Applying knowledge to improve water quality
Pacific Northwest
Regional Water Program
A Partnership of USDA NIFA
& Land Grant Colleges and Universities

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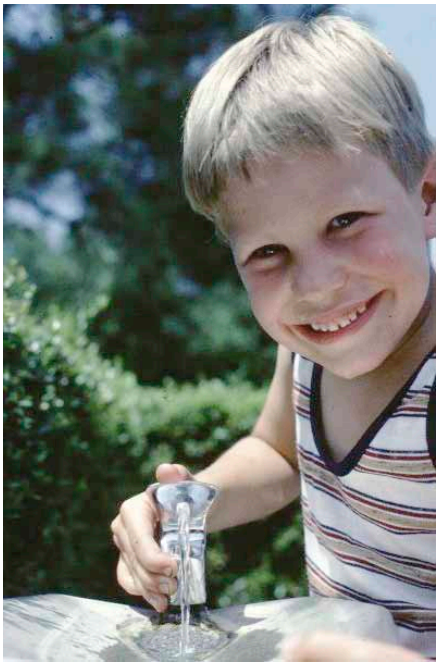
PNWWATER 080

Contaminants of Concern:

Safe Drinking Water Campaign



Recent surveys have indicated that residents of the Pacific Northwest consider drinking water and human health the most important water resource issue in the region. To address this high level of public interest about drinking water, the land grant institutions (LGIs) in the region developed a comprehensive domestic water resource guide in 2003 that contains up-to-date information about drinking water safety and potential contaminants (see PNWWATER UPDATE No. 11; http://www.pnwwaterweb.com/WQFlyers_DomWat.pdf).

To further address this need for high quality information about drinking water and human health, Northwest Indian College, Oregon State University, the University of Alaska, the University of Idaho, and Washington State University have teamed up to produce a "Safe Drinking Water Campaign" to increase public literacy about potential drinking water contaminants. We plan to offer specific education programs about four important drinking water contaminants each year. Each targeted contaminant will be addressed with a three-month educational effort. Over the next 12 months we will develop and deliver educational programs to address iron, nitrates, arsenic and Cryptosporidium in drinking water. This campaign will kick off with iron in May. Below are some of our reasons for addressing iron in drinking water.

Iron as a Contaminant

Iron is a harmless element present in public and private water supplies. Rainwater percolating through soil and rock dissolve minerals containing iron and holds them in solution. The water's hardness and acidity influences the amount of iron that will dissolve during the percolation process. These iron-rich waters recharge surface waters and aquifers that inevitably serve as drinking water sources. Although present in most drinking water at some level, iron is hardly ever found at concentrations greater than 10 parts per million. Often corrosion can also be a source of iron in drinking water. Iron contamination as a result of corroded pipes is a common occurrence in many cities that have water systems over a century old.

At concentrations most commonly found in drinking water, the presence of iron is not considered a health problem. Although generally harmless, high concentrations of dissolved iron can result in poor tasting, unattractive water that stains both plumbing fixtures and clothing. When iron-rich waters mix with tea, coffee, or alcoholic beverages, they assume a black, inky appearance with an unpleasant taste. In addition, vegetables cooked in iron-rich waters will also become dark and unappetizing. Concentrations of iron as low as 0.3 ppm will deposit reddish-brown stains on fixtures, utensils, and clothing, all of which can be difficult to remove.

Pacific Northwest Regional Water Quality Coordination Project Partners

Land Grant Universities

Alaska
Cooperative Extension Service
Contact Fred Sorensen:
907-786-6311
http://www.uaf.edu/ces/water/
University Publications:
http://www.alaska.edu/uaf/ces/publications/

Idaho
University of Idaho
Cooperative Extension System
Contact Bob Mahler: 208-885-7025
http://www.uidaho.edu/wq/wqhome.html
University Publications:
http://info.ag.uidaho.edu/Catalog/catalog.htm

Oregon
Oregon State University
Extension Service
Contact Mike Gamroth: 541-737-3316
http://extension.oregonstate.edu/
University Publications:
http://extension.oregonstate.edu/catalog/

Washington
Washington State University
WSU Extension
Contact Bob Simmons:
360-427-9670 ext. 690
http://wawater.wsu.edu/
University Publications:
http://pubs.wsu.edu/

Northwest Indian College
Contact Charlotte Clausing:
360-392-4319
cclausing@nwic.edu or
http://www.nwic.edu/

Water Resource Research Institutes

Water and Environmental Research Center (Alaska)
http://www.uaf.edu/water/

Idaho Water Resources Research Institute
http://www.boise.uidaho.edu/

Institute for Water and Watersheds (Oregon)
http://water.oregonstate.edu/

State of Washington Water Research Center
http://www.swwrc.wsu.edu/

Environmental Protection Agency

EPA, Region 10
The Pacific Northwest
http://www.epa.gov/r10earth/

Office of Research and Development, Corvallis Laboratory
http://www.epa.gov/wed/

For more information contact Jan Seago at 206-553-0038 or seago.jan@epa.gov

If iron is present in household water at levels exceeding 0.3 ppm, potential water treatment is determined by the type of iron problem present in the water system:

Problem	Cause	Treatment Options
Water is clear when exiting the tap but if allowed to sit, reddish brown particles begin to form and settle to the bottom.	Dissolved ferrous iron.	Phosphate compounds with iron concentrations less than 3 mg/L. Water softeners with iron concentrations less than 5 mg/L.
Red, brown, or black stains on laundry and/or plumbing fixtures.		Chemical oxidation with potassium permanganate or chlorine followed by filtration with iron concentrations less than 10 mg/L. Oxidixing filter, such as manganese greensand, with iron concentrations less than 15 mg/L. Pressure aeration with iron concentrations less than 25 mg/L.
Water contains red, brown, or black particles directly out of the tap.	Corrosion of plumbing system pipes. Or, ferrous iron that has been exposed to the atmosphere prior to exiting the tap.	Use a neutralizing filter, particle filter, or sand filter and increase the pH.
Reddish-brown or black sludge in toilet tanks or faucets.	Iron bacteria.	Shock treatment with chlorine, continuous feed of chlorine, followed by filtration.
Reddish-brown, black, or yellow color that does not settle out after a period of 24 hours.	Organic iron.	Chemical oxidation with chlorine followed by filtration.

When faced with possible iron contamination in the household water supply, the initial step is to verify the cause of the contamination. Remediation methods should be customized to the type of iron discovered in the water system. Without knowledge of the form of iron causing the contamination, treatment may be ineffective. The source of iron may be from natural processes or corrosion of the water pipes. A laboratory analysis of the water to verify the scope of the problem and potential treatment solutions should start with a test for iron concentration. A water sample kit can be obtained from a certified laboratory. If the source of water is a public water system, it is then essential to contact a utility official to verify whether the issue is linked to a public system or from the home's plumbing or piping.

A new regional publication on Iron in Drinking Water will be available online in May. Please check the University of Idaho's publication catalog (http://info.ag.uidaho.edu/) at that time for more information.

National Water Quality Program Areas

The four land grant universities in the Pacific Northwest have aligned our water resource Extension and research efforts with eight themes of the USDA's National Institute of Food and Agriculture.

1. Animal Waste Management
2. Drinking Water and Human Health
3. Environmental Restoration
4. Nutrient and Pesticide Management
5. Pollution Assessment and Prevention
6. Watershed Management
7. Water Conservation and Management
8. Water Policy and Economics

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