AWQC

RADIOACTIVITY TESTING SERVICES

- High quality analytical services
- Leading edge research
- Solving water quality issues

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NATA
WORLD RECOGNISED ACCREDITATION

bsi. ISO 9001:2015 Quality Management

Sources of radiation

Sources of radiation are all around us. Some occur naturally in the environment and some are human-made. Radiological contamination of drinking water can result from:

- Naturally occurring concentrations of radioactive materials, such as the radionuclides of the radium, uranium and thorium, being absorbed by groundwater as it moves through the earth.
- Technological processes involving high concentrations of naturally radioactive materials, such as mining.

By far the largest proportion of human exposure to radiation comes from natural external sources including ingestion or inhalation of radioactive materials and solar radiation. While a very low proportion of the total human exposure comes from drinking water, there is evidence from both human and animal studies that low to moderate radiation dose exposure can increase the long-term incidence of genetic disorders and cancer.

For these reasons, the World Health Organisation and Australian Drinking Water Guidelines (ADWG) recommend drinking water and source water supplies be routinely monitored for radioactivity.

Radioactivity monitoring

The AWDG recommend an annual dose of 1 mSv per year should be applied for radioactivity in drinking water. If the dose is above 1 mSv per year, the source water should be analysed on a more regular basis. However, if the dose from the use of a water supply exceeds 10 mSv per year, immediate action must be taken to reduce the existing or potential exposure.

The process of identifying individual radioactive species and determining their concentrations in water requires sophisticated and expensive analysis, which is normally not justified due to concentrations in most circumstances being low. For this reason, a more practical approach involves using a screening procedure, where the total radioactivity present in the form of alpha and beta radiation.
The ADWG state that samples with measured activity above the 0.5 Bq/l guideline should be further investigated. For example, the impact of uranium, radium and lead isotopes on dose should be considered.

Where source water is groundwater or water that has contacted minerals (such as soil) the water should also be tested for radon (Rn222) because this nuclide will not be detected by the gross alpha beta method. The ADWG has a limit of 100 Bq/l for Rn222.

The Australian Drinking Water Quality guidelines for gross alpha, gross beta and radon 222 for a range of waters are:

	Gross alpha	Gross beta	Radon 222
Water use	**Screening value (Bq1-¹)**		
Drinking water - human	0.5Bq/L	0.5Bq/L	<100 Bq/L
Drinking water - livestock	0.5Bq/L	0.5Bq/L	<100 Bq/L
Irrigation	0.5Bq/L	0.5Bq/L	
Recreational	0.1Bq/L	0.1Bq/L	

AWQC radiation testing services

Our NATA accredited radiation testing and analysis is provided for gross alpha, beta, radon 222 (Rn-222), radium 226 and 228, lead 210, polonium 210 and total uranium and thorium for a range of water matrices, including drinking water, and source waters such as groundwater and wastewater.

Features of our radiation testing services include:

- high sensitivity with lower limits of detection
- fast turnaround times
- rapid response services for health-related incidents
- local expertise to help with technical enquiries.

Radiation testing	Unit	Turnaround times	Water/wastewater matrix
Gross alpha	Bq/L	5 and 10 days	Yes
Gross beta (K40 corrected)	Bq/L	5 and 10 days	Yes
Radon 222	Bq/L	24 hrs and 48 hrs 5 and 10 days	Yes
Radium 226 and 228	Bq/L	5, 25 and 35 days	Yes
Lead 210	Bq/L	25 and 25 days	Yes
Polomium 210	Bq/L	15 and 45 days	Yes
Total uranium and thorium by ICP-MS	mg/L	5 days	Yes
Annual dose	mSv/year		Derived calculation

Locations

250 Victoria Square/Tarntanyangga
ADELAIDE SA 5000

158 Fulham Road
ALPHINGTON, VIC 3078

Call us on 1300 653 366
awqc.com.au