

Frequently Asked Questions about Uranium in Mineral Water

BfR FAQs, 28 January 2009

In the past, the Federal Institute for Risk Assessment (BfR) had assessed the possible health risks associated in particular with uranium levels in mineral water that is claimed to be suitable for the preparation of infant formula. For these waters the Institute had suggested a maximum uranium level which has since been taken over into the Ordinance on Natural Mineral Water, Spring Water and Table Water. As BfR has also received several enquiries about uranium in drinking and mineral waters prompted by the recent media coverage, we have compiled the following questions:

Why can drinking and mineral waters contain uranium?

Uranium occurs in varying concentrations and compounds in rocks, minerals, water, soil and the air. Furthermore, uranium can also be introduced into the environment by human beings, for instance via mineral phosphorous fertilisers. As uranium occurs in many areas on earth, food like drinking and mineral water may also contain traces of it. Depending on the soil conditions, the uranium levels in water may vary from region to region.

Does uranium in drinking or mineral water constitute a health risk?

Uranium is a radioactive heavy metal. In food it only occurs at comparatively low levels. With regard to the consumption of drinking and mineral water, radioactivity is not, therefore, of any importance when it comes to potential risks. There could, however, be a risk from the chemical properties of the substance when higher concentrations of renal toxic uranium are taken in over a longer period.

Are there binding statutory maximum levels for uranium in drinking or mineral water?

Up to now, there is no statutory binding maximum level for uranium in drinking water either on the national or the European levels. This also applies - with one exception - to mineral, spring and table water. When manufacturers claim that these waters are suitable for the preparation of infant formula, they may not contain more than 2 microgram uranium per litre. In 2006 BfR assessed mineral water intended for infant formula and recommended this maximum level. In the meantime, this maximum level has been taken over into the Ordinance on Natural Mineral Water, Spring Water and Table Water.

BfR based its assessment on the International Guidelines for Drinking Water Quality of the World Health Organisation (WHO). They indicate a guideline value for uranium of 15 microgram per litre. This value does not take into account any possible special exposure of consumers. Hence individual countries can still adapt it to their respective conditions like, for instance, the prevailing soil conditions or specific eating habits.

In Germany the Federal Environmental Agency (UBA), which is responsible for assessing drinking water quality, recommends compliance with a guideline value of 10 microgram uranium per litre water.

Why did BfR correct its maximum level recommendation for uranium in mineral water for infant formula from 2005?

Mineral, spring and table waters, which are claimed to be "suitable for the preparation of infant formula", must meet special requirements. For instance, they may only contain a maximum of 2 microgram uranium per litre. BfR had recommended this maximum level in its opinion of 16 January 2006 which corrected its recommendation from 2005. Because of open

questions about the radioactive effects of the heavy metal and the associated, possibly carcinogenic effect, the Institute had recommended a maximum level of only 0.2 microgram uranium per litre at that time. Since then it has become clear that the radioactive effect of the levels of uranium that occur in mineral waters is of no importance for potential health risks. Hence, only the chemical effects of uranium were taken into account when setting the corrected maximum level.

How did BfR establish its recommended maximum level proposal for uranium in mineral waters that are claimed to be suitable for the manufacture of infant formula?

When setting the maximum uranium level for mineral waters that are claimed to be “suitable for the production of infant formula”, BfR based this on the TDI value that the World Health Organisation (WHO) had set for uranium. TDI stands for Tolerable Daily Intake and indicates the amount of a substance that a person can take in daily over a lifetime without any appreciable health risk. For uranium this TDI is 0.6 microgram uranium per kilogram bodyweight and day. Short-term, minor exceedings of this value do not constitute a health risk either because sufficient safety factors were taken into account when setting the TDI and it was based on lifelong, daily intake.

Infants, who are fed solely with infant formula, take in comparatively large amounts of water and have a low bodyweight. The “front runner” is, as shown by food consumption studies, a three-month-old male infant with a bodyweight of 6.5 kilogram. He takes in approximately 670 gram water per day via infant formula. In its risk assessment, BfR chose him as the “model” because he consumes the highest amount of water compared with his weight and would, therefore, take in the highest amount of uranium per kilogram bodyweight. This “high level consumer” would also comply with the TDI of the World Health Organisation if the water contained up to 6 microgram uranium per litre. Only three months later, this infant has a bodyweight and water consumption that allow a uranium level in drinking water of 10 microgram uranium per litre without exceeding the WHO TDI. Hence, at uranium levels below 10 microgram per litre drinking or mineral water, BfR does not see any elevated health risk and believes these waters to be completely suitable for the preparation of infant formula.

Mineral waters, which are expressly advertised for the preparation of infant formula, must satisfy specific requirements because of these advertising claims. Their uranium content must also differ considerably from the content of all other waters. BfR has, therefore, recommended a stricter maximum uranium level of only 2 microgram per litre for waters with claims of this kind. There is a similar situation for other undesirable components of natural mineral waters like for instance nitrate, fluoride or sulphate, too.

Why may drinking water contain more uranium than mineral water which is advertised for infant formula?

Drinking water is a food for normal consumption which is not advertised specifically for any consumer group. Studies have shown that uranium levels in drinking water are mostly below 2 microgram uranium per litre. Hence, they are also below the national drinking water guideline value of the Federal Environmental Agency of 10 microgram uranium per litre drinking water and the international guideline value in the WHO Guidelines for Drinking Water Quality of 15 microgram uranium per litre.

The situation is different in the case of mineral, spring and table waters that are expressly claimed to be “suitable for the preparation of infant formula”. In order to protect consumers from misleading information, the Mineral and Table Water Ordinance prescribes maximum levels for uranium and other undesirable components. In 2006 BfR recommended that the uranium level for these waters should be a maximum of 2 microgram per litre. This maximum

level has been taken over into the Mineral and Table Water Ordinance. The Mineral and Table Water Ordinance can be accessed on the Internet at www.bundesrecht.juris.de (in German only).

Is drinking water suitable for the preparation of infant formula?

The Federal Environmental Agency (UBA) and the Federal Institute for Risk Assessment both agree that there is no elevated health risk in conjunction with uranium levels below 10 microgram per litre drinking water or packaged water (including natural mineral waters). Waters of this kind are also completely suitable for the preparation of infant formula.

One exception is water which is recovered from the few regions in Germany in which the uranium level is far higher than the UBA guideline value of 10 microgram uranium per litre or the WHO drinking water guideline value of 15 microgram uranium per litre. In these regions parents should prepare infant formula with mineral waters that are expressly claimed to be suitable for this purpose as a precautionary measure.

Packaged water that expressly claims to be “suitable for the preparation of infant formula” must satisfy specific special requirements because of these advertising claims, and must differ considerably in terms of its uranium level from other waters.

How can consumers find out how much uranium is contained in their drinking and mineral water?

The competent authorities of the federal states and communes are the first contacts for questions about uranium levels in drinking water. Local water suppliers can also provide information on this. The uranium level need not be stipulated on bottled mineral water. Consumers can obtain information on the uranium levels in mineral waters from the manufacturers.

What else is BfR doing to protect consumers?

BfR recommends the setting of a European maximum level for uranium in drinking and mineral waters. A maximum level for uranium in all mineral waters would have to be set on the European level. As the corresponding EU Directive 2003/40/EC has not contained any provisions for uranium up to now, BfR has suggested to the European Food Safety Authority (EFSA) that uranium in food, particularly in mineral waters, should be assessed, and an acceptable daily intake established. This health assessment could then serve as the foundation for the setting of a maximum level for uranium in mineral waters by the EU Member States.