

Safety of Homegrown Produce Irrigated with Groundwater near the Eugene Railyard

This fact sheet is designed to provide those in the Trainsong and River Road neighborhoods with information about the safety of using their water supply wells for irrigation. Some water supply wells in those neighborhoods have been affected by solvent contamination from the nearby Union Pacific Railyard.



Using irrigation well water for gardens is safe in the River Road and Trainsong neighborhoods

Background

Low levels of groundwater contamination from the Union Pacific Railyard extend into some areas of the Trainsong and River Road neighborhoods. Solvents have not been used at the Railyard since the 1980s, and contaminant levels in groundwater have been generally decreasing over time from onsite cleanup work and natural causes.

Neighbors with irrigation wells have asked DEQ about the safety of using their wells. DEQ has determined that use of the irrigation wells is safe for outdoor use, including gardening, car-washing, and swimming. All neighborhood residents are connected to EWEB's water supply and are not exposed to solvent contaminants through their home's drinking water supply.

DEQ did further analysis to answer questions about the potential uptake of solvents into homegrown produce, and the safety of using their well water for irrigation of produce.

How did DEQ approach the problem?

In some portions of the River Road and Trainsong neighborhoods, the shallow groundwater is contaminated with trichloroethylene (TCE) and perchloroethylene (PCE). TCE and PCE are some of the most frequently identified groundwater contaminants in the United States, and there has been extensive work done to examine potential risks. DEQ looked at national research on chemical uptake, and did additional review of the levels of solvent in the neighborhood irrigation wells.

What did DEQ find?

The results of DEQ's review show that the current levels of solvents are below harmful levels, and are safe for irrigating home gardens.

It is important to remember that an irrigation well could have other contaminants, such as bacteria, or other chemicals, such as nitrate, that are not related to the Eugene Railyard. These contaminants may be present at concentrations that could pose a health risk if residential well water is used for drinking.

The following sections explain more about the research and analysis.

What does the research show about how the solvents behave?

The solvent chemicals in groundwater from the Railyard are volatile, meaning that they evaporate easily at normal temperatures. For this reason, the solvents will tend to evaporate during the irrigation process, rather than be taken up or absorbed by plants.

Research has also shown that if the solvents manage to reach the plants and get absorbed by them, the solvents do not accumulate in plant tissues (Davis et al. 1998). Rather, the solvents are transferred to air through pores in the plants' tissues. The resulting air concentrations do not pose a threat to health because the amounts of solvents released are very low and they mix readily with surrounding air.

Studies have also shown that solvents taken up through a plant's root system tend to concentrate in the cells near the surface of the roots (Agustin 1994). In root vegetables such as beets, carrots, and potatoes, these cells are typically lost during



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washing and peeling of the produce. In above-ground fruits and vegetables (e.g., tomatoes, lettuce, squash, etc.), the roots are not consumed.

Plants are also able to break down solvents. Consequently, any solvents taken up by plants may be present temporarily in the roots and stems of the plant, but are much less likely to be present in the leaves or other above-ground, potentially edible parts of the plant (Newman et al. 1997).

In summary, the research done shows that uptake and accumulation of solvents in plants and subsequent exposures by home gardeners and their families are likely to be low.

Risk Evaluation

To supplement the literature search, DEQ estimated the potential risks associated with eating homegrown produce from gardens irrigated with well water containing solvents in the Trainsong and River Road neighborhoods.

Mathematical models are relied upon to estimate how much health risk may be posed to an individual from exposure to chemicals. Neither USEPA nor DEQ has developed models for evaluating food chain exposures to solvents; therefore, a model from the California Environmental Protection Agency was used to evaluate such exposures. The assumptions of the model are designed to ensure that potential risks are not underestimated.

The assessment assumed that an individual would eat approximately 23 pounds of homegrown produce per month for 12 months of the year. In addition, the assessment assumed that a resident would live near the Railyard for 28 years.

The modeling results indicate that potential risks associated with eating homegrown produce irrigated with well water containing solvents are very low and do not significantly change the overall risks from the groundwater exposures already assessed for outdoor uses of water supply wells in the neighborhoods near the Railyard.

Eating homegrown produce irrigated with well water containing solvents in the vicinity of the Eugene Railyard is safe for adults and children. For general food safety, produce should always be washed prior to consumption.

References

Agustin, R.A.C. 1994. Analysis of the Potential for Plant Uptake of Trichloroethylene and an

Assessment of the Relative Risk from Different Crop Types. NTIS/AD-A284 800. July 1994.

Davis, L.C., S. Vanderhoof, J. Dana, K. Selk, K. Smith, B. Goplen, and L.E. Erickson. 1998. Movement of Chlorinated Solvents and Other Volatile Organics through Plants Monitored by Fourier Transform Infrared (FT-IR) Spectrometry. Journal of Hazardous Substance Research, Vol. 4, pp. 1-26.

Newman, L.A., S.E. Strand, N. Choe, J. Duffy, G. Ekuan, M. Ruzsaj, B.B. Shurtleff, J. Wilmoth, P. Heilman, and M.P. Gordon. 1997. Uptake and Biotransformation of Trichloroethylene by Hybrid Populus. Environmental Science and Technology, Vol. 31, pp. 1062-1067.

For More Information

If you have any questions or concerns regarding this fact sheet or other cleanup activities at the Eugene Rail Yard, or if you would simply like additional information, please visit DEQ's project website at:
<http://www.deq.state.or.us/lq/cu/wr/uppreugene/>

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