

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 4^o-6^o 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.

DIAGRAM 1

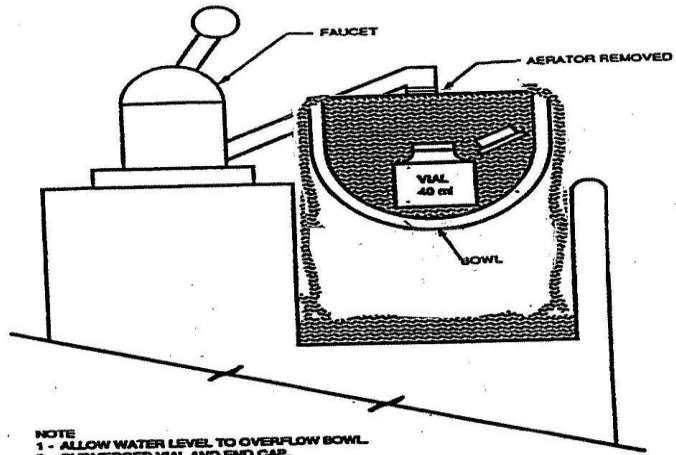
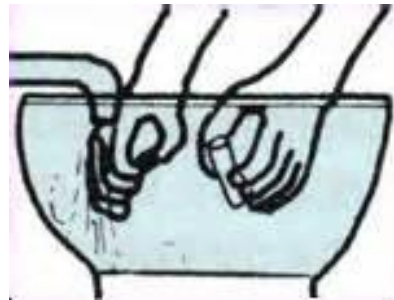


DIAGRAM 2



III. Syringe Technique

(For laboratories that supply radon-in-water test kits that contain the liquid scintillation cocktail)



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

1. Attach a sampling funnel and tubing to the **non-aerated** faucet.
2. Turn on the water and allow a steady flow for two minutes.
3. Slow the water flow and invert the funnel (mouth up). Adjust the flow so that the pool water in the funnel cavity is not turbulent.
4. Insert the needle of a **20 ml** hypodermic syringe below the water surface, withdraw several ml of water and discard. Repeat this rinse several times.
5. Withdraw 12-15 ml of water slowly to minimize air bubbles. Invert syringe to eject any air bubbles and retain 10 ml of water.
6. Place the syringe needle under the surface of an appropriate organic accepting liquid scintillation cocktail contained in a 20 ml glass scintillation vial and slowly eject the water from the syringe into the cocktail.
7. Slowly withdraw the syringe and tightly cap the vial using a TFE or foil-lined cap. Seal with electrical tape.
8. After the glass 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.

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