

Elevated uranium in shallow fractured granitic aquifers, NW India: a structural and geochemical perspective

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Fractured rock aquifers are the major source for drinking water purposes in arid and semi-arid regions. But these are not monitored periodically and not all aquifers are safe for drinking purposes due to the presence of naturally occurring emerging contaminants. One of the contaminants is uranium which occurs naturally in groundwater and its assessment for drinking water is important for public health. The present work was carried out to investigate the occurrence and distribution of uranium in groundwater based on the structural and geochemical study. The uranium concentration in groundwater varies from 10.1 ppb to 62.5 ppb with a mean of 30.65 ppb. About 46% of the samples were falling above the drinking water limit of 30 ppb set by WHO. It is observed that uranium concentration in groundwater depends upon lithology, weathering, and rainfall recharge in the area. A higher concentration of uranium was found in the granitic aquifers and varied along with the groundwater table condition. The study shows higher uranium concentration confined along the shear zones where the degree of fracturing is more as compared to brittle zones. The study finds that a combination of different factors such as rock containing uranium (mostly granite), oxidizing conditions that leach out uranium from the rocks and make it soluble, and the groundwater chemistry with high carbonate in which uranium is attached and thus become mobile, contributed elevated uranium concentration in these fractured rock aquifers.