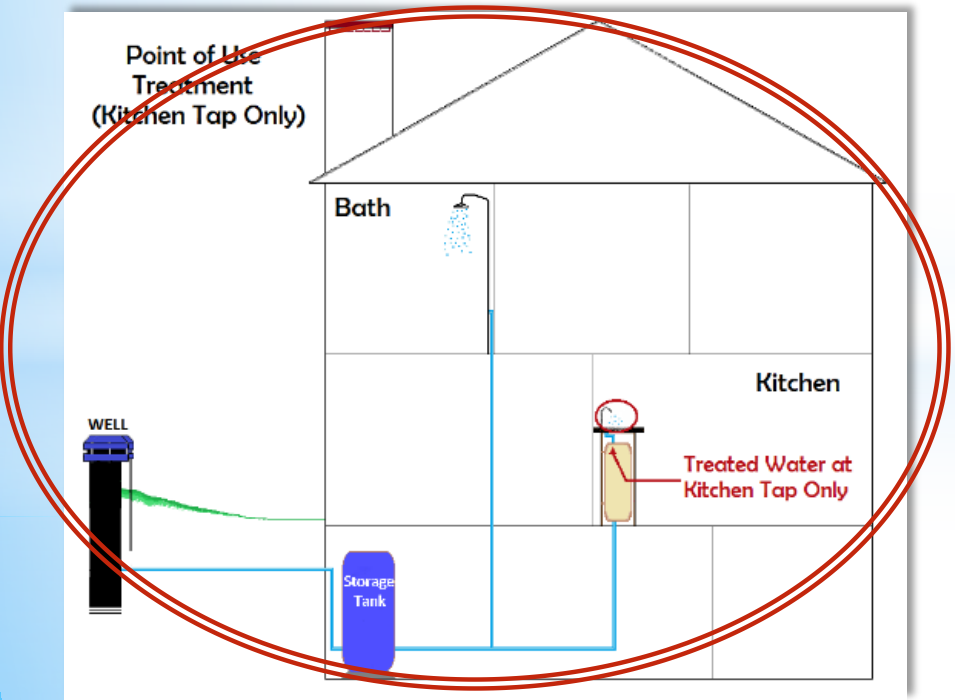
Treating for Uranium in PW Water

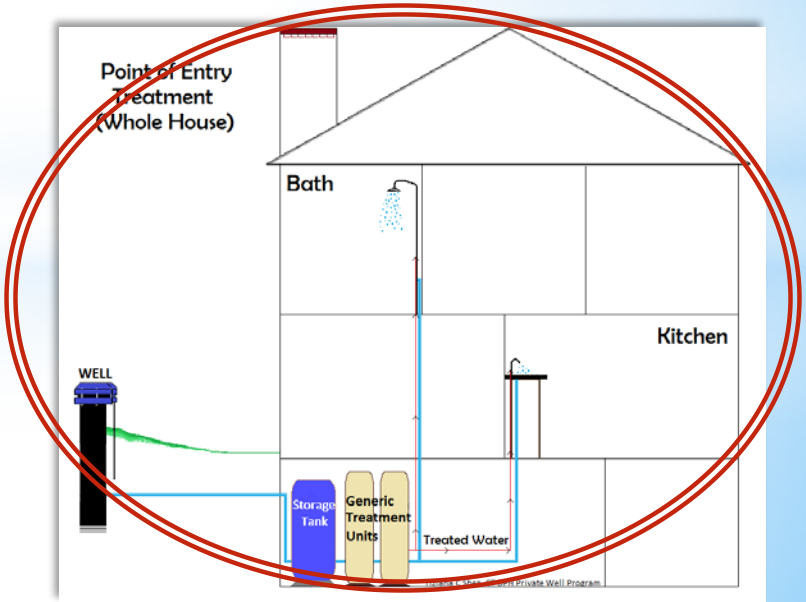
92 $5f^3 6d^1 7s^2$
U
Uranium
238.029

MCL for Uranium: 30 ug/L, ppb (0.03 mg/L, ppm)

CURRENT Bathing & Showering Guidance Level: 900 ug/L, ppb (0.9 mg/L, ppm)

Primary health concern from water consumed

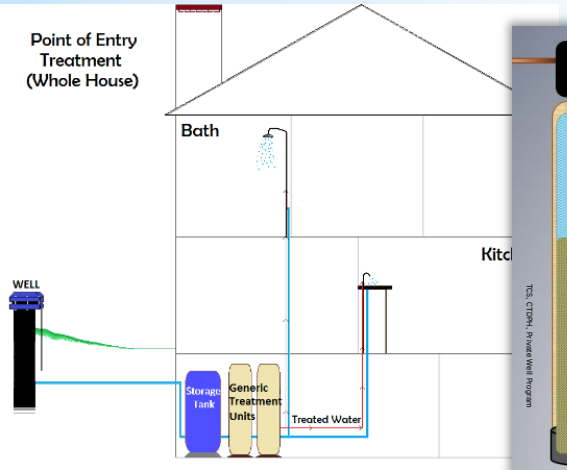


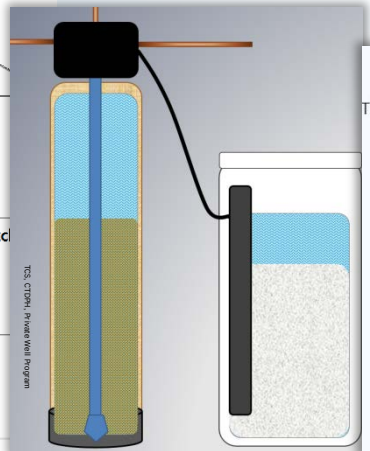


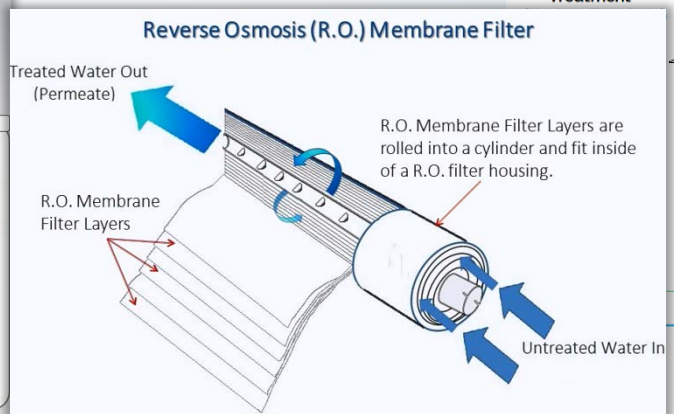
Uranium in Private Well Water: CT

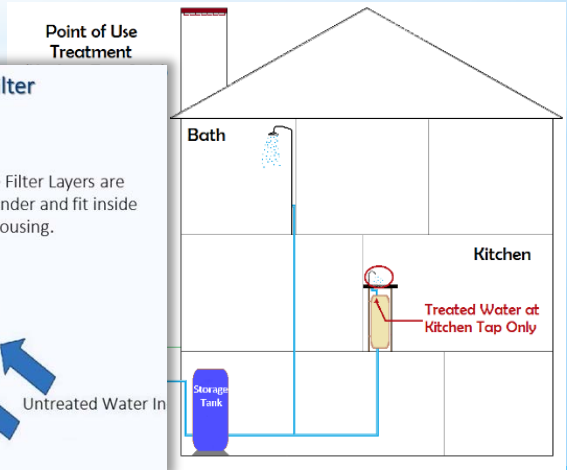
U Treatment; Point of Use vs. Whole House:

- ✓ **Reverse Osmosis** (*recommended for point of use*)
  - ✓ Above **30** ug/L
- ✓ **Anion Exchange** (*recommended for whole house*)
  - ✓ Current guidance, above **900** ug/L







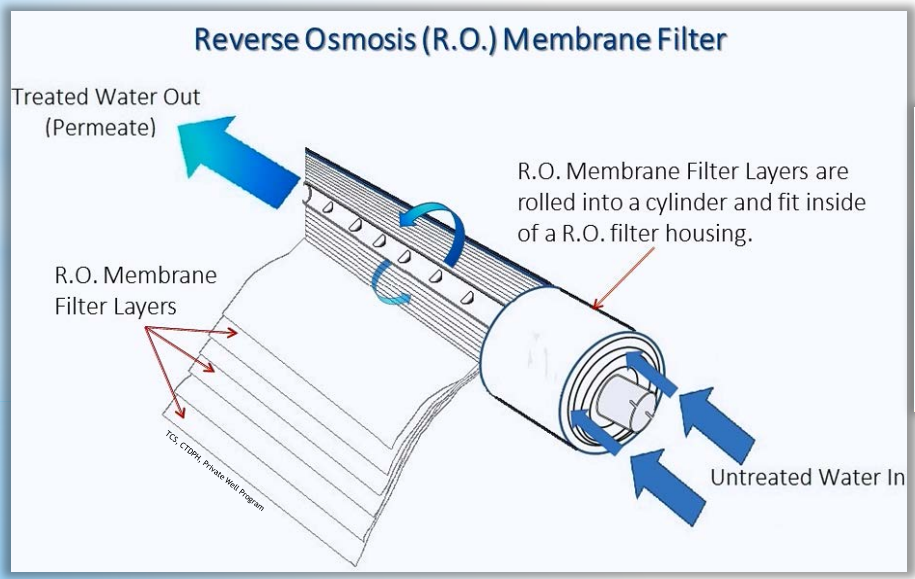


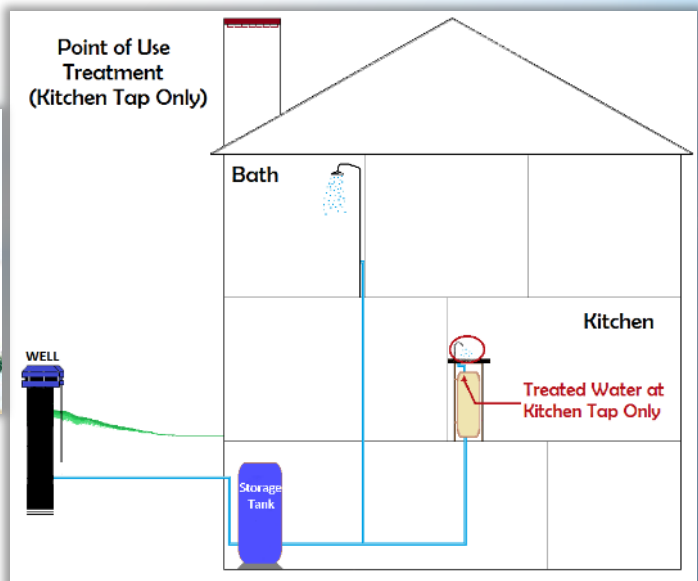
Uranium in Private Well Water: CT

Point of Use Treatment: **REVERSE OSMOSIS**

- ✓ Above 30 ug/L – less than 900 ug/L
- ✓ Uses a semi-permeable filter membrane. With the use of water pressure, water passes through but leaves certain contaminants behind on the membrane.

✓Refrigerator lines ✓Remineralization

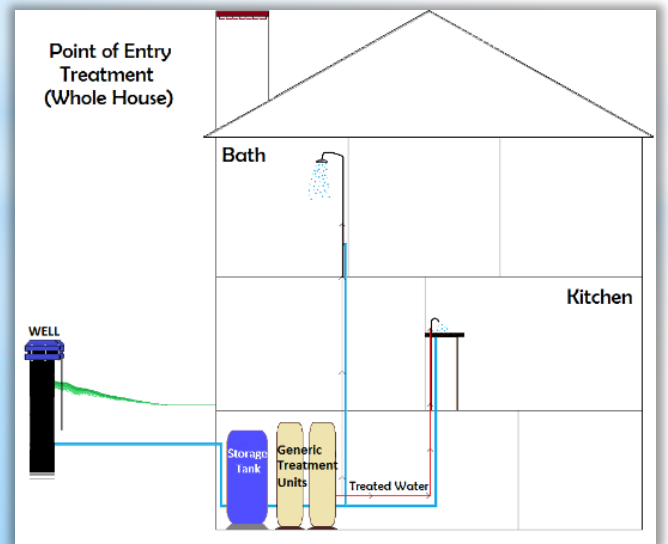


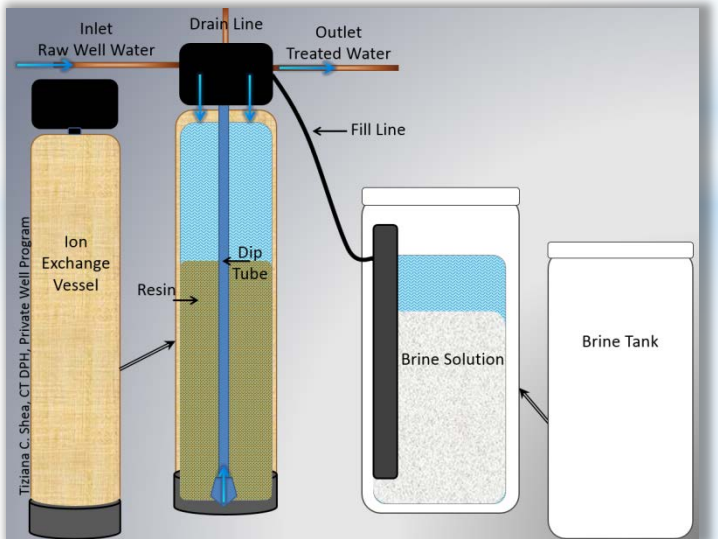


Uranium in Private Well Water: CT

Whole House Treatment: **ANION EXCHANGE**

- ✓ Above 900 ug/L (*current B&S guidance*)
- ✓ Water passes through a tank filled with anion resin media. Contaminant ions exchange places with the ions on the resin beads.
  - ✓Resin beads need to regenerate ✓Backwash (WTW – Technical Stds)



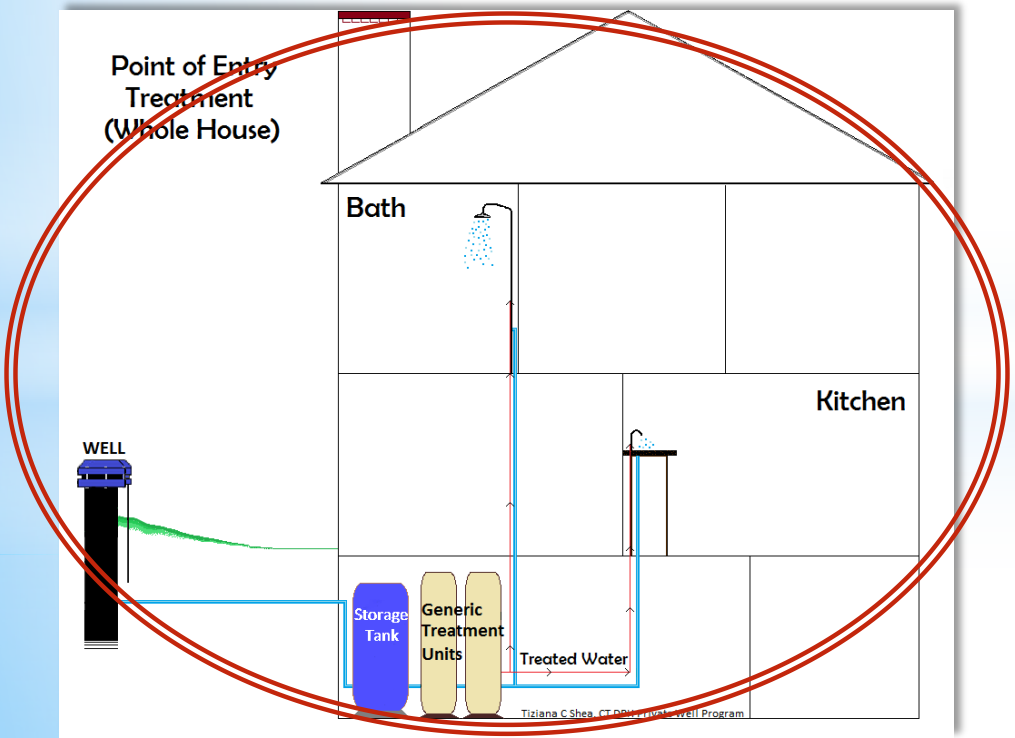


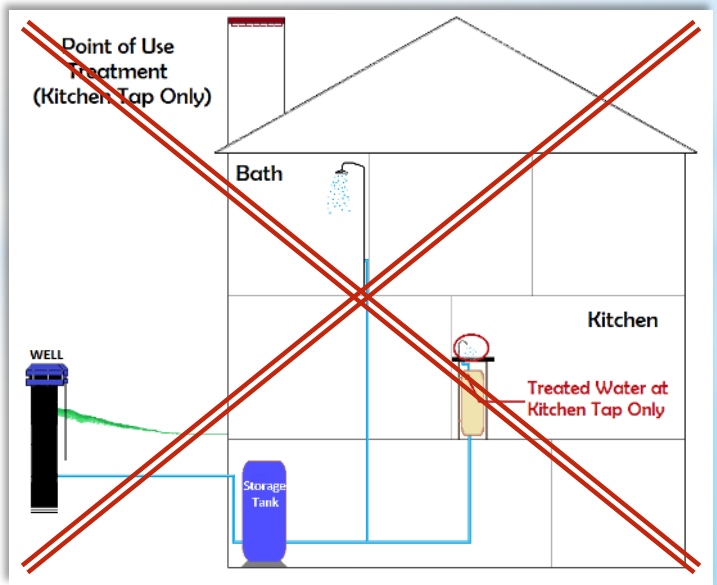
Radon in Private Well Water: Treating for Radon in Water

86 $4f^{14}5d^{10}6s^{2}6p^{6}$
Rn
Radon
(222)

Rn Guidance Level: 5,000 pCi/L

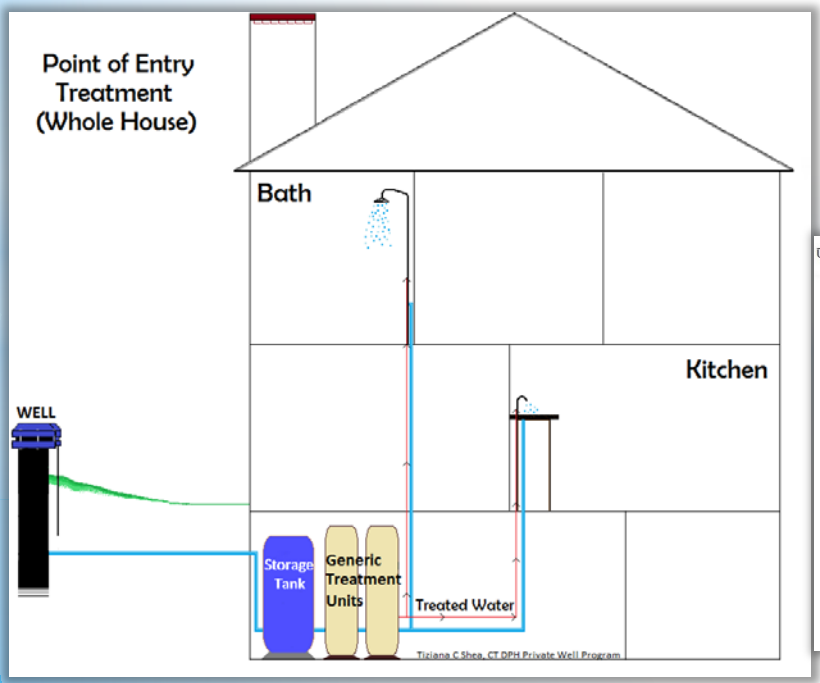
Primary health concerns are with inhalation of radon off gassing from water during use

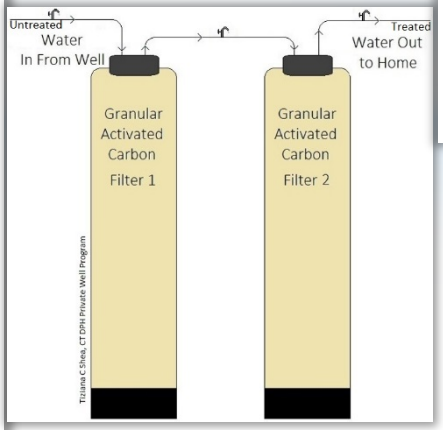


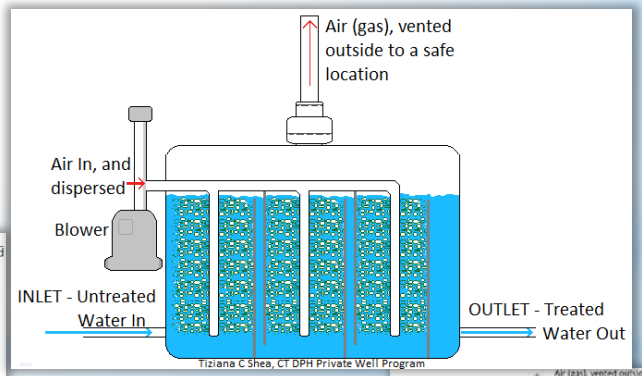


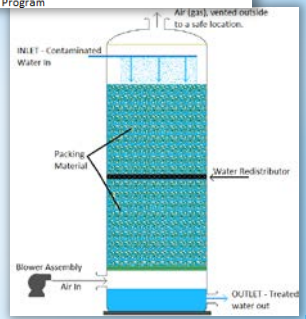
Radon in Private Well Water: Whole House Treatment Options

- **Granular Activated Carbon (GAC)**
  - ✓ Above 5,000 pCi/L – Below 10,000 pCi/L
- **Aeration** (*Recommended Option*)
  - ✓ Above 10,000 pCi/L



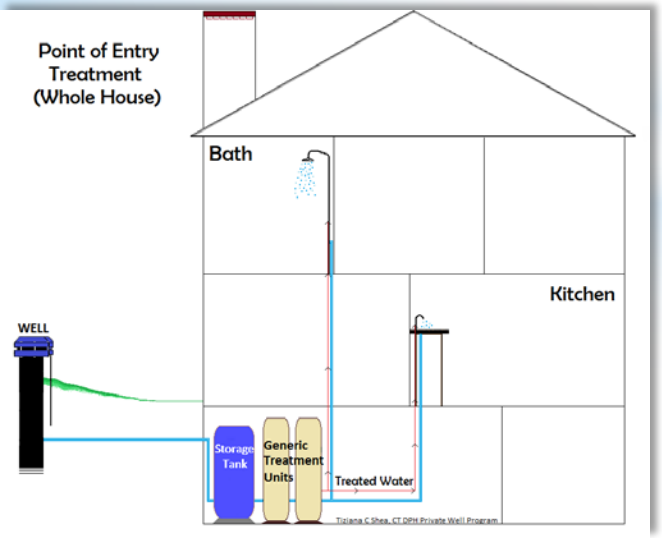


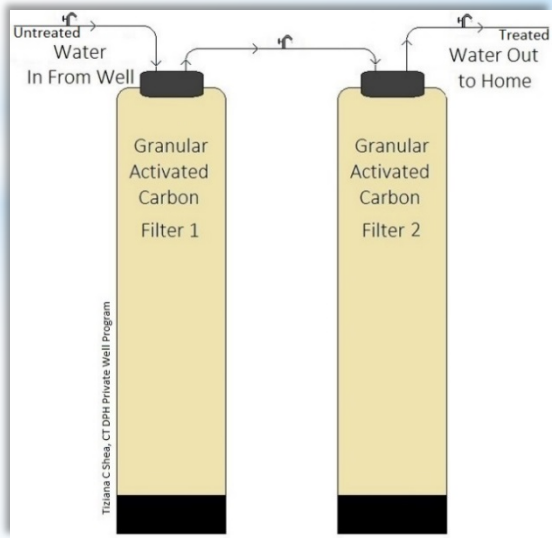




Radon in Private Well Water: GAC Treatment (Whole House)

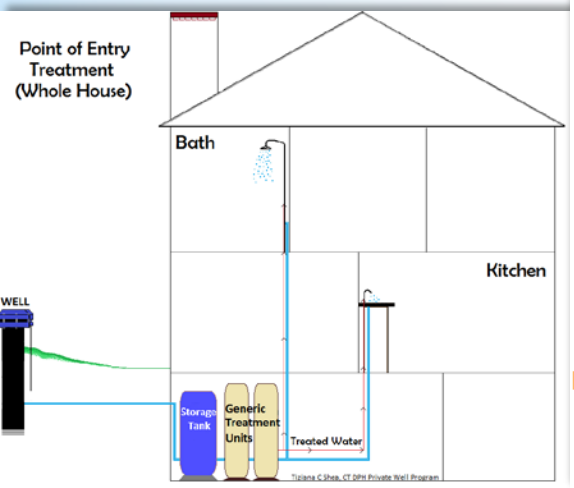
- ✓ For levels above 5,000 pCi/L – below 10,000 pCi/L
- ✓ Water passes through a tank filled with granular activated carbon media. Contaminants are adsorbed onto its surface.
  - ✓Media filter MUST be changed regularly (radioactivity can collect)
  - ✓All water treatment devices require general maintenance

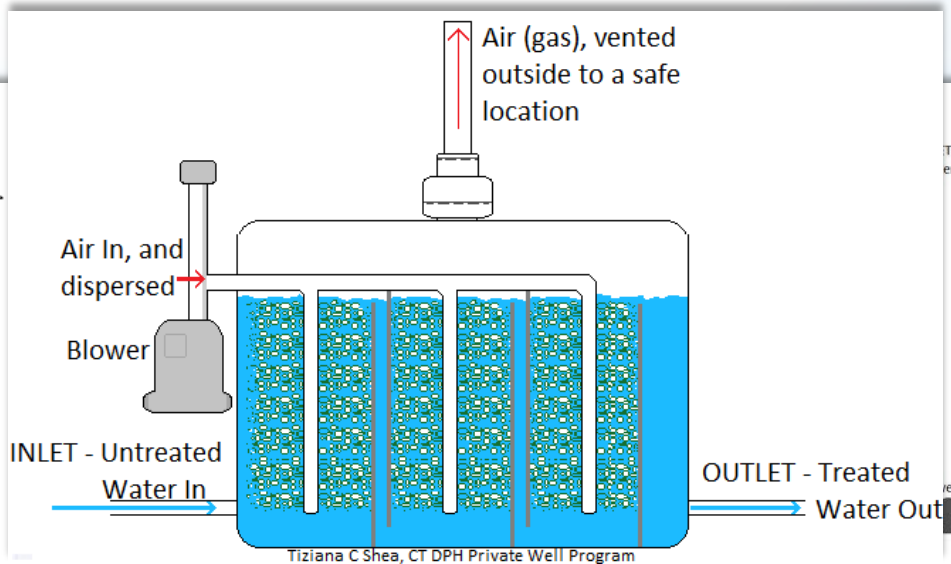


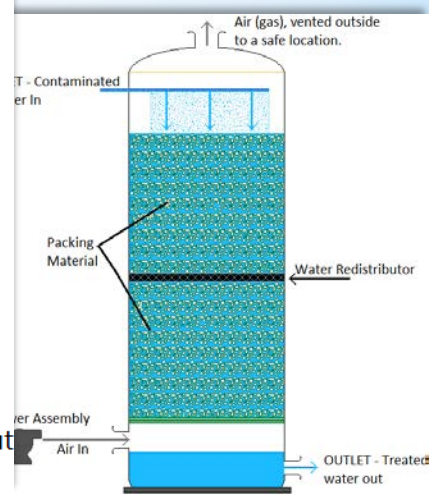


Radon in Private Well Water: Aeration Treatment (Whole House)

- ✓ For radon levels above 10,000 pCi/L
- ✓ Aeration mixes or circulates untreated water with air, promoting radon gas to release into the atmosphere, then is properly vented outdoors.
  - ✓All water treatment devices require general maintenance







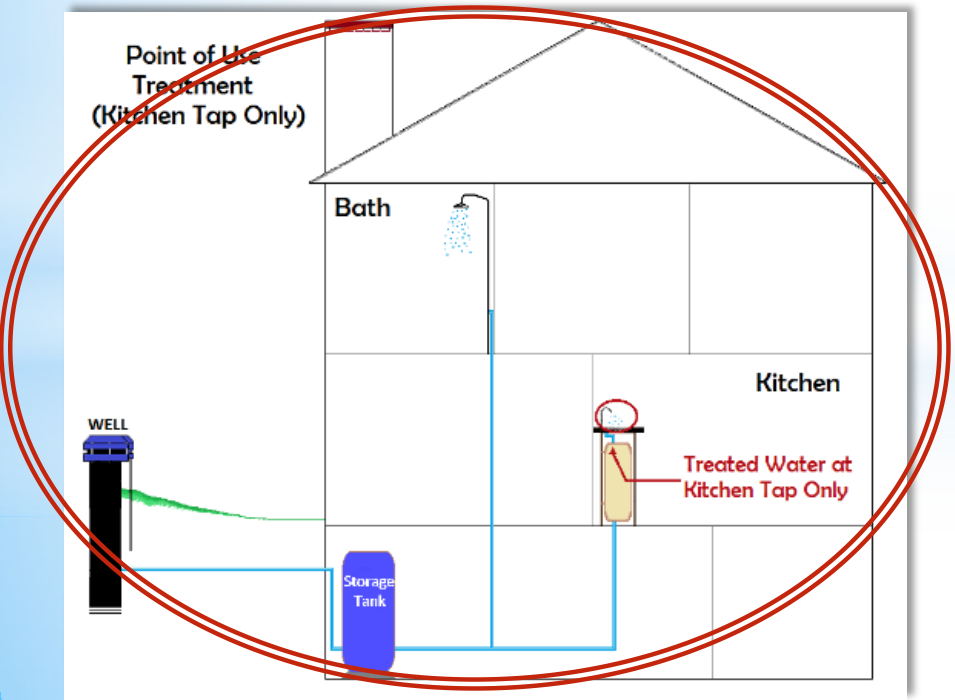
Treating for Radium in PW Water

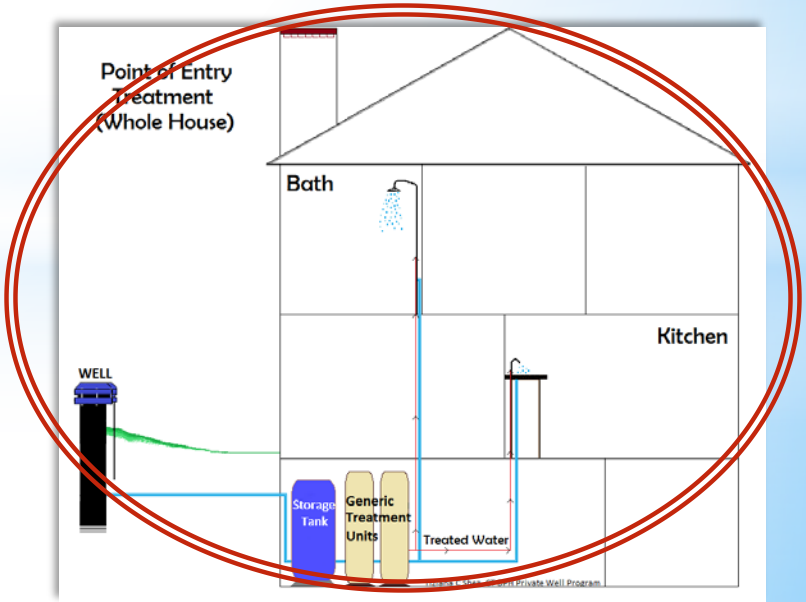
88 $7s^2$
Ra
Radium
(226)

MCL for Radium (combined Ra-226 & Ra-228): 5 pCi/L

CURRENT Bathing & Showering Guidance Level: 150 pCi/L

Primary health concern from water consumed

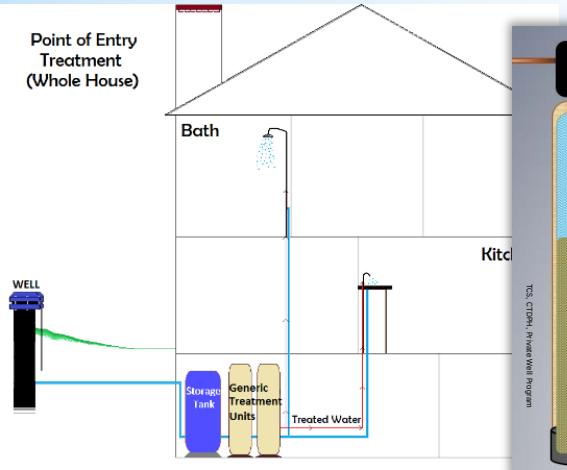


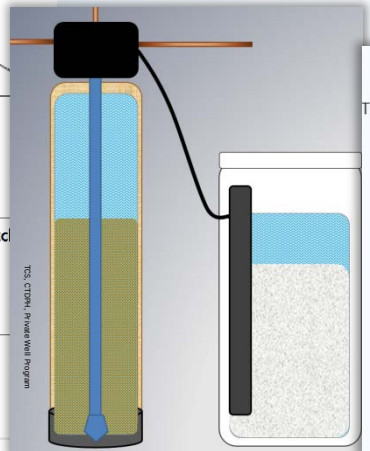


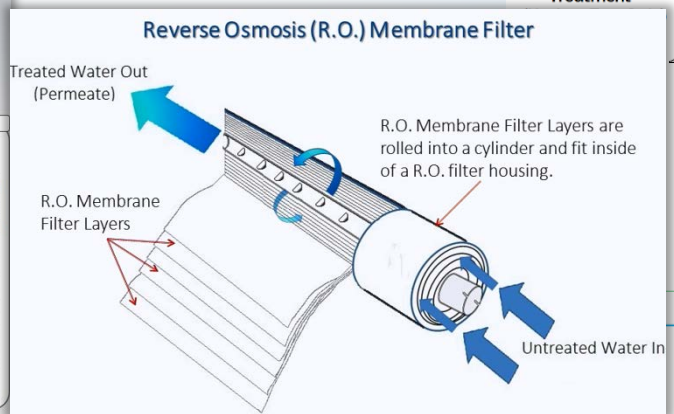
Radium in Private Well Water: CT

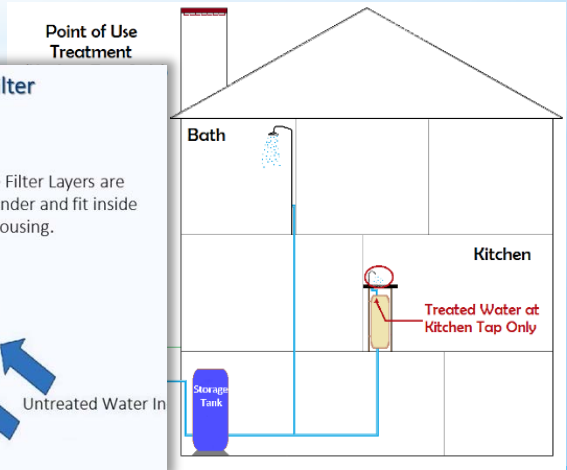
Ra Treatment; Point of Use vs. Whole House:

- ✓ **Reverse Osmosis** (*recommended for point of use*)
  - ✓ Above **30** ug/L
- ✓ **Cation Exchange** (*recommended for whole house*)
  - ✓ Current guidance, above **900** ug/L







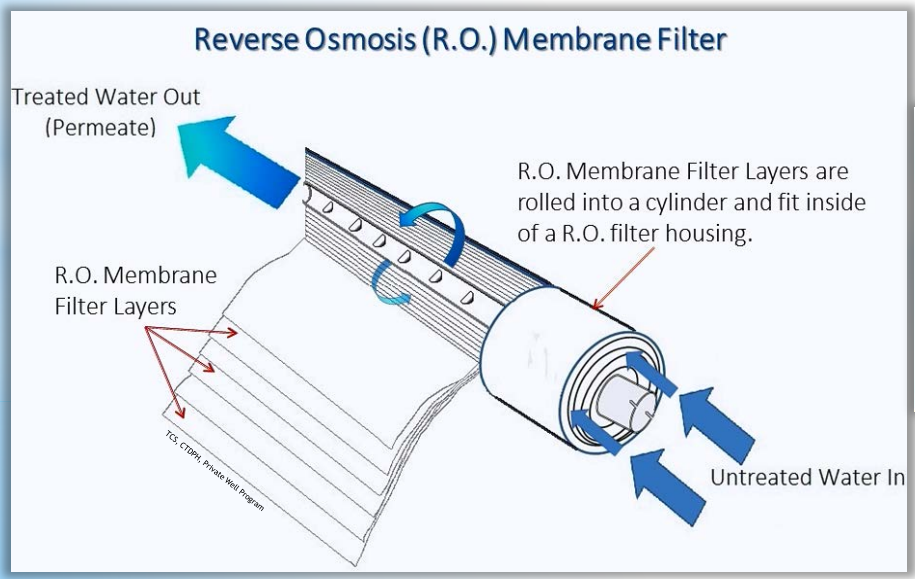


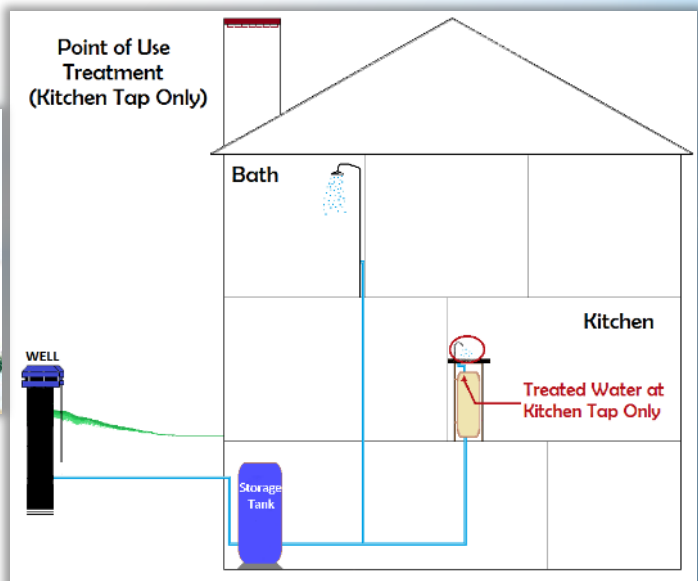
Radium in Private Well Water: CT

Point of Use Treatment: **REVERSE OSMOSIS**

- ✓ Above 5 pCi/L
- ✓ Uses a semi-permeable filter membrane. With the use of water pressure, water passes through but leaves certain contaminants behind on the membrane.

✓Refrigerator lines ✓Remineralization

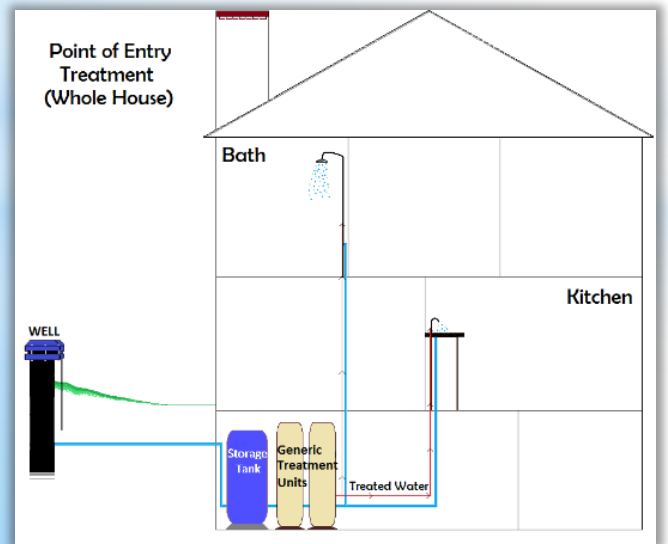


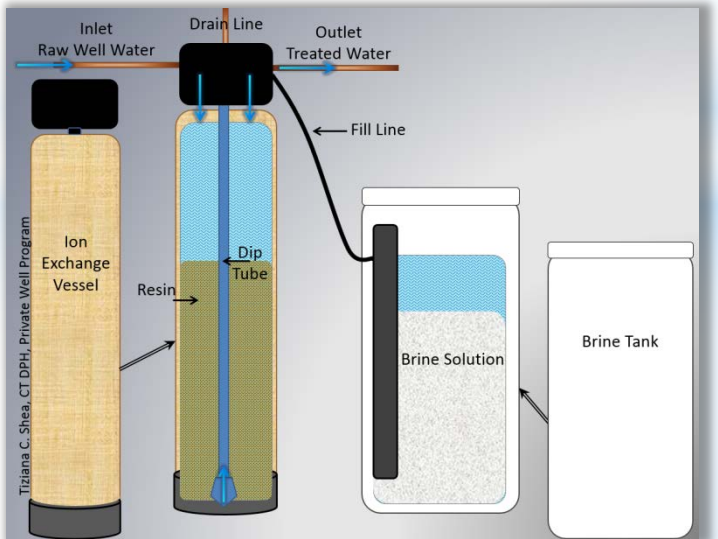


Radium in Private Well Water: CT

Whole House Treatment: **CATION EXCHANGE**

- ✓ Above 150 pCi/L
- ✓ Water passes through a tank filled with anion resin media. Contaminant ions exchange places with the ions on the resin beads.
  - ✓Resin beads need to regenerate ✓Backwash (WTW – Technical Stds)





U, Rn, Ra in Private Well Water: CT Resources for Treatment Questions

All treatment requires maintenance, once it's installed don't forget about it.

CT Department of Public Health – Private Well Program

PRIVATE WELL WATER TREATMENT

How to Get Started and Helpful Resources

If you tested your private well water quality and water test results indicate that you have a problem, you may need to consider installation of a water treatment system. (*Refer to Publication #24: Private Well Testing for information on what to test for.*)

When shopping for water treatment equipment, be a good consumer and do your research. The State of Connecticut does not license home water treatment devices and sometimes treatment installers may not have the appropriate license for the work they are performing. The Connecticut Department of Consumer Protection (CT DCP) licenses plumbers, the following CT DCP plumbing license types include work related to water conditioning (treatment):

- P1 & P2 – all plumbing and piping work
- J1 & J2 – limited to domestic water pumps and water conditioning

The Connecticut Department of Public Health (CT DPH), Private Well Program does not maintain a list of instate well water treatment contractors or products. You can search for a contractor by doing an internet search, by using the yellow pages or by word of mouth. It is recommended that you ensure that the treatment contractor you choose is knowledgeable and has the appropriate license(s) for the work that is being done. Ask for referrals and contact them to determine customer satisfaction. Talk with your local health department, neighbors, or others to see if they have had any experience, good or bad, with the company. Contact the Connecticut Department of Consumer Protection Occupational & Professional Licensing Division at (860) 713-6135 for more information on professional licenses.

Refer to Publication #19: Questions to Ask When Purchasing Water Treatment Equipment for Your Home for information regarding things to consider and questions to ask when you are making decisions related to purchasing water treatment equipment.

Some well water treatment systems are rated by a third party organization such as the National Sanitation Foundation International (NSF). NSF is a non-profit organization that evaluates water treatment equipment to determine the validity of its product claims. Products that are NSF tested and certified will display the NSF listing mark on the product or in its advertising literature and can also be found on their website.

If you'd like information regarding a specific treatment type, please refer to the publications listed under the "Publications and Fact Sheets" of the CT DPH, Private Well Program website.

PRIVATE WELL WATER IN CONNECTICUT

Publication Date: June 2016

Publication # 19: Questions to Ask when Purchasing Water Treatment Equipment for Your Home

When shopping for water treatment equipment, be a good consumer and do your research. The State of Connecticut does not license home water treatment devices and some treatment installers may not have appropriate licenses for the work they are performing. Consumers need to be informed of treatment products that they install and be mindful of advertising claims that appear too good to be true. This publication provides questions you should ask before purchasing any water treatment equipment.

The first step in choosing a water treatment device is to have your water tested. Refer to Publication #24: *Private Well Testing* for information on what to test for. You may also want to contact your Local Health Department to determine if there are any known contaminants in your neighborhood. Be wary of "free" water testing offered by a water treatment company. It is better to rely on independent water tests conducted by a state certified laboratory to identify and evaluate specific contaminants.

If the water test indicates that you have a problem, installation of a treatment system may be necessary to remedy it. Be aware that installation of water treatment equipment requires attention to the following points:

- Determine what the specific maintenance needs are for the unit you are installing. You may need to contract with a knowledgeable individual or company to service your treatment unit(s) on a routine basis.
- Some whole house treatment systems may need to be periodically backwashed, which will require a means for treatment backwash wastewater disposal. Treatment backwash may be necessary to lift and clean the filter media of some treatment devices. This process may flush some unwanted contaminants from the treatment media and helps to restore the quality of the filter media.

Summary

The purchase of water treatment equipment is a decision that must be carefully considered. Whether the purchase is being made to improve the aesthetic characteristics of the water or to address health consideration, many factors must be determined. You may want to keep a logbook, allowing you to keep track of all maintenance and repairs on your treatment system.

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General, CT DPH Private Well Online Resources:

www.ct.gov/dph/privatewells

https://testyourwell.ct.gov/

www.ct.gov/dph/radon

www.ct.gov/dph/environmentalhealth

CT DPH - Environmental Health Section

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Thank You