University of Nevada
Cooperative Extension

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Drinking Water Quality in Nevada: Common Problems for the Well Owner

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In large municipal areas, including Reno/Sparks and Las Vegas, much of the drinking water supply comes from surface water bodies, such as the Truckee River and Lake Mead. In rural areas, however, most residents are dependent upon groundwater supplies for their household and irrigation uses. The National Ground Water Association estimated that there were 36,810 household wells in use in Nevada as of 1996. These wells are unregulated for drinking water purposes, despite the potential for contamination, so it is important for well owners to recognize some of the common water quality problems they may encounter when using wells for home drinking water supply.

Sources of pollution

There are two types of pollution that threaten Nevada's water supply. These fall under the general heading of point and nonpoint sources of pollution.

Point source pollution

Point source pollution usually has a single, easy-to-identify source, such as a pipe that drains chemicals or wastes from a manufacturing plant. This type of pollution can be managed because sources can be identified, regulated and treated. It has become less of a problem over the past three decades due to improvements in treatment practices for discharged wastes.

Non-point source pollution

Non-point source pollution, or pollution over a wide area that results from everyday activities, continues to be difficult to prevent. Sources of nonpoint pollution are often difficult to identify. Pesticides, fertilizers and animal waste residues may find their way into our drinking water supply. Effluent from septic systems that are old or poorly maintained sometimes seeps into our groundwater supply. Petroleum products from minor engine leaks end up in parking lots and can be washed into rivers and streams.

Nevada's groundwater quality is generally good for most uses, although there are naturally occurring minerals that may affect taste and appearance. In some areas, groundwater may be saline. Fortunately, relatively few public water systems served by groundwater have detected contaminants introduced by human activities. However, when groundwater is polluted, it is extremely difficult and costly to clean up, even if sources of the pollution are controlled. Many millions of dollars have been spent in Nevada to clean up contaminated groundwater.

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Table 1. Chemicals with Standards Set to Protect Human Health (Primary Standards)

Contaminant	Sources	"Normal Range"	Federal/Nevada Maximum Contaminant Level (MCL)	Health Implications
Nitrate (N)	Runoff from fertilizer use; leaching from septic tanks, sewage or animal waste; erosion of natural deposits		10 mg/L [1] (measured as nitrogen)	Methemoglobinemia (blue baby syndrome) in infants under six months, causing lack of oxygen transport, hence bluish skin color
Fluoride (F)	Water additive that promotes strong teeth; erosion of natural deposits; discharge for fertilizer and aluminum factories	Less than 1.2 mg/L [1]	4 mg/L Secondary standard = 2 mg/L	Dental fluorosis (mottled teeth); bone disease (pain and tenderness of the bones)
Arsenic (As)	Erosion of natural rock deposits; mining activities; also used in petroleum refining, wood preservatives, herbicides, etc.	Less than 5 ug/L [3]	0.01 mg/L	Skin damage; circulatory system problems; increased risk of cancer; death
Radon-222	Naturally occurring	Less than 4 pCi/L [2]	Proposed MCL = 300 pCi/L	Lung cancer (inhaled); risk of internal organ cancers (ingested)
Radionuclides				
Radium-226 and Radium-228	Naturally occurring	Trace levels	5 pCi/L combined	Increased risk of cancer, including bone, stomach and lung
Uranium	Naturally occurring	Trace levels	30 ug/L [3]	Increased risk of bone and other cancers; kidney toxicity
Gross Alpha	Naturally occurring and manmade sources	Range highly variable	15 pCi/L	Increased risk of cancer
Beta and Photon Emitters	Manmade radioactive contaminants associated with operating nuclear power plants, facilities that use radioactive material for research or manufacturing or facilities that dispose of radioactive material	Range highly variable	4 millirems ede/yr [4], any organ or whole body	Increased risk of cancer
Mercury	Erosion of natural deposits; discharge from refineries and factories; runoff from landfills and cropland; mining activities	Less than 3ng/L for surface water	0.002 mg/L (inorganic mercury)	Kidney damage, brain and nerve damage, genetic defects. The organic form of mercury is far more toxic than the inorganic.

[1] Milligrams per liter (mg/L); equivalent to parts per million (ppm)
[2] PicoCuries per liter (pCi/L) is an activity measurement of radioactive decay
[3] Micrograms per liter (ug/L); equivalent to parts per billion (ppb)
[4] Millirems ede/yr refers to the dose ingested over 50 years at the rate of 2 liters of drinking water per day

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For example, a plume of perchloroethylene that lies under downtown Reno resulting from spills and improper waste disposal by dry cleaning and degreasing businesses operated decades ago has contaminated five community wells to date. The cost to clean it up is anticipated to total $14 million or more. Owners of private domestic drinking water wells are not subject to drinking water standards, and no agency will monitor or test their wells or prevent use of the water, regardless of quality. Instead, it is the responsibility of the well owner to test their drinking water for possible contamination. Water may look, smell and taste fine, and yet contain harmful pollutants. It is important to learn about the types of contaminants that can be found in groundwater and appropriate methods for removing them by water treatment.

Common contaminants in the state of Nevada

In Nevada, the most common chemical contaminants of well water that may affect your health are nitrate, fluoride, arsenic, radon, radionuclides and mercury. Information about each of these substances, including the drinking water standards, is found in **Table 1** on the previous page. The majority of complaints about aesthetics and cosmetics result from high levels of hardness, sulfate, iron, fluoride and manganese. Consult **Table 2** on this page for information on these contaminants.

Drinking water standards

The U.S. Environmental Protection Agency (EPA) has set standards for public drinking water supplies based on maximum contaminant levels (MCLs) in the water supply. Public water supplies are tested

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Table 2 Chemicals with Standards Set for Aesthetics/Cosmetics

Chemical Name	Sources	"Normal Range"	Nevada Maximum	Symptoms
Hardness	Naturally dissolved minerals, especially calcium and magnesium from soil and limestone	0 -180 mg/L [1]	No level; water in excess of 300 mg/L is considered very hard	Soap residues and spots on glass surfaces; poor sudsing; damages household appliances
Sulfate	Natural deposits; salts; by-product of coal mining	Varies widely	500 mg/L	Bitter tasting water; laxative effect; scaly deposits; corrosion; "rotten egg" odor from hydrogen sulfide gas formation
Iron	Naturally occurring in rocks and leaching of cast iron pipes	0.3-60 mg/L	0.6 mg/L	Discolored water; rusty sediment; brown/orange staining of fixtures and laundry; metallic taste
Manganese	Natural deposits in rocks and soil	0.3-60 mg/L	0.1 mg/L	Brownish color; bitter taste; black stains on laundry and

[1] Milligrams per liter (mg/L); equivalent to parts per million (ppm)

References:

National Drinking Water Clearinghouse. 2000. Radionuclides Tech Brief. On Tap, Vol. 9, Issue 1.

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regularly to ensure that they meet primary and secondary drinking water standards.

Primary standards

Primary water standards are legally enforceable standards that apply to public water systems. These standards are set to protect drinking water quality by limiting the levels of specific contaminants that can adversely affect public health.

Secondary standards

Secondary drinking water standards provide guidelines for regulation of contaminants that may have cosmetic effects, such as skin or tooth discoloration, or aesthetic effects, including taste, odor and color.

"Public water supplies are tested regularly to ensure that they meet primary and secondary drinking water standards."

Who to contact:

Nationwide

EPA Ground Water and Drinking Water Hotline

1-800-426-4791

Can help you locate agencies in your area and provide information on safe drinking water.

Web site: www.epa.gov/safewater

Community Right-to-Know Hotline

1-800-424-9346

Provides information on uses and releases of chemicals in your state.

In Nevada

Bureau of Safe Drinking Water for State of Nevada

775-687-9520

Provides information to residents of the state of Nevada about private well water quality.

Web site: ndep.nv.gov/bsdw/wells.htm

Nevada State Health Laboratory

775-688-1335

Provides information and services for water testing.

Website: www.medicine.nevada.edu/dept/pathology/nshl.asp

University of Nevada Reno-Cooperative Extension

775-784-4848

Provides information to the public.

Web site: www.unce.unr.edu

Nevada Division of Environmental Protection, Bureau of Safe Drinking Water

775-687-9507

Information about water testing laboratory certification and establishment of standards.

Website: http://ndep.nv.gov/bsdw/labservice.htm

Nevada Rural Water Association

Provides statewide technical assistance programs

775-841-4222

Website: www.nvrwa.org