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March 10, 2011

Mr. Tom Atwood
c/o Desert View Estates Water Corporation (DVEWC)
P.O. Box 165
Kuna, ID 83634

RE: Desert View Estates Update—Health Hazard from Ground Water Mitigated in Community near Kuna, ID

Dear Mr. Atwood and the Water Corporation Board:

This letter is a follow-up to our 2007 health consultation, Desert View Estates Water System: Evaluation of Uranium and Alpha Particles in Drinking Water (ATSDR 2007). The 2007 report was written for Desert View Estates Water Corporation (DVEWC) in order to evaluate the health risk posed by uranium in your drinking water system. It is our understanding that a new well was drilled and is now providing the drinking water for the community system and two of the original wells are dedicated to irrigation alone. As a follow-up, we have evaluated and documented the improvement in the water and the reduction of health hazards due to this upgrade.

Background

From December 2004 until January 28, 2010, DVEWC had been under a consent order from the Idaho Department of Environmental Quality (IDEQ) to resolve the uranium problem in their public drinking water. In April 2007, the Bureau of Community and Environmental Health (BCEH) was asked by the DVEWC shareholders to give a brief presentation at the annual board meeting regarding health effects of uranium exposure. At this meeting, shareholders requested that BCEH conduct a health consultation to better address the concerns of shareholders.

What were the findings of the previous health consultation?
In 2007, the levels of uranium in DVEWC water were approximately 2-3 times higher than the Environmental Protection Agency's (EPA) Maximum Contaminant Level (MCL) for uranium of 30 µg/L (micrograms per liter) (EPA 2003). The naturally-occurring uranium found in the wells at Desert View Estates is radioactive, but, based on numerous human and animal studies (ATSDR 1999), there is no evidence that the levels of radioactivity in the water would cause cancer.

In the 2007 health consultation, levels of uranium in the Desert View Estates drinking water presented a hazard for children given the potential for causing kidney damage; however, it was not expected that there would be outward symptoms of this damage. There was also concern for possible kidney damage in adults (ATSDR 1999; Kurttio et al. 2002). Due to potential health risks, it was recommended at that time that precautions be taken to reduce the risk of kidney damage from consuming large amounts of uranium-containing water (ATSDR 2007).

How has the situation improved?
DVEWC received a loan from the IDEQ to drill a new, deeper well to supply the subdivision with drinking water. This new well (Well #5) was put online in January 2010. Two of the original three wells continue to be used for outdoor irrigation in the community.

The most recent compliance sampling results are shown in Tables 1 and 2 below. EPA allows for a surrogate of uranium (gross alpha activity) to be used to screen for uranium in drinking water. Gross alpha is the total alpha radiation emitted by both uranium and radium. If the gross alpha level is greater than 15 picocuries per liter (pCi/L), then uranium-specific analysis of the water is required (EPA 2003).

Table 1: Compliance sampling results for Well #5, May 2010

Contaminant	*Measured Concentration*	*MCL*	*Exceeds MCL?*
Gross Alpha	1.73 ±0.93 pCi/L	15 pCi/L*	No
Uranium (total)	non-detect (<1 µg/L)	30 µg/L^	No

**EPA 2000*
^EPA 2003
MCL: Maximum Contaminant Level
pCi/L: picocuries per liter
µg/L: micrograms per liter

Table 2: Compliance sampling results for Well #5, August 2010

Contaminant	*Measured Concentration*	*MCL*	*Exceeds MCL?*
Gross Alpha	2.51 ±1.11 pCi/L	15 pCi/L*	No
Uranium (total)	not required to be tested	30 µg/L^	No

**EPA 2000*
^EPA 2003
MCL: Maximum Contaminant Level
pCi/L: picocuries per liter
µg/L: micrograms per liter

Water from the new well (Well #5) that now supplies household tap water to all residents is below the MCL for uranium and for gross alpha radiation. Therefore, there are no anticipated health risks associated with adults or children consuming this water.

What about possible uranium residue in the water lines?
The household delivery system water lines have been flushed and there is no evidence that uranium leaves residual contamination that could enter into household tap water.

Can uranium affect plants, livestock or household animals?
Since the original two wells used for irrigation still have elevated uranium levels, there is some concern for uranium uptake into food when raising fruits and vegetables. Uranium can be absorbed and concentrated in some plants, including vegetables, if the water or the soil or both contain uranium. Root vegetables (e.g., radishes, carrots, potatoes) and leafy greens (e.g., lettuce, spinach) absorb the most uranium based on a study in Nambe, New Mexico (Hayes et al. 2000). This study started with uranium-free soil and then irrigated vegetables with varying concentrations of uranium-containing water. Vegetables take up uranium directly from water, and also from uranium deposited by the water into soil. Uranium uptake is dependent on many soil conditions, however, and it is unlikely that uranium would be taken up into vegetables as much from soils at Desert View Estates as from those in New Mexico. Soil pH at Desert View Estates ranges from 7.2 to 7.6 with no carbonates present (USDA NRCS, accessed 2011). In Nambe, New Mexico, the soil pH ranged from 7.6 to 7.9 with an abundance of carbonates; these are conditions that are more favorable for uptake of uranium from soil into plants. Since overall more uranium is taken up from soil than directly from water, the uranium concentration in root vegetables and leafy greens watered with Desert View Estates irrigation water would theoretically be lower than the concentration in the same vegetables grown in New Mexico. We do not have soil uranium or vegetable uranium concentrations from Desert View Estates to verify this assertion, but the science supports this conclusion.

If residents of Desert View Estates consume large quantities of home-grown leafy greens or root vegetables, they may still want to grow these vegetables using an alternative water source (such as the household tap water) even though uptake is likely lower than what was recorded in the New Mexico study. Fruit trees and other fruits (including tomatoes) minimally absorb uranium and are not considered to pose a health concern if watered with the irrigation water.

Airborne uranium particles present in soil and dust where uranium water has been applied can deposit on vegetables, but this fraction is expected to be less than 1% (Shang 2006) and is easily removed by washing. It should also be noted that phosphate fertilizers contain appreciable levels of uranium that can accumulate in soils and be taken up into vegetables or deposited on their surfaces. It is recommended that all vegetables grown using irrigation water and/or fertilized with phosphates at Desert View Estates be thoroughly washed before eating.

Animals including livestock, chickens and household pets that drink water containing uranium are not expected to have any noticeable health effects from the irrigation water, though the animals may have kidney effects without outward symptoms (IAEA 1994; DOE 2003; Kurttio et al. 2002). Adults and children can eat chickens and other animals raised on the irrigation water. The eggs that chickens produce are also safe for consumption. Since water containing uranium is no longer being used for drinking inside the homes, the small amount of uranium that may be in chickens and eggs is not sufficient to be a health hazard (ATSDR 2007; Fromm 2006).

Public health actions taken

Since the original health consultation (ATSDR 2007), DVEWC has drilled a new well (Well #5) that is deeper than the original wells and provides water with non-detectable levels of uranium. The original wells will still be used for irrigation to prevent undue strain on Well #5 and ensure a consistent supply of uranium-free drinking water.

Conclusions

BCEH concludes that DVEWC, by putting into service the new well (Well #5) for drinking water, has fixed the uranium problem and the community's water supply will no longer harm people's health. Average consumption of vegetables, chickens and eggs raised using the irrigation water does not pose a health hazard.

What does BCEH recommend?

Now that the new Desert View Estates' community Well #5 has been installed and uranium levels reduced, BCEH recommends the following:

- Adults and children can drink the new tap water from Well #5.
- In the event that Well #5 fails, IDEQ and residents should be immediately notified by DVEWC that Well #3 will temporarily supply domestic water to their houses, and bottled water should be used for drinking and cooking until Well #5 is back online.
- DVEWC should perform one additional quarterly round of well sampling (two would be better) to ensure there is no seasonal variation in groundwater flow that might result in increased uranium concentration in the water from Well #5.
- Children, particularly young children, should not drink the irrigation water or consume food prepared using the irrigation water.
- If residents of Desert View Estates consume large quantities of home-grown leafy greens or root vegetables watered with irrigation water, they may still want to grow these vegetables using an alternative water source (such as the household tap water). Other vegetables and fruits do not significantly concentrate uranium

and may be grown for consumption using the irrigation water. All home-grown produce should be washed thoroughly before eating.

- Chickens and eggs raised on irrigation water can be consumed by adults and children and do not represent a health risk.
- If you are concerned about you or your children's health, please talk with your health care provider.

Residents with further questions or concerns are encouraged to contact us at 208-334-5682 or elgethun@dhw.idaho.gov. We are very pleased that your water system has been updated and that the risk of health effects from uranium exposure has been mitigated.

Best regards,

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