Appendix F

Public Education and Outreach Plan

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1.0 Introduction

The Community Source Water Protection Plan for Public Water Systems in Humboldt County identifies increasing community awareness of the source of their drinking water supply and how they can help to protect it as one of the Plan goals. A variety of education and outreach actions are listed in the Community Source Water Protection Plan Action Plan to achieve this goal. This Public Education and Outreach Plan (Education Plan) provides a variety of tools and tactics to implement the public education and outreach actions.

Source water protection programs in Nevada are initiated and implemented at local levels and depend on the willingness of a community to support the local program. Therefore, public education and participation is an important strategy to enable community members to be stewards of their local drinking water sources, to promote voluntary protection efforts, and to build public support.

The following are useful contacts for implementing this Education Plan.

Contacts

Organizations	Phone Number	Email Address
Humboldt County		
Regional Planning Department	(775) 623-6393	Betty.lawrence@hcnv.us
County Manager	(775) 623-6300	dave.mendiola@hcnv.us
Educational and Technical Resources		
Rural Community Assistance Corp.	(916) 447-9832	kmcbride@rcac.org
Nevada Rural Water Associates	(775) 841-4222	NVRWA@pyramid.net
Nevada Outdoor School	(775) 623-5656	http://www.nevadaoutdoorschool.org/ melanie.erquiaga@nevadaoutdoorschool.org
Desert Research Institute Hydrologic Sciences	(775) 673-7300	http://www.dri.edu/hydrologic-sciences
UNR Water Resources	(775) 784-6221	http://www.hydro.unr.edu/Default.aspx
Resource Concepts, Inc.	(775) 883-1600	http://www.rci-nv.com/source_water_protection/ jill@rci-nv.com lynn@rci-nv.com

2.0 Education Plan Goals, Target Audiences and Educational Focus

This Education Plan has been prepared to help the target audiences to gain understanding of and interest in doing their part to protect community source water. The Local Planning Team that developed the Community Source Water Protection Plan, identified residents and businesses in the County as the primary target audience for the following specific topics:

- Increase Knowledge of Septic System Operation and Maintenance.
- Increase Knowledge of Well Protection, Operation, Maintenance, Water Quality Testing and Abandonment.
- Increase Knowledge of Proper Chemical and Prescription Drug Use, Storage and Disposal.
- Increase Knowledge of Source Water Protection Concepts, Locations of Source Water Protection Areas and Areas of Interest and Compatible Uses.
- Increase Knowledge of Pollution in Stormwater and How to Minimize it.

3.0 Educational Information and Tools for Target Audiences

During the process of preparing the Community Source Water Protection Plan, several educational tools were developed to help facilitate immediate public education and awareness for source water protection. These tools can be used in conjunction with the successful local educational programs (such as the Nevada Outdoor School and Ag-in-the-Classroom), as well as community events and public meetings.

The Watershed and Groundwater Physical Models

The watershed and groundwater physical models used together with the Source Water Protection Area maps are powerful three-dimensional education tools to illustrate how source water can be contaminated from every-day activities. The watershed model shows how contaminants from industry and residential activities can be washed into our drainages. The groundwater model illustrates how contaminants in drainages can infiltrate into the ground and eventually contaminate a drinking water well. These models are available for purchase or may be borrowed from the Nevada Division of Environmental Protection. Attachment A includes a brief example for how the models can be used in a classroom.

- The watershed model may be purchased from Enviroscapes at http://www.enviroscapes.com/nonpoint-source.html
- The groundwater model may be purchased from University of Nebraska, Lincoln http://groundwater.unl.edu/

Maps of Source Water Protection Areas

Source Water Protection Areas can be depicted over a variety of base maps such as topography, aerial photos, or streets to illustrate their location relative to where people live and work.

Web Site Sources

The Web is an excellent source of free educational materials. Although Web sites change frequently, the following sites typically have free downloadable educational documents.

- National Environmental Services Center www.nesc.wvu.edu
- EPA https://www.epa.gov/ground-water-and-drinking-water
- National Groundwater Association www.wellowner.org

Additional web site sources are listed in Attachment B of this Education Plan.

4.0 Useful CSWP Information

The CSWP Plan contains a variety of information that can be used when conducting public education and outreach. This information includes:

- Names and affiliations of the individuals who helped prepare the Community Source Water Protection Plan (page i);
- Source Water Protection Area maps (Community Source Water Protection Plan Appendix A);
- Inventory and map of activities and conditions that may adversely affect drinking water quality (see the Community Source Water Protection Plan Appendix D);
- The Management Strategies and Best Management Practices that a community intends to use to protect its drinking water sources (see the Community Source Water Protection Plan Section 3.4);
- The Contingency Plan describing what the community would do to replace its drinking water supply if the source became contaminated (see the Community Source Water Protection Plan Section 3.5); and
- The Action Plan that provides a schedule for implementation of the Public Education Plan (see the Community Source Water Protection Plan Appendix E).

5.0 Educational Messages and Discussion Points

The presenter(s) should engage their audience in order to bring the source water protection concepts into a person's own experience. The discussions before, during and after the presentations help to facilitate this. The following questions can help to kick start open communication.

When you turn the tap in your home where does the water come from?

Most people do not know where their water comes from unless they own their own well. If you are on your own well, then the water comes from the shallow aquifer in the immediate vicinity of your well. If you are connected to the public water system then your water comes from a source water protection area, is treated and piped to your home.

What is Source Water Protection?

Source water protection is a way to prevent drinking water from becoming polluted. Much can be done to prevent pollution, such as the informed use of land and proper use and disposal of chemicals.

What are source water protection areas?

In Humboldt County, source water protection areas are specific areas surrounding public water supply wells as illustrated by the source water protection figures. Typically, the source water protection areas include a broad recharge area surrounding the wells.

Why is it important to protect water at the source?

Protecting public drinking water supplies *before* pollution enters our drinking water supplies lessens potential health issues, the high costs associated with water treatment, and source water development. People in Humboldt County can help protect our source water by managing land uses and human-caused sources of contamination to prevent pollution *before* it enters our drinking water supply.

What contaminates the water we drink?

There are numerous pollutants that can contaminate surface and groundwater. Some contaminants are a result of improper disposal of common household and business products such as cleaning products, waste oil, pet waste, fertilizers and pesticides. These and other harmful products, when improperly used, stored or disposed of may threaten to contaminate our drinking water.

6.0 Other Education and Outreach Tools

The Community Source Water Protection Local Planning Team should consider themselves Plan Ambassadors. The entire Team should take every opportunity to convey the essence and objectives of the Community Source Water Protection Plan. The following tactics help increase knowledge and change behavior in accordance with protecting our drinking water sources.

Nevada Outdoor School – The Nevada Outdoor School, based in Winnemucca, has existing programs that help students to develop an understanding of their environment. The Nevada Outdoor School has offered to bring source water protection messages into their program curriculum and has the watershed model and the groundwater model to work with.

Social media (blogs, podcasts, Facebook, YouTube, Twitter, LinkedIn) – These can be a crucial component to communications and is worth consideration. Through websites, blogs, YouTube, etc., audiences have an opportunity to get information anytime. It can also provide an interactive experience. Be aware this kind of media changes rapidly.

Newsletter inserts – Newsletters may include updates on the Community Source Water Protection Plan, testimonials collected, pertinent Nevada Division of Environmental Protection news, information on what other communities are doing to protect their water resources, and real time changes happening at businesses or source water sites. Photos and links to information make newsletter inserts more interesting.

Fact sheet, brochures, handouts, flyers, etc. – The key is to plan ahead as to how you want the audience to use them, how you will get them to the audience, and how you will evaluate their effectiveness. Libraries, community centers, builder associations, economic development authorities and other offices with substantial walk in traffic are useful locations. However, unless your audience knows the materials are available at these locations, the materials will not be successful. Some examples are included in Attachment D.

Inserts in water bills – The water purveyors may want to insert information in water bills periodically to communicate drinking water source protection measures. Source water Protection is an excellent message for Public Water Systems to incorporate in the annual "Consumer Confidence Report" required for many community water systems.

Press releases – Developing relationships with local media and pitching stories and event ideas to them is an effective way to reach several audiences including business leaders and residents. A list of media outlets for the Humboldt County area and a press release template are attached to this Education Plan. Contact persons at these outlets can change quickly so it is important to confirm this information before moving forward.

Website inserts and links – The Local Planning Team may choose an appropriate website to serve as the repository for education materials. The website could provide information businesses regarding how they can become source water protectors and share stories of

how they are helping protect their community's source water. If a website is created, then all tactics should include a website address. Photos and links are very helpful on a website.

Public meetings/conferences/community events – Several are identified in the Action Plan. Publicize the meeting or event and use other tactics to support the education at the meeting, conference, or event.

Posters – Purveyors may want to create appropriate signage as a reminder of best management practices related to protecting your community's drinking water source.

Employee training on materials handling practices, emergency spill situations – Purveyors should have these items on hand and, if asked, they may consider including information on the importance of protecting your community's source water.

Site signage – Signage at businesses that use best management practices to lessen their impact on source water indicating their dedication to their community's most important resource, drinking water. For example:

> [INSERT BUSINESS NAME HERE] is dedicated to protection of drinking water sources in Humboldt County through the use and support of best management practices.

Guest columns/editorials – Providing guest columns and editorial pieces to local newspapers enables the CSWP Team the opportunity to position the Team as source water protection experts. Guest columns from respected and well-known community members also offer a medium to encourage, educate, and motivate readers to protect their source water. Use the attached Nevada media list to assist you in pitching a guest column or editorial.

Case studies – Case studies give audiences an understanding of the issue and how it is being approached in the community. The studies should be brief with general information as to who, what, where, when, and why and include photos where appropriate.

7.0 Education and Outreach Success Evaluation

Evaluating effectiveness is the foundation for a successful plan implementation. Effective evaluation is key in determining how effective your messages and tactics are and what changes can be made to improve the program. Based on the tactics chosen and available resources, at least one form of measurement will work for each tactic. Establish the best form of evaluation as soon as you have decided on which tactics to execute. When conducting outreach one should be thinking about the difference being made and how best to measure the impact. Quantitative and qualitative measures should be considered.

Quantitative measurements – These measure the amount of information, not necessarily the quality of information.

- Quantity of presentations delivered and people in attendance;
- Quantity of distributed materials; and
- Quantity of inquiries (phone calls, e-mail, e-newsletter, website testimonials and visits).

Qualitative measurements – These measure the quality of the information by giving an opportunity for feedback. In this way, you can determine how the messages you are communicating are being received. This can be as simple as asking each and every person who has come into contact with your messages a few simple questions:

- Survey attendees of presentations;
- Email surveys to those who receive email communications; and/or
- Online survey of website visitors.

8.0 Education Outreach Tips

Education outreach should be personalized for your individual needs. Depending on the tactics selected, you may need to create additional communication pieces. A few tips to remember when creating any communication piece:

- Simple and consistent is best;
- Use words that the general public will understand;
- Allow whitespace – do not fill every space; and
- You do not need to say it all – the more you say the less effective the entire piece.
- Be consistent in the look and message of every piece and limit it to no more than three messages.

Finally, always include a call to action such as:

- “To learn more, log onto our website: www.xxxx.org”
- “To register for a presentation, contact your water purveyor.”
- “Take oil to one of the following disposal locations…”

A great idea without the resources to execute it will not be effective, nor will brochures that simply sit on the counter at the community library when they need to be in people's hands. Therefore, when education for an audience is desired, these are a few things to consider:

- What is the best way to reach my audience?
- What is my budget?
- How much time do I have?
- How will I follow up to see if it was effective? And when?

Public Education and Outreach Attachment A

Using the Models in Outreach: An Example

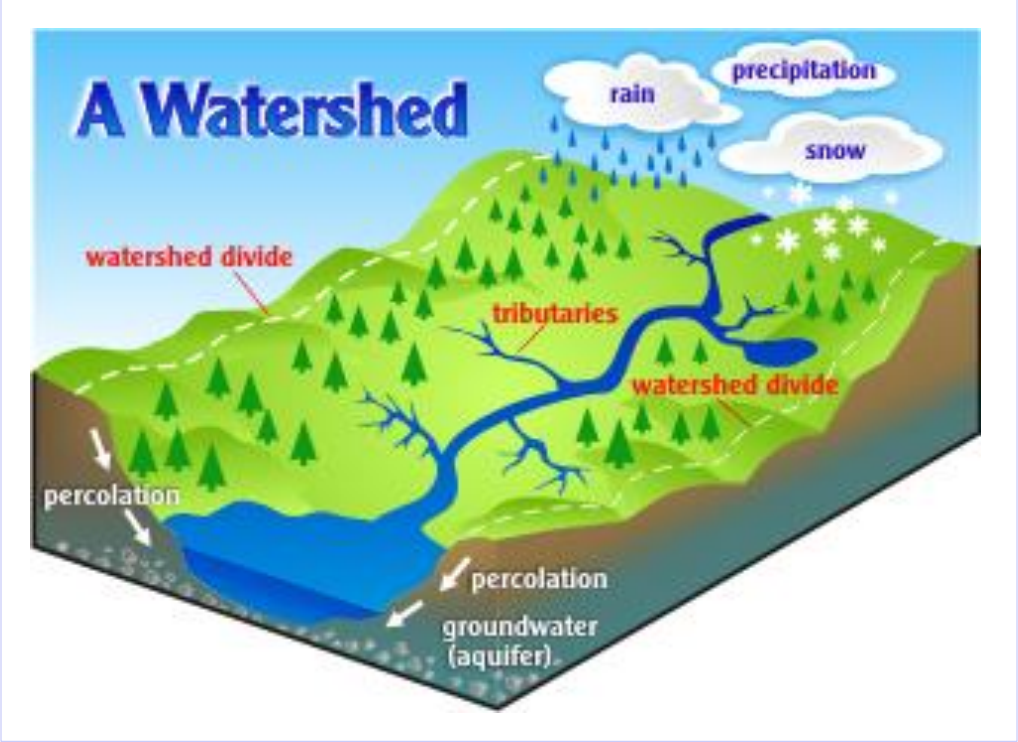
Outreach using the watershed and groundwater models is appropriate for community events or schools. Presentations can be brief or extend up to an hour.

When you turn on the tap in your home, where does the water come from?

Depending on the answers the discussion evolves. A discussion regarding what the sewer does, rainfall quantities, the Humboldt River or nearby creek as appropriate for the area.

What is a watershed?

Watershed is a difficult concept and a drawing can facilitate the discussion. A watershed is the area of land where all of the water that is under it or drains off of it goes into the same place. The following figure is an example.



Demonstration of the Watershed Model

- ✓ Invite the participants to come close to see the watershed model and ask if they know:

  What is a contaminant? Discuss various forms such as oil and grease, factory chemicals, fertilizer, etc. and sprinkle it around.

  How much rainfall does the community receive each year? Discuss and then rain on the watershed, it flows down, then discuss infiltration, pull the plug and move to the groundwater model.

- ✓ Discuss the importance of individual actions to protect source water, drinking water.

Demonstration of the Groundwater Model

- ✓ Put green and red food coloring into the lake and pond areas and pump different wells, discuss aquifers, contaminants, pumping, water movement, etc.

Share the SWPA Maps of the Community

- ✓ Discuss the 2, 5, 10, and 25-year capture zones, the source water protection areas, and what they mean.
- ✓ Discuss different common chemicals or products that are more or less harmful to the environment. The importance of thinking about the chemicals we use and how we use them.
- ✓ Discuss proper disposal methods, the importance of keeping contaminants out of the irrigation ditches and the Household Hazardous Waste program available to the community.
- ✓ Re-iterate that each person makes a difference to source water protection by his or her actions and choices they make every day.

Public Education and Outreach Attachment B

Online Resources

For more information on your drinking water and source water protection go to:

What is Groundwater; Source Water Protection & Landowners
https://www.youtube.com/watch?v=oNWAerr_xEE
https://www.youtube.com/watch?v=LnZdvEYm4Q4

Nevada Source Water Protection – General Information
http://ndep.nv.gov/bwpc/sourcewater.htm

Nevada Integrated Source Water Protection Program
http://ndep.nv.gov/bwpc/wellhead.htm

Nevada Source Water Assessment Program
http://ndep.nv.gov/bsdw/swap-map.htm

Nevada Drinking Water
http://water.epa.gov/drink/local/nv.cfm

After the Storm: A Citizen's Guide to Understanding Stormwater
http://www.epa.gov/npdes/pubs/after_the_storm.pdf

This EPA link is excellent regarding water quality and household wells
http://water.epa.gov/drink/info/well/upload/2003_06_03_privatewells_pdfs_household_wells.pdf

The Nevada State Laboratory has information regarding water quality analyses. Their Web site is www.medicine.nevada.edu/nsphl

NEMO Nevada (Nonpoint Education for Municipal Officials) is an educational program provided by the University of Nevada Reno Cooperative Extension program for land use decision-makers addressing the relationship between land-use and water resource protection. Excellent on-line resources are available:
https://www.unce.unr.edu/programs/sites/nemo/

Links may change but you can search for key words above that describe each link!

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Public Education and Outreach Attachment C

Terms Defined

Aquifer: a naturally occurring, underground area of water-soaked sand or gravel.

Best Management Practices: are barriers, methods, measures or practices designed to prevent or reduce water pollution.

Contamination: introduction of an undesirable chemical or biological substance not normally present in source water.

Groundwater: water found beneath the earth's surface.

Source water: consists of bodies of water such as lakes, springs, streams, rivers and groundwater/ aquifers that become our water supply.

Nevada Division of Environmental Protection (NDEP): NDEP will protect the State's natural resources through an effective, efficient program of permitting, enforcement of regulations, monitoring the environment, pollution prevention and remediation based on state and federal laws.

Bureau of Safe Drinking Water: the mission of the State of Nevada Bureau of Safe Drinking Water is to protect the public health of the citizens, tourists and visitors to the State by assuring that the public water systems provide safe and reliable drinking water.

NDEP encourages, motivates and supports communities' local source water protection activities; manages, shares and integrates source water protection information; develops federal, state and local source water protection partnerships; and integrates and implements source water protection at the state level.

Bureau of Water Pollution Control: the mission of State of Nevada Bureau of Water Pollution Control is to protect the waters of the State from the discharge of pollutants. This is accomplished by issuing discharge permits, which define the quality of the discharge necessary to protect the quality of the waters of the State, enforcing the state's water pollution control laws and regulations, and by providing technical and financial assistance to dischargers. Through the NDEP, BWPC helps communities protect their drinking water.

Integrated Source Water Protection Program: The State of Nevada Integrated Source Water Protection Program is a comprehensive, voluntary approach designed to help communities develop and implement a plan that protects their drinking water supplies. The Integrated Source Water Protection Program is a program created and monitored through the Bureau of Safe Drinking Water.

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Public Education and Outreach Attachment D

Examples of Educational Information

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WINNEMUCCA CITY OF
Consumer Confidence Report – 2016
Covering Calendar Year – 2015

This brochure is a snapshot of the quality of the water that we provided last year. Included are the details about where your water comes from, what it contains, and how it compares to Environmental Protection Agency (EPA) and state standards. We are committed to providing you with information because informed customers are our best allies. It is important that customers be aware of the efforts that are continually being made to improve their water systems. To learn more, please attend any of the regularly scheduled City Council meetings held on the first and third Tuesday of the month at 2:00 p.m. **For more information please contact the City of Winnemucca City Manager/Engineer Steve West at (775) 623-6333.**

Your water comes from:

Source Name	Source Water Type
WELL 5	Ground Water
RAILROAD SPRING	Ground Water
WELL 6	Ground Water
WELL 2A	Ground Water
WELL 7	Ground Water
WELL 4	Ground Water

We add disinfectant to your water to protect you against microbial contaminants. The Safe Drinking Water Act (SDWA) requires states to develop a Source Water Assessment (SWA) for each public water supply that treats and distributes raw source water in order to identify potential contamination sources. The state has completed an assessment of our source water. For results of the source water assessment, please contact us.

Message from EPA

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons, such as those with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline (800-426-4791).

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline (800-426-4791).

The sources of drinking water (both tap water and bottled water) included rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water before we treat it include:

Microbial contaminants, such as viruses and bacteria, may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.
Inorganic contaminants, such as salts and metals, can be naturally-occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.
Pesticides and herbicides may come from a variety of sources such as storm water run-off, agriculture, and residential users.
Radioactive contaminants, can be naturally occurring or the result of mining activity
Organic contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, may also come from gas stations, urban storm water run-off, and septic systems.

In order to ensure that tap water is safe to drink, EPA prescribes regulation which limits the amount of certain contaminants in water provided by public water systems. We treat our water according to EPA's regulations. Food and Drug Administration regulations establish limits for contaminants in bottled water, which must provide the same protection for public health.

Our water system tested a minimum of 10 samples per month in accordance with the Total Coliform Rule for microbiological contaminants. Coliform bacteria are usually harmless, but their presences in water can be an indication of disease-causing bacteria. When coliform bacteria are found, special follow-up tests are done to determine if harmful bacteria are present in the water supply. If this limit is exceeded, the water supplier must notify the public by newspaper, television or radio.

Water Quality Data

The tables following below list all of the drinking water contaminants that were detected during the 2015 calendar year. The presence of these contaminants does not necessarily indicate that the water poses a health risk. Unless noted, the data presented in this table is from testing done January 1- December 31, 2015. The state requires us to monitor for certain contaminants less than once per year because the concentrations of these contaminants are not expected to vary significantly from year to year. Some of the data, though representative of the water quality, is more than one year old. **The bottom line is that the water that is provided to you is safe.**

Terms & Abbreviations

Maximum Contaminant Level Goal (MCLG): the "Goal" is the level of a contaminant in drinking water below which there is no known or expected risk to human health. MCLG's allow for a margin of safety.
Maximum Contaminant Level (MCL): the "Maximum Allowed" MCL is the highest level of a contaminant that is allowed in drinking water. MCL's are set as close to the MCLG's as feasible using the best available treatment technology.
Action Level (AL): the concentration of a contaminant that, if exceeded, triggers treatment or other requirements that a water system must follow.
Treatment Technique (TT): a treatment technique is a required process intended to reduce the level of a contaminant in drinking water.
Maximum Residual Disinfectant Level (MRDL): the highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
Maximum Residual Disinfectant Level Goal (MRDLG): the level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLG's do not reflect the benefits of the use of disinfectants to control microbial contaminants.
Non-Detects (ND): laboratory analysis indicates that the constituent is not present.
Parts per Million (ppm) or milligrams per liter (mg/l)
Parts per Billion (ppb) or micrograms per liter (µg/l)
Picocuries per Liter (pCi/L): picocuries per liter is a measure of the radioactivity in water.
Millirems per Year (mrem/yr): measure of radiation absorbed by the body.
Million Fibers per Liter (MFL): million fibers per liter is a measure of the presence of asbestos fibers that are longer than 10 micrometers.
Nephelometric Turbidity Unit (NTU): nephelometric turbidity unit is a measure of the clarity of water. Turbidity in excess of 5 NTU is just noticeable to the average person.

Testing Results for WINNEMUCCA CITY OF

Microbiological	Result	MCL	MCLG	Typical Source
No Detected Results were Found in the Calendar Year of 2015				Naturally present in the environment

Disinfection By-Products	Monitoring Period	RAA	Range	Unit	MCL	MCLG	Typical Source
TTHM	2015	1	1	ppb	80	0	By-product of drinking water chlorination

Lead and Copper	Date	90TH Percentile	Unit	AL	Sites Over AL	Typical Source
COPPER	2011 - 2013	0.15	ppm	1.3	0	Corrosion of household plumbing systems; Erosion of natural deposits; Leaching from wood preservatives.
LEAD	2011 - 2013	1	ppb	15	0	Corrosion of household plumbing systems; Erosion of natural deposits.

Regulated Contaminants	Collection Date	Highest Value	Range	Unit	MCL	MCLG	Typical Source
ARSENIC	6/9/2015	4	4	ppb	10	0	Erosion of natural deposits; Runoff from orchards; Runoff from glass and electronics production wastes.
BARIUM	5/11/2015	0.15	0.15	ppm	2	2	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits.
CHROMIUM	5/11/2015	1	1	ppb	100	100	Discharge from steel and pulp mills; Erosion of natural deposits.
FLUORIDE	6/9/2015	0.3	0.3	ppm	2	4	Natural deposits; Water additive which promotes strong teeth.
NICKEL	3/4/2014	0.002	0.002	mg/L	0.1	0.1	
NITRATE	5/11/2015	6.8	6.8	ppm	10	10	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits.
SELENIUM	5/11/2015	7	7	ppb	50	50	Discharge from petroleum and metal refineries; Erosion of natural deposits; Discharge from mines

Radionuclides	Collection Date	Highest Value	Range	Unit	MCL	MCLG	Typical Source
COMBINED RADIUM (-226 & -228)	12/18/2013	1	1	pCi/L	5	0	Erosion of natural deposits
COMBINED URANIUM	4/2/2013	7	4 - 7	µg/L	30	0	Erosion of natural deposits
GROSS ALPHA, INCL. RADON & U	4/2/2013	6.3	6.3	pCi/L	15	0	Decay of natural and man-made deposits
GROSS BETA PARTICLE ACTIVITY	4/2/2013	4.4	4.4	pCi/L	50	0	Decay of natural and man-made deposits

Secondary Contaminants	Collection Date	Highest Value	Range	Unit	SMCL	MCLG
CHLORIDE	6/9/2015	79	79	mg/L	400	
IRON	6/9/2015	0.28	0.28	mg/L	0.6	
MAGNESIUM	6/9/2015	18	18	mg/L	150	
pH	6/9/2015	7.93	7.93	pH	8.5	
PH, CACO3 STABILITY S.U.	6/10/2014	21.5	21.4 - 21.5	C		
SODIUM	6/9/2015	62	62	mg/L	200	20
SULFATE	6/9/2015	74	74	mg/L	500	
TDS	6/9/2015	460	460	mg/L	1000	

Health Information About Water Quality

Additional Required Health Effects Language:

Nitrate in drinking water at levels above 10 ppm is a health risk for infants of less than six months of age. High nitrate levels in drinking water can cause blue baby syndrome. Nitrate levels may rise quickly for short periods of time because of rainfall or agricultural activity. If you are caring for an infant, you should ask for advice from your health care provider.

Violations

During the 2015 calendar year, WINNEMUCCA CITY OF is required to include an explanation of the violation(s) in the table below and the steps taken to resolve the violation(s) with this report.

Type	Category	Analyte	Compliance Period
No Violations Occurred in the Calendar Year of 2015			

Health Information About the Above Violation(s)

There are no additional required health effects violation notices.

Water System Contact Information

Water System Name: City of Winnemucca
County: Humboldt
BSDW System ID Number: NV0000248
Number of Connections: 3300
Population Served: 9900
Owner's Rep: Steve West
Telephone: 775-623-6333
Fax: 775-623-6321
E-mail: wmcadsw@winnemuccacity.org
Operator: Roger Sutton
Telephone: 775-623-6381
Fax: 775-623-6321
Address: 90 W. 4th street, Winnemucca, NV 89445

Nevada Division of Environmental Protection
Bureau of Water Quality Planning

Abandoning Unused Water Wells
FACT SHEET

If you don't use your well, why should you plug it?

Unplugged abandoned wells can come back to haunt you and your water supply. Every year, many wells are abandoned when they are replaced with new wells or when homes are connected to community water systems. When an abandoned well is improperly plugged, or not plugged at all, it can be a hazard to safety and health.

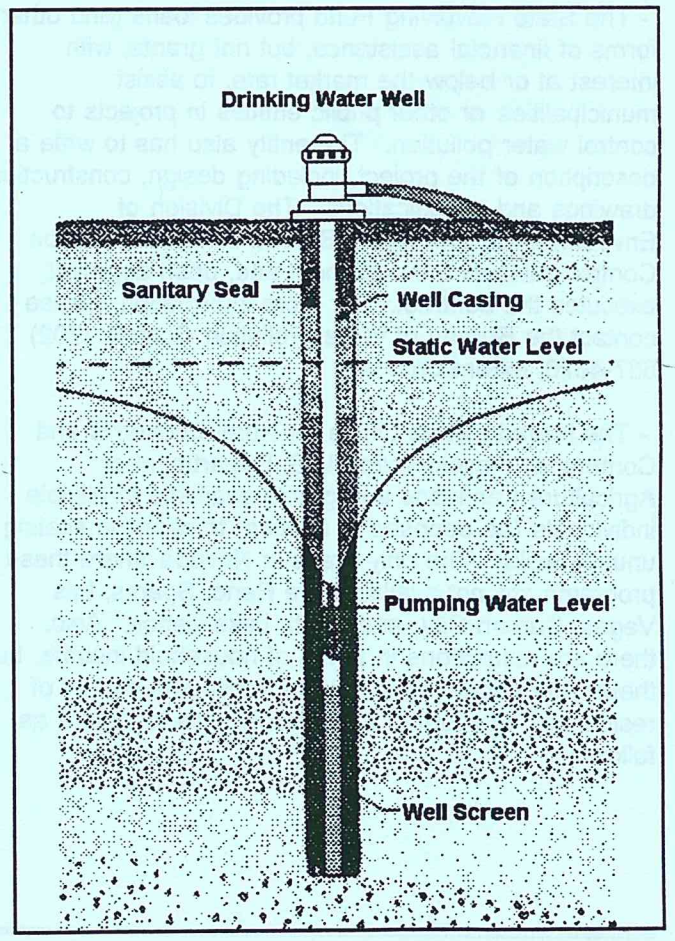
Unplugged abandoned wells may provide a direct path from the land surface to ground water. When they are not properly plugged, pesticides, fertilizers, and other contaminants have an easy path straight to your ground water. If the well is open, you also run the risk of children, animals and others falling into it. You may be held liable for their injuries. Also, you may be held liable for any illegal dumping done without your knowledge, or for mischievous acts and pranks committed to your well.

Another reason for properly abandoning your well is that the State of Nevada, Division of Water Resources, has adopted regulations that require the plugging of water wells. The regulations require that water wells be plugged by a licensed well driller. The well casing has to be removed, perforated or ripped, depending on the geological conditions of the site. The plugging has to be done by filling the drill hole with neat cement or a bentonite product. After the well has been properly plugged, the driller then makes a report in writing to the Division of Water Resources. It is important to point out that property owners are responsible for proper well abandonment.

What if there is an abandoned well on my property and I don't know about it?

Abandoned wells are not always in clear sight. To find out if there is one on your property, try contacting the following sources.

- Former property owners or neighbors, who may remember well locations.
- Well drillers, who may be able to say where they drilled a well no longer in use.
- Old photos, which may show windmills, houses, barns, or other buildings where wells might be found.
- Fire insurance plan drawings, which might contain records of old wells.
- Government agencies or surveys, such as the State Division of Water Resources, Conservation Districts, Nevada Bureau of Mines and Geology, U.S. Geological Survey, and Irrigation Districts.



MAY 1995

Can I get financial assistance for plugging unused wells on my property?

There are some sources of financial assistance available in different forms - grants, loans or a combination of both.

- Section 319 of the Clean Water Act 1987 Amendments provides for funds, which require a 50% local match, for projects that improve water quality. Under this provision, community entities (as opposed to individuals), apply to the Nevada Division of Environmental Protection (NDEP), Bureau of Water Quality Planning, with a written proposal describing their project. The community entities can be, for example, GIDs (General Improvement Districts) or Home Owner Associations. The Bureau then reviews all the proposals received, prioritizes them, and awards the funds appropriately. Ground water protection is a high priority at the federal and State level. For more information, please contact the Bureau of Water Quality Planning, (702) 687-4670, extension 3100.

- The State Revolving Fund provides loans (and other forms of financial assistance, but not grants) with interest at or below the market rate, to assist municipalities or other public entities in projects to control water pollution. The entity also has to write a description of the project, including design, construction drawings and specifications. The Division of Environmental Protection, Bureau of Water Pollution Control, reviews the document and, upon approval, executes the contract. For more information, please contact the Bureau of Water Pollution Control, (702) 687-4670, extension 3140.

- The Nevada State Office for Rural Economic and Community Development, U.S. Department of Agriculture has loans and grants available to eligible individuals (as opposed to entities) to assist in sealing unused wells. The only areas in Nevada where these programs are not available are Reno, Sparks, Las Vegas, Carson City, and South Lake Tahoe. Also, there are restrictions in terms of household income, but these vary according to size of family and county of residence. For further information, please inquire as follows:

For the counties of Elko, Eureka, NE Nye and White Pine, please contact:

Clayre Moiola, County Supervisor
2002 Idaho Street
Elko, NV 89801
(702) 738-8468

For the counties of Clark, Lincoln and South Nye, please contact:

Jeanette Jeffries, County Supervisor
2357-A Renaissance Drive
Las Vegas, NV 89119
(702) 262-9047

For the counties of Churchill, Esmeralda, Lyon, Mineral, NW Nye, Storey and Washoe, please contact:

Barbara Williams, County Supervisor
111 Sheckler Road
Fallon, NV 89406
(702) 423-7541

For the counties of Humbolt, Lander and Pershing, please contact:

Susan Wagstaff, County Supervisor
1200 Winnemucca Blvd E
Winnemucca, NV 89445
(702) 623-4461

How can I get more Information?

If you would like to obtain more information about Properly Abandoning Wells, please contact the Division of Water Resources, at (702) 687-3861.

If you are interested in finding out more about protecting your ground water, or if you have any other water quality questions, you can contact the Bureau of Water Quality Planning, at (702) 687-4670, extension 3088.

NDEP acknowledges contributions from the book *50 Ways Farmers Can Protect Their Groundwater* written by Michael C. Hirschi, F. William Simmons, Doug Peterson and Ed Giles and published by the University of Illinois and the UI Cooperative Extension Service.

Good Agricultural Practices and Good Handling Practices: Water Use in Horticultural Systems

Seth Urbanowitz, Extension Educator

Introduction

Good agricultural practices (GAPs) and good handling practices (GHPs) encompass management practices producers, growers and packers of fresh produce should follow to minimize contamination of their product. This publication covers those practices related to water use.

Water is of special concern in maintaining produce safety due to the ability of pathogens to survive long periods in water, the ability of water to transport pathogens over a large area and the number of ways in which water can contact fresh produce pre- and post-harvest. The application of contaminated water in pre- or post-harvest management has a high likelihood of reaching the consumer.

Water and Microbial Hazards

Anytime water comes into contact with fresh produce, its quality determines the potential for pathogen contamination, since water may carry many different microorganisms that are harmful to human health. Given that small amounts of microorganisms (usually as few as 10 to100 cells) in water can cause foodborne illness, water use is one of the most important critical components of a food safety program. Water that is inadequate in quality has the potential to be a vehicle for larger areas of contamination in the field, packhouse or transportation environment. Contamination can occur pre-harvest in field operations, such as irrigation, transplant establishment, fertilizer/pesticide applications, frost control and cooling. It can also occur during post-harvest activities, including product rinsing, washing, waxing, cooling and transport. Producers and packers need to be proactive in minimizing microbial contamination of their product.

Agricultural Water

Water quality is of particular importance when it comes into contact with the edible portion of the product, both pre- and post-harvest. All agricultural water must be safe and of adequate sanitary quality for its intended use (Food and Drug Administration, 2013). Agricultural water does not include indirect water application (noncrop contact), such as drip irrigation to an aboveground crop or furrow irrigation to fruit trees.

The quality of agricultural water will vary and is highly dependent upon the water's source. Surface water has the highest probability of being contaminated, while groundwater is of moderate risk, and municipal water is considered low risk. Properly constructed, placed, protected and maintained wells will help to ensure high-quality water. Applications of water should always be appropriate for the intended use, whether it be for the crop or during post-harvest handling.

Pathogens in Agricultural Watersheds

Most waterborne pathogens are excreted or shed in the feces of vertebrates. Water contamination routes are typically agricultural runoff, storm water, septic tank or well head leakage, wild and domestic animals, and land application of manure. Pathogens tend to fluctuate seasonally due mainly to temperature and precipitation. In certain circumstances, such as where there are high animal densities in confined animal facilities or where large numbers of newborn animals are present, pathogens in the watershed can quickly increase (Natural Resources Conservation Service, 2012).

The survival of pathogens in agricultural watersheds is governed by water turbidity, temperature, pH, oxygen levels, presence of nutrients (especially nitrogen), organic matter content and level of solar radiation. However, certain pathogens can remain viable for long periods of time despite the chemical, physical and biological stresses of the environment through resistant forms, such as cysts. *Escherichia coli* and Salmonella spp. can over winter in streambeds, and increased levels have been shown to be associated with larger rainfall events and higher temperatures (Haly, Cole and Lipp, 2009). Being aware of seasonal variation and land use in your watershed will help minimize the risk if microbial contamination on your farm. Actively participating in a local watershed group can be a way to influence water quality in your watershed and educate others.

Land Use and Mapping

Awareness of current and historical land uses on your property and in your watershed will allow you to better manage your production system with food safety in mind. Feedlots, animal pastures and dairy operations in your area can be a source of contamination. As such, producers should know what is upstream and how seasonal variation may influence water quality.

Developing a map of water sources, distribution systems and associated potential sources of contamination, such as adjacent and upstream land uses, will allow for a more comprehensive approach to understanding water quality on your farm or ranch. Include a record of well placement and distances to points of contamination, such as chemical and fuel storage areas. Review your map initially to see what management changes will have the greatest impact on water quality, and periodically to assess your system. If necessary, erect barriers that reduce the potential for water contamination. Examples of barriers might include sod or grass waterways, fencing, and earthen dams or berms.

Irrigation and Crop Protection Water

Assessing access to water, crop water demands and food-safety issues related to water use are important parts of fruit and vegetable production. Water that is of good quality, free of pathogenic microorganisms, is critical for on-farm food safety. Regularly inspect, especially at the onset of the growing season, and maintain water sources that are under your control.

The method and timing of irrigation has an effect on the potential to contaminate produce. Drip irrigation is a method that prevents contamination from product contact and soil splash. Avoiding irrigation one week before harvest can help minimize contamination of produce. In general, maximize the time between irrigation and harvest to reduce contamination due to dryness and exposure to solar radiation, which increases the rate of inactivation or death of pathogens (NRCS, 2012). Putting into place practices that protect water sources, such as grass waterways and fencing to exclude animals, will help to reduce contamination of your water source.

Water used in foliar sprays, including agricultural teas, frost protection and pesticide or fertilizer applications, should be from a pathogen-free source and potable as pathogens can persist and even grow in crop sprays. Avoid using surface water for irrigation immediately after storm events due to the chance of microbial loading into waterways. Irrigation water from a pond or lake that has had animals grazing in close proximity should not be used if it will come into direct contact with the crop or is untreated. Well water is less likely to be contaminated than surface water; however, wells should be properly located, maintained and constructed to reduce the chance of contamination.

Worker Hygiene

All water used for hand-washing must be potable. Workers must be trained and re-trained on proper hygiene, waste disposal and food-safety principles to reduce contamination. These trainings and related signage should be culturally sensitive and in the languages relevant to the operation.

Microbial Testing of Water

Testing water for generic *E.coli* may be required under the Food Safety Modernization Act of 2011, depending on your production practices, product and scale of operation. Being certified as following Good Agricultural Practices will require you to test the water used in production. Despite potential requirements, testing offers a "point in time" look at the quality of your water and is a good practice to follow to reduce contamination of your product.

Water quality can vary over time and should be tested to reflect seasonal fluctuations. Testing frequency should be conducted based on its source. In general, surface water should be tested once per month over the growing season, at planting, during peak use and just before harvest; well water should be tested once every three months; and municipal water is assumed safe but should be accompanied by tests from the municipality. All irrigation water that is tested should be collected as close to the field as possible.

Identification and quantification of all microbial pathogens in water is not practical due to the cost. However, methods are used that enumerate key organisms that serve as an indicator of water quality. Indicator bacteria may not be pathogenic but do indicate potential fecal contamination. Total coliform is a broad category that occurs in the environment, often in the absence of fecal contamination. Fecal coliform is a subgroup of total coliform and is commonly used as an indicator of fecal and bacterial contamination in watersheds (NRCS, 2013). Generic *E. coli* is a subgroup of the fecal coliform group found in high concentrations in mammalian fecal material. Water should be tested for generic *E. coli* at a close, reliable laboratory.

Microbial standards for water used for ice, agricultural teas, sprout or mushroom production, on food contact surfaces and hand-washing require that no detectable generic *E. coli* present per 100 milliliters of water. Irrigation water that comes into contact with the edible portion of the product (crop contact irrigation) should have no more than 235 colony forming units (CFU) of generic *E. coli* per 100 milliliters of any single water sample and a rolling geometric mean of five samples (n=5) of no more than 126 CFU/100 milliliters.

If standards are exceeded, stop using the water source and determine the cause of contamination (i.e. broken seal around well). Once you determine that you have exceeded allowable limits, document that you are addressing the issue and the corrective action taken such as replacing a seal around a well. Once you have

corrected the issue, reinspect your water supply and retest your water.

Processing Water

It is critical that water coming into contact with fresh produce during cleaning, cooling and other post-harvest activities must be potable. Water quality management throughout processing is essential to good sanitation, as reusing water can build up the amount of pathogens in the system with contamination spreading to larger volumes of product. In many instances, shelf life and safety are improved by not washing the product.

If water is used post-harvest, practices should be implemented that ensure that the water is of adequate quality at the start and end of all post-harvest processes (FDA, 1998). If water is being reused, water flow should be counter to the movement of produce through the different operations so that the most processed produce is always in contact with the cleanest water. Applying a regular treatment of disinfectant chemicals can be a good way to ensure water quality. Instillation of backflow devices is a necessary precautionary step to prevent contamination of clean water from contaminated water.

Disinfectants

The purpose of adding any disinfectant is to prevent cross-contamination and reduce microbial buildup. The addition of a disinfectant to wash water will not eliminate microbes from the product. There are many criteria to consider when selecting and incorporating a disinfectant into a processing system. Consult a university or industry expert to see what is appropriate for your system. Regardless of your selection, all sanitizers must be approved by the Environmental Protection Agency for use with fresh produce.

When using disinfectants, there are several tests that should be performed and recorded. Periodic testing of microbial loads and pH should be conducted to ensure continued efficacy of the wash treatment over time. Temperature monitoring is an essential component for some products due to the risk of water infiltration. Standard operating procedures (SOPs) should be developed that outline the use of sanitizers and water change schedules. Logs of temperature, pH and disinfectant levels should be maintained. Water contact surfaces must be cleaned and sanitized as necessary to keep produce safe.

Product Cooling

Produce is cooled to remove field heat and extend the life of the product. Many different methods are employed, including using water, ice and forced air. The method used depends on the product being cooled and operator preference. Water or ice used for cooling should be potable (no detectable generic *E. coli* per 100 milliliters). Good practices include:

- Cooling the product quickly and maintain temperatures to maximize produce quality.
- Considering the use of sanitizers in cooling water.
- Keeping water and ice clean and sanitary.
- Manufacturing, transporting and storing ice under sanitary conditions.
- Maintaining sanitary equipment.
- Preventing condensate from cold storage mechanisms from dripping onto produce.
- Storing similar commodities together to avoid cross-contamination (FDA, 1998).

Conclusion

Water is an important point of control for on-farm food safety. Pre- and post-harvest applications can easily contaminate large volumes of product. Water applications

should be of appropriate quality for their intended use. Assessing, monitoring and protecting your water source are important steps to take to reduce the risk to your operation and the consumer. Monitoring water quality for generic *E. coli* is a good practice that can help you understand the quality of your water source. All post-harvest water must be potable water. It is important to prevent cross-contamination via wash water or through other post-harvest processes. Always talk with a professional in the industry or at a university before selecting a sanitizer. It is also important to keep any records related to water use for a minimum of two years. Before implementing a water management plan, understand any potential buyer demands and regulatory requirements and meet those criteria.

References

Food and Drug Administration. Food Safety Modernization Act. 2011. Retrieved from: http://www.fda.gov/downloads/Food/GuidanceRegulation/FSMA/UCM360734.pdf January 18, 2013.

Food and Drug Administration. FSMA Facts: More on the proposed agricultural water standards- FDA's proposed rule for produce safety. 2013. Retrieved from: http://www.fda.gov/downloads/Food/GuidanceRegulation/FSMA/UCM360242.pdf July 15, 2013.

Food and Drug Administration. Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables. 1998. Retrieved from: http://www.fda.gov/downloads/Food/GuidanceComplianceRegulatoryInformation/GuidanceDocuments/ProduceandPlanProducts/UCM169112.pdf July 15, 2013.

Haly, B. J., Cole, D. J., and Lipp, E. K. Distribution, diversity, and seasonality of waterborne salmonellae in a rural watershed. Applied and Environmental Microbiology, 75(5), 2009.

Natural Resources Conservation Service. Introduction to Waterborne Pathogens in Agricultural Watersheds. Nutrient Management Technical Note No. 9. 2012.

Safer Alternatives to Hazardous Household Products

SUBSTANCE	ACTIVE INGREDIENT/EFFECTS	SAFER ALTERNATIVE
Glass Cleaner	Ammonia: irritant - can cause chemical burns, affects mucous membranes	Vinegar and water
Drain Cleaner	Lye - very caustic, can cause chemical burns	Metal snake, or ¼ cup baking soda, followed by ½ cup vinegar, flush with boiling water when fizzing stops.
Toilet Cleaner	Chlorine and hydrochloric acid: irritant, causes burns, toxic	2-3 teaspoons borax and liquid dish soap in 2 quarts warm water
Furniture Cleaner	Petroleum distillates, nitrobenzene - flammable toxic	One part lemon juice to two parts olive or vegetable oil
Mothballs	P-dichlorobenzene, a known carcinogen	Cedar blocks or chips, store clean woolens in airtight container or bag
Silver Polish	sulfuric acid, acidified thiourea - causes burns, toxic	Soak in boiling water with 1 tsp. baking soda, 1 tsp. salt with a piece of aluminum foil
Insecticides	Various chemicals, some quite toxic	Roaches - boric acid powder or baking soda & powdered sugar Ants - red chili powder or cream of tartar across entry path Garden - mild insecticidal soaps, organic controls
Batteries	Corrosive, toxic, contain heavy metals	Use rechargeable batteries when feasible.
Paint solvents and thinners	Flammable and Toxic	Use latex paints. If cleaning brushes, let paint settle to bottom of closed jar, pour off clear solvent and reuse. Any rinse water should not be disposed of on the ground or into a storm drain.

For more information about recycling call:
(702) 687-4670 x.3003

HOW DO I PARTICIPATE?

(1) Carefully inventory the pesticides you would like to bring in for disposal.

(2) Call the Nevada Division of Agriculture to register for an upcoming collection in your area:

Reno: (702) 688-1180
Winnemucca: (702) 623-6501
Las Vegas: (702) 486-4690
Elko: (702) 738-8076

(3) Remember, there is no charge for the disposal of waste pesticides.

When transporting old paper, plastic and metal containers remember that they may fall apart easily. Handle them with care, and remember to wear protective clothing when handling any pesticide.

For more information about the Pesticide Waste Disposal Program, call the Nevada Division of Agriculture office nearest you:

Reno: (702) 688-1180
Winnemucca: (702) 623-6501
Las Vegas: (702) 486-4690
Elko: (702) 738-8076

Nevada Division of Agriculture strives to encourage, advance and protect the agricultural industry of Nevada.

(O)-4040

PESTICIDE DISPOSAL PROGRAM

A safe and environmentally responsible method to dispose of waste pesticides

FREE OF CHARGE

Published by the

Division of Agriculture

Nevada Department of Business and Industry

PROTECTING NEVADA'S ENVIRONMENT

Unused pesticides and pesticide wastes can be potential sources of contamination to Nevada's streams, lakes and groundwater. The Pesticide Waste Disposal Program, sponsored by the Nevada Division of Agriculture, assists farmers, ranchers, pest control operators, and other pesticide users to safely dispose of their waste pesticides.

Since 1994 hundreds of Nevadans have participated in pesticide waste collection events sponsored by the Division of Agriculture, this has resulted in the safe disposal of thousands of pounds of waste pesticides.

Pesticide users who take part in this program can benefit by safely eliminating some unwanted and potentially hazardous materials from the workplace. Participation also helps reduce the risk of pesticide contamination of our soils, groundwater, streams, and wetlands.

WHAT IS A WASTE PESTICIDE?

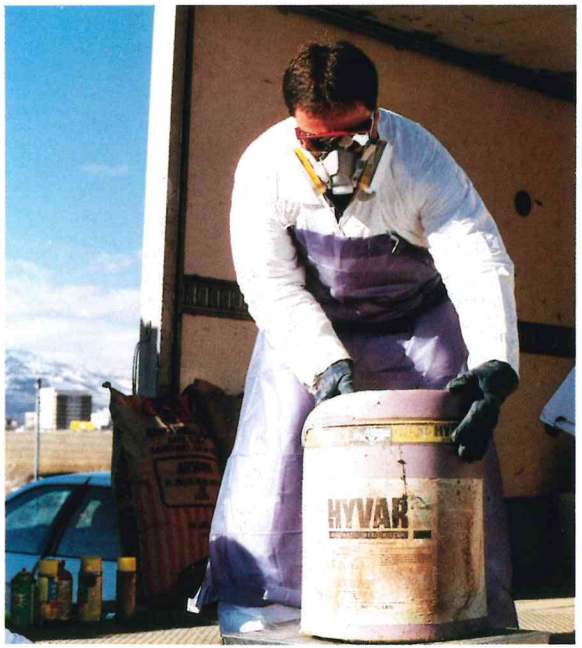
Any pesticide that is no longer usable, has been banned, or is unwanted is a waste pesticide. Banned products such as DDT and chlordane have been collected at past disposal events.

Acceptable Products: All pesticides will be accepted, this includes:

- Insecticides
- Weed killers
- Fungicides
- Rodent baits
- Other pesticides

IS THERE A DISPOSAL FEE?

This service is funded by pesticide registration fees and is available at no cost to pesticide users. The Nevada Division of Agriculture holds collection events at various times throughout the state. Waste pesticides are packed and transported to EPA-approved facilities where they are destroyed.



cals or additives should never be dumped down household drains or toilets attached to septic systems. Call your Cooperative Extension Office for a copy of the brochure, *Understanding Your Septic Tank System* (FS92-27).

- Abandoned wells should be capped and sealed. Since they provide a direct conduit to the aquifer, the wellhead protection area around them should be maintained.

- Some businesses generating industrial wastewater dispose of this polluted water in outdated septic systems, drainfields, dry wells, cesspools, pits or storm drains. These too can be sources of ground water and surface water contamination, and in some cases their use should be discontinued. Call the Bureau of Water Pollution Control, 687-5870, for details.

- Well owners should inventory all potential sources of contamination on their property and adjacent properties, and protect the well against contamination by any sources which cannot be eliminated. Table 1 lists common sources of ground water contamination.

- Well owners should test wellwater at least once a year for coliform bacteria and at least every 3 years for the "Routine Domestic Water Analysis". See the Cooperative Extension brochure, *Drinking Water Testing for Private Well Owners* for more information (FS92-30).

WELLHEAD PROTECTION FOR COMMUNITY WELLS

The more water pumped from a well, the larger and more comprehensive the wellhead protection area should be. Several strategies may be employed to protect aquifers supplying community wells, including prohibiting land uses with high pollution potentials, enlarging the WHPA, rezoning, or purchasing key parcels within the WHPA. Qualified communities may obtain grants through the Nevada Division of Environmental Protection to establish a local Wellhead Protection Program.

Table 1. Common Sources of Ground Water Contamination by Category.

Agricultural	
Animal burial areas	Irrigation sites
Animal feedlots	Manure spreading areas/pits
Fertilizer storage/use	Pesticide storage/use
Commercial	
Airports	Jewelry/metal plating
Auto repair shops	Laundromats
Boatyards	Medical institutions
Construction areas	Paint shops
Car washes	Photography establishments
Cemeteries	Railroad tracks and yards
Dry cleaners	Research laboratories
Gas stations	Scrap and junkyards
Golf courses	Storage tanks
Industrial	
Asphalt plants	Petroleum production/storage
Chemical manufacture/storage	Petroleum pipelines
Electronics manufacture	Septage lagoons
Electroplaters	Sludge storage tanks
Foundries/metal	Toxic and hazardous spills
Machine/metal-working shops	Wells (operating/abandoned)
Mining and mine drainage	Wood preserving facilities
Residential	
Fuel oil	Septic systems, cesspools
Furniture stripping/refinishing	Sewer lines
Household hazardous products	Swimming pools (chemicals)
Household lawns	
Other	
Hazardous waste landfills	Recycling/reduction facilities
Municipal incinerators	Road deicing operations
Municipal landfills	Road maintenance depots
Municipal sewer lines	Storm water drains/basins
Open burning sites	Transfer stations

WHERE TO GET HELP AND FURTHER INFORMATION:

Ground Water Program Coordinator
Bureau of Water Quality Planning
Nevada Division of Environmental Protection
333 W. Nye Lane
Carson City, NV 89710
(702) 687-5883

REFERENCES

Power to Protect, U.S. EPA workbook and video for Nevada.
Wellhead Protection Trainings, 1991.

Wellhead Protection, a Decision Makers Guide
U.S. EPA,
EPA 440/6-87-009, 1987.

Citizens Guide to Ground-Water Protection
U.S. EPA, EPA 440/6-90-004, 1990.

Prepared by: John Cobourn, Water Resource Specialist
University of Nevada Cooperative Extension

Fact Sheet 92 - 33

PROTECT YOUR WELLWATER

"Clean Water: We Can Make a Difference!"

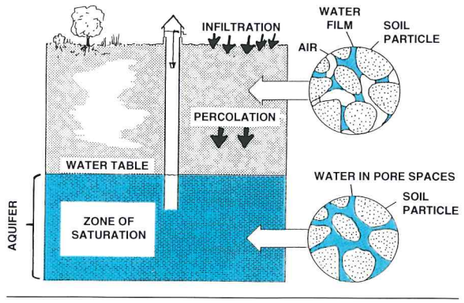
University of Nevada Cooperative Extension

Nevadans obtain their drinking water from two sources: ground water and surface water. Residents of cities and towns get their domestic water from private or public utility companies which draw water from local wells, streams and reservoirs. In outlying or rural areas, homeowners rely on private wells for their household needs. While the quality of drinking water in urban systems is monitored by the utility company and regulated by the government to meet state and federal Safe Drinking Water Standards, private well owners are responsible for testing and protecting their own drinking water supply. This brochure discusses basic concepts and strategies to ensure safe drinking water supplies from wells.

UNDERSTANDING GROUND WATER

To learn how to protect wellwater, it is first necessary to understand some key terms. **Ground water** is water that fills (saturates) the **pore spaces** among soil particles and throughout porous bedrock such as limestone, sandstone or basalt. Ground water accumulates from precipitation or surface water which soaks into **(infiltrates)** the soil and moves **(percolates)** downward to the **water table**, which is the uppermost layer of the **zone of saturation**. (See Figure 1.) The process by which underground water deposits **(aquifers)** are replenished from the surface is called **recharge**.

Figure 1. Understanding the Key Terms of Ground Water



Shallow aquifers are typically recharged not only by precipitation and seepage from lakes and rivers but also from irrigated agricultural fields and ditches. Their shallow nature and easy recharge makes them particularly susceptible to contamination, especially as human activity above them increases. Contamination of deep aquifers is less likely, but can occur when people use abandoned wells improperly as waste disposal sites.

HOW DOES GROUND WATER BECOME CONTAMINATED?

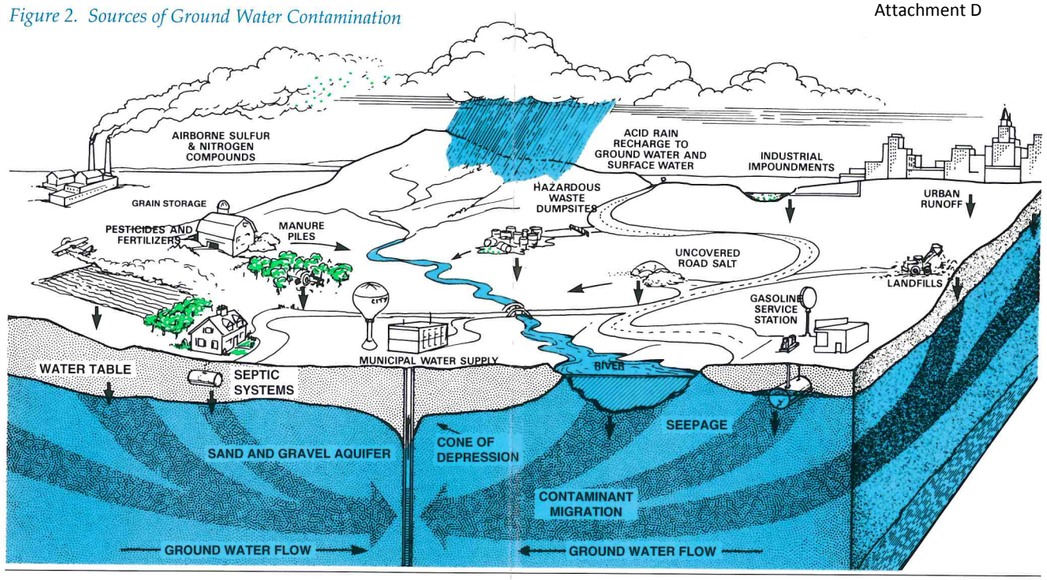
Ground water is not always safe to drink. It can be contaminated by natural or human causes. Some deep aquifers contain water which has naturally high concentrations of salts and other dissolved solids. On the other hand, much of our ground water is quite good, but can be threatened by human sources of contamination.

Many human activities and pollutants have contaminated our aquifers. Industrial and agricultural fuels, nutrients from animal wastes or septic systems, and fertilizers are examples of pollutants that can reach ground water. Such pollutants are sometimes misused or dumped on the ground, sometimes spilled or leaked, and, in some cases, old-fashioned (and now illegal) dry wells and leachfields used for industrial waste disposal result in direct "injection" of pollutants to ground water. Pollutants can percolate downward by themselves or in solution with water, making the ground water unusable by plants, animals and humans. Figure 2 illustrates sources of contamination to ground water.

WELLHEAD PROTECTION

Wellhead protection is a basic strategy to protect ground water. By alerting citizens to keep all hazardous or toxic substances away from the wellhead (the portion of the well above ground), the potential for pollution of ground water can be reduced. Every well owner should

Figure 2. Sources of Ground Water Contamination



establish a Wellhead Protection Area (WHPA) around his or her well. Private well owners should designate a protection area with a minimum radius of 100 feet around the wellhead. For larger public supply or agricultural wells, where groundwater flow patterns are known, the WHPA comprises all of the zone of contribution, which is the surface area contributing recharge to the well. Here are some ways to protect ground water within the WHPA:

- Residents must avoid spilling or disposing of animal wastes, fuels, pesticides, fertilizers, paints, etc., within the WHPA or within the WHPA of adjacent properties.

- A well must be properly sealed with a 50-foot-deep concrete collar around the well casing to prevent contaminants from directly entering the aquifer. In addition, the top of the well casing must be capped, and must be at least 12 inches above finished grade. For other construction details consult the office of the Nevada State Engineer, Division of Water Resources, Carson City, at 687-4380.

- The well-house should not be used to store fuels, solvents, degreasers, paint products, pesticides, fertilizers, deicers, etc. These should be stored outside the WHPA.

Other important aspects of Wellhead Protection include the following:

- Site the well outside areas of potential contamination. Wells should not be located in corrals, pastures, feedlots or drainage ways from such facilities or near underground fuel storage tanks. A wellhead should be at least 150 feet from a septic tank and its leachfield. However, if it is a shallow leachfield (36" or less to bottom of trench) the separation can be as little as 100 feet.

- Nearby septic systems should be correctly sited, installed and maintained. Most should be pumped about every 3 years. Harmful chemi-

PARCEL NUMBER

(This number can be found on your tax statement)

If septic system records are available, they are filed by this number. Since 1990, the Division of Consumer Health Protection of the Nevada Department of Human Resources has maintained septic system records. They may also have records prior to 1990. The phone number in Carson City is (702) 687-4750.

If any information is available, obtain a copy for future reference.

If there is no official record, it is a good idea to make a rough drawing of the location of the septic and leach lines for future reference.

KEEP ALL INFORMATION ABOUT YOUR SEPTIC SYSTEM, INCLUDING THIS FOLDER, FILED WITH OTHER IMPORTANT DOCUMENTS RELATING TO YOUR HOME.

Your Septic System Installer

Name
Address
Phone
Date Installed

Your Septic System Pumper

Name
Address
Phone

NEVADA GOLD

GUARDING OUR LOCAL DRINKING WATER

A LOCAL GROUNDWATER PROTECTION PROGRAM

If you have questions about water, wastewater, or your septic system, start with your local University of Nevada Cooperative Extension Office, your local representative of the Division of Consumer Health of the Nevada Department of Human Resources, or your local health department.

STATE RESOURCES

Nevada Department of Human Resources. Includes Divison of Consumer Health Protection (for public water systems, small sewage disposal systems, individual septic systems): (702) 687-4750.

Nevada Department of Conservation and Natural Resources. Includes divisions of Water Planning, Environmental Protection, and Water Resources (State Engineer): (702) 687-4360.

Educational Program sponsored by the University of Nevada, Reno, Cooperative Extension.

Adapted from Thurston County, WA Environmental Health Division Pamphlet.

AN OWNER'S MANUAL ON SEPTIC SYSTEM CARE

TO PROTECT YOUR FAMILY'S HEALTH

SEPTIC SMARTS

To extend the life of your septic system, save money on maintenance costs, and protect water quality

DO...

Inspect your septic tank annually

Generally, septic systems should be pumped every 3 to 5 years. Inspection by you or a professional, may show that you need to pump more or less often. Regular pumping ensures that solids will not flow from the septic tank into the drainfield. Solids can destroy the drainfield. Pumping will not bring a failing drainfield back into service.

Use less water
This reduces the amount of wastewater entering the septic system and may increase its lifespan. Excessive water use is one of the main causes of septic system failure.

To reduce household water usage:

- Use water-saving bathroom and kitchen fixtures (faucets, showers, toilets)

- Run and drain appliances, such as dishwashers and washing machines, one at a time

- Spread laundry over an entire week and avoid partial loads

- Fix all faucet leaks promptly

Direct water from downspouts and roofs away from the drainfield
Additional water from these sources may prevent the drainfield from working properly

Keep cars and trucks off the septic tank and drainfield areas
This prevents pipes from breaking and soil from becoming compacted. Compacted soils can't absorb the water from the drainfield.

Use phosphate-free detergents
This helps prevent algae problems in nearby ditches, drains, canals, and streams.

MAINTENANCE RECORD

Use the chart below to keep a record of septic system maintenance and as a reminder of when it is time for the next inspection and pumping.

If you move, leave this folder with the new homeowner.

Date	Work Done	Firm	Cost

DON'T...

Don't use a garbage disposal
A garbage disposal adds solids and grease to the septic system, which may lead to drainfield failure.

Don't use septic tank additives or "miracle" septic system cleaners
Some of these additives can actually harm the system by allowing solids to flow into and clog the drainfield. Additives and cleaners can also contaminate ground and surface water.

Don't dispose of water from hot tubs into the septic system
This large volume of water is harmful to the system, and the chlorine in the water can destroy important bacteria in the septic system. Drain hot tubs into the ground, away from the drainfield and not into a
storm drain.

Don't flush solid wastes into the septic system
This includes diapers, cigarrette butts, coffee grounds, tampons, condoms, and grease.

Don't put strong chemicals, such as cleaning products, down the drain
Household chemicals, such as drain cleaners, paint thinners, and floor cleaners, can destroy the important bacteria in the septic tank and contaminate ground and surface water.

Don't construct anything over the drainfield
This includes patios, carports, sidewalks or landscaped plastic. Grass is the best cover for the septic tank and drainfield. Soil compaction and paving prevents oxygen from getting into the soil. This oxygen is needed by bacteria to break down sewage.

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COOPERATIVE EXTENSION

Bringing the University to You

Fact Sheet 99-26 (formerly 92-27)

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Public Health Engineer
Bureau of Health Protection Services
State of Nevada

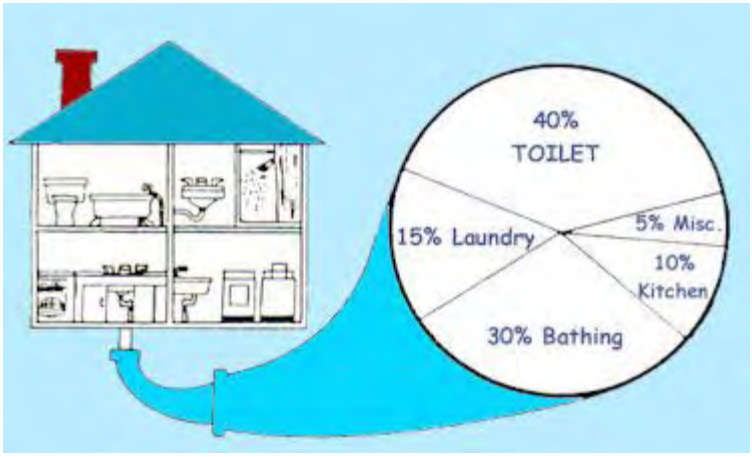
Revised by:
Susan Donaldson, Ph.D.
Water Quality Education Specialist

SEPTIC SYSTEMS

Because they are out of sight, they are often out of mind, but septic systems cannot be neglected without problems for the homeowner.

While public sewer lines carry away household waste in urban areas, rural properties rely on self-contained sewage treatment systems installed below ground near the property they serve. Such systems are called septic tank-soil absorption systems, otherwise known as “septic systems.”

Proper disposal of domestic waterborne wastes includes physical disposal of the sewage into the environment without adverse health, odor, aesthetic or nutrient (fertilization) effects. This is provided by a properly managed septic system. Appropriate handling of waste water is essential in maintaining health standards of water quality and recharging ground water. To avoid contamination of ground water supplies, septic systems should be installed at least 150 feet from any drinking water well.



Septic systems are called upon to receive and process household wastewater from toilets, showers, washing machines, sinks and garbage disposal units (see Figure 1). Their efficiency is dependent upon their design, proper installation, and maintenance program. Failure in any one of these areas can lead to improper operation, which can create a health hazard and a potential financial burden.

HOW A SEPTIC SYSTEM WORKS

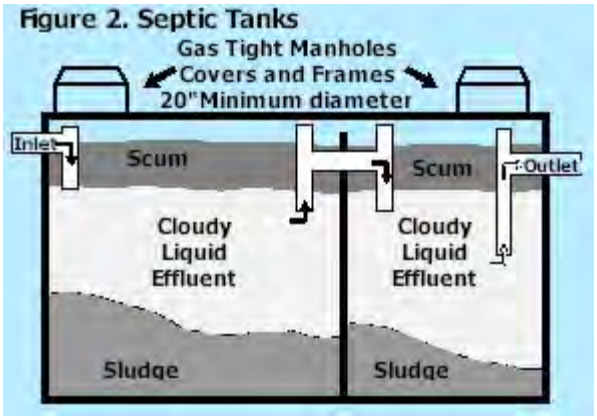
All septic systems function in the same general manner, piping household wastewater to a holding tank where solids are removed. Through bacterial action, some of the solids are digested and converted to liquid for discharge into a "soil absorption area." The remaining solids are stored for future disposal.

The septic tank was patented in London, England around 1900 and is described in Webster's Dictionary as "a tank in which waste matter is decomposed through bacterial action." The modern septic tank is a watertight box usually made of precast concrete, concrete blocks, or reinforced fiberglass. When household waste material enters the box, several thing occur:

1. Organic solid material floats to the surface and forms a layer that is commonly called "scum." Bacteria in the septic tank set about to biologically convert this material into liquid.
2. Inorganic or inert solid materials that cannot be biologically converted, and the by-products of bacterial digestion, sink to the bottom of the tank and form a layer commonly called "sludge."
3. A cloudy liquid lies between the two layers and is the only ingredient that should overflow into the soil absorption area.

A properly functioning tank is illustrated in Figure 2.

Figure 2. Septic Tanks



The overflow of solid material into the soil absorption area should be avoided because it will clog soil pores in the absorption area and result in system failure. Two factors contribute to solid material overflow: bacterial deficiency and failure to have sludge accumulations removed periodically.

Bacteria must be present in the septic tank to digest the organic solids. Normal household waste provides enough bacteria to digest the solids UNLESS the bacteria is killed off. Bacteria are very sensitive to environmental changes and may be destroyed by such common home-care products as:

- detergents
- cleaning compounds
- disinfectants
- polishes
- toilet
- sink and tub cleaners
- bleach
- caustic drain openers
- acids
- cleaners

Check the labels on these and other products used in the home. Labels carrying any of the following warnings indicate the presence of ingredients that may kill bacteria.

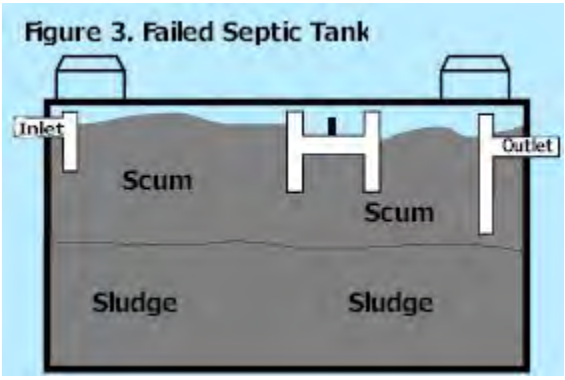
"Harmful if swallowed"
"Avoid contact with the skin"
"Do not get in open cuts or sores"
"If product comes in contact with eyes, call a physician immediately"

Look for products labeled "safe for use in septic systems."

When bacteria are not present to digest and liquefy the scum at the top of the septic tank, the scum will accumulate until it overflows, clogging the soil absorption area.

The sludge at the bottom of the septic tank is inorganic and inert material that is not biodegradable and will not decompose. If not removed on a periodic basis, it will accumulate and overflow, also clogging the absorption area. Figure 3 illustrates a failed septic system.

Figure 3. Failed Septic Tank

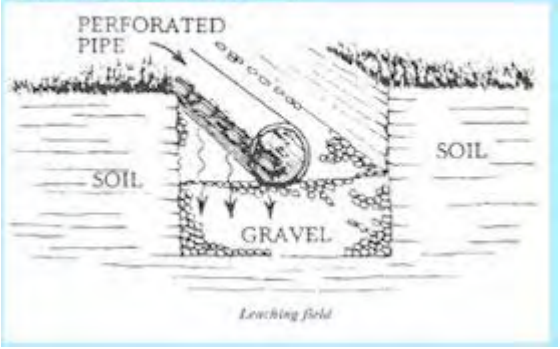


SOIL ABSORPTION AREAS

There are three main types of absorption areas — leaching fields, filter beds, and drainage pits sometimes called drywells or cesspools.

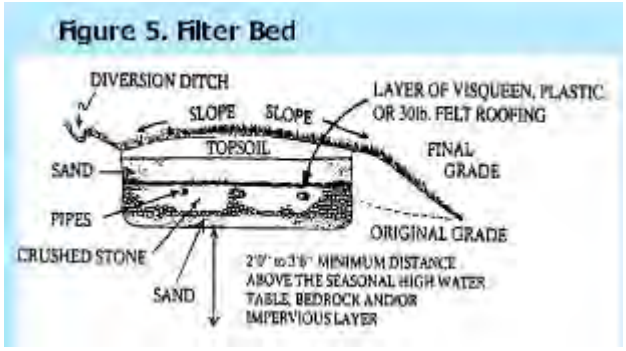
Leaching fields generally consist of a network of perforated pipes laid in a gravel-lined trench. If solids are permitted to enter the pipes, they can clog the perforations, causing draining to slow and eventually stop. See Figure 4.

Figure 4. Leaching Field



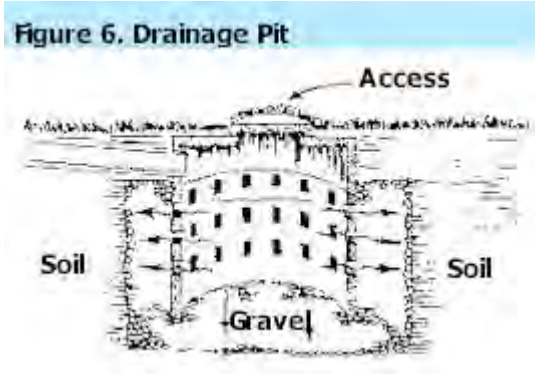
Filter beds shown in Figure 5 work on the same principle as leaching fields, with a perforated pipe running through layers of sand and crushed stone. Filter beds are wider than leaching fields and can be constructed either above or below ground. Because of their smaller size, filter beds are more suitable to high water table soils, or smaller properties that lack the space required for the long trenches of a leaching field. Again, solids must be kept out of the filter lines to prevent clogging.

Figure 5. Filter Bed



Drainage pits shown in Figure 6 are constructed of either precast or concrete block cylinders. They have closed tops, open bottoms, and holes in the sidewalls. Some older septic systems consist of only a drainage pit or a cesspool. Their use is no longer permitted.

Figure 6. Drainage Pit



SEPTIC SYSTEM MAINTENANCE

Septic systems require two things: proper bacterial action and periodic pumping.

To ensure that proper bacterial action takes place, the system should receive normal household waste that contains the organisms necessary to initiate and promote anaerobic digestion. All bacteria-killing products should be disposed of properly according to label directions and should not be disposed of in the household septic system.

The frequency of pumping the septic tank will depend on the size of the tank, the number of people occupying the home, the frequency of garbage disposal use, and the condition of the system. Since there is no tank additive that will dissolve or eliminate the accumulation of sludge, IT MUST BE PUMPED OUT. Failure to pump periodically can cause solids to overflow into the absorption area. This can clog the system and may force replacement of the absorption area at considerable expense and inconvenience. Typical replacement costs are likely to exceed $4,000.

Generally, a properly designed tank of 1,000 gallons capacity and used by a family of 4 people should be pumped about every 3 years. More frequent pumping may be necessary in larger families or if a garbage disposal is used or excessive amounts of household grease enter the system.

Pumping of septic tanks should be performed by professionals who have the necessary equipment to do the job properly. They can be found in the Yellow Pages of your telephone directory under "Septic."

COMMONLY ASKED QUESTIONS

Q: **What causes the thick crust in my septic tank?**
A: This is organic material that has congealed into a solid mass. The condition is dangerous and indicates a bacterial deficiency. Have the tank pumped to avoid future problems.

Q: **Will acid help my septic system?**
A: Acids and chemicals work only temporarily. They are extremely dangerous to use and are harmful to the environment. The Environmental Protection Agency has banned the use of these hazardous materials in many places.

Q: **Does it help to add yeast, baking soda or inoculants?**
A: Yeast merely provides a fermentation environment. It does not provide bacteria. Baking soda raises the pH in the tank and also provides no bacteria. A high pH can harm the septic process. The benefits of inoculants are inconclusive.

Q: My system recently backed up for the first time in years. What do I do now?
A: A backup is the first sign of septic system failure. It will occur again unless maintenance is begun. Contact a septic service provider immediately.

WARNING SIGNS OF SEPTIC SYSTEM PROBLEMS

Sluggish drains in the home
Plumbing backups
Gurgling sound in pipes or drains
Outdoor odors
Mushy ground or greener grass around septic system

OTHER CAUSES OF SEPTIC FAILURE

Placement in poor drainage area
Failure to install according to septic codes
Overloading. Use water sparingly. Do only full loads of wash at off-peak times, if possible, and try to limit the number of loads daily.
Pouring kitchen grease into drains.
Flushing cigarette butts, sanitary napkins or other inorganic materials down the toilet.
Extensive use of garbage disposals. Ground up foods are hard on septic systems because they are not digested first by the human body.
Use of salts and chemicals from water softeners and washing machines can damage septic tanks. Channel washing machine water and waste from water softeners into a separate disposal area such as a dry well, if permitted.
Tree roots clogging pipes. Contact a septic contractor for repairs.

Source: Cape Cod Biochemical Co., Pocasset, MA

All water from natural sources contains some impurities which may adversely affect its suitability for drinking. It is therefore important to test well water periodically to determine its quality.

The purpose of this publication is to describe recommended water sampling procedures, and to aid interpretation of the routine water chemistry analysis results from the Nevada State Health Laboratory.

ROUTINE WATER CHEMISTRY ANALYSIS

The most common analysis conducted is the routine chemistry analysis. The Bureau of Health Protection Services recommends this analysis be performed every three years. Many water characteristics are evaluated by this test to determine if water meets State standards.

WATER SAMPLING PROCEDURE

The proper collection, handling and preservation of a water sample is crucial for an accurate water test. To get an accurate reading of your water's chemical make-up, follow these procedures:

- Purchase a 1/2- or 1-gallon container of distilled water. Once the contents have been used, prevent contamination by leaving the container empty and recapping it.
- Label the container with permanent ink, writing your name, address and phone number.
- To ensure an accurate reading, your water system must be operating long enough to remove water from within the well casing. The length of time needed to clear the casing will vary, but generally running the outside irrigation system for 4 hours will be sufficient. Running water outside the house rather than inside will prevent overloading of the septic system. New wells or water systems not in use for several weeks may require longer pumping periods prior to collecting a water sample.
- Fill the distilled water bottle with water taken from the faucet used to flush the system. Do not use a garden hose unless it too was used to flush the system.

HAVING YOUR WATER TESTED

Water testing is done by the Nevada State Health Laboratory, Nevada Division of Health. Cost of the routine water chemistry analysis will vary, so ask for rates in advance.

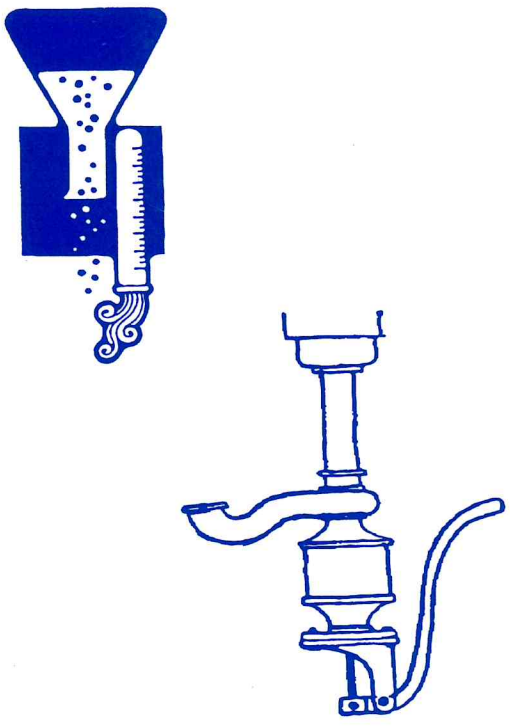
A completed form must accompany your water sample. This form is available from county Public Works Departments or Bureau of Health Protection Services offices located throughout Nevada. Water samples sometimes can be delivered or mailed to the office nearest you (see list) or directly to the State Lab in Reno. Check with the regional office for their procedure in mailing.

UNDERSTANDING TEST RESULTS

Congress passed the Safe Drinking Water Act in 1974 (amended 1986) which requires the U.S. Environmental Protection Agency (EPA) to set limits or standards for contaminant concentrations which may pose a health hazard in public drinking water. There are two categories of drinking water standards: Primary or Maximum Contaminant Level and Secondary or Secondary Maximum Contaminant Level. Primary standards (Table 1) are the highest allowable concentrations of contaminants based on health considerations. Secondary standards (Table 2) regulate contaminants that cause offensive taste, odor, color, corrosivity, foaming, and staining. Primary and secondary standards do not apply to individual private wells, but serve as a guide to assure safe drinking water for these systems. Additional information included on the lab analysis form is shown in Table 3. These values are obtained during laboratory testing procedures. They provide additional information about the water's suitability for a particular use.

Public Education and Outreach Plan
Community Source Water Protection Plan
for Public Water Systems in Humboldt County, Nevada
Attachment D

HOW TO TEST YOUR WELL WATER AND UNDERSTAND THE RESULTS



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REFERENCES

The Safe Drinking Water Act. 1990. United States Environmental Protection Agency, Region 9, W-6-1, San Francisco, Calif.

Private Drinking Water Supplies - Quality, Testing, and Options for Problem Waters. 1991. Northeast Regional Agricultural Engineering Service. NRAES-47.

What Do The Standards Mean? A Citizens Guide To Drinking Water Contaminants. 1990. Virginia Polytechnic Institute and State University, Blacksburg. 8-90-2M.

Private Water Systems Handbook. 1989. The Midwest Plan Service. Iowa State University, Ames, Iowa.

Bob Hammond
Extension Educator

Steven R. Lewis
Extension Educator

Wayne S. Johnson
State Extension Specialist

Ed Spoon
Public Information Officer

In cooperation with
Nevada Bureau of Health Protection Services

FACT SHEET 92-17

Appendix F
December 2016

NEVADA STATE HEALTH DIVISION
BUREAU OF HEALTH PROTECTION SERVICES

REGIONAL OFFICES:

CARSON CITY (89710)
505 East King St.
Room 103
687-6615

ELKO (89801)
850 Elm Street
753-1138

ELY (89301)
P.O. Box 939
City Hall
289-3325

FALLON (89406)
190 West 1st Street
423-5136

LAS VEGAS (89301)
620 Belrose Street
486-5068

***RENO (89503)**
Nevada State Health Laboratory
Nevada Division of Health
1660 N. Virginia Street
688-1335

TONOPAH (89049)
Station House Complex
P.O. Box 667
482-3997

WINNEMUCCA (89445)
25 West 4th Street
623-6409

*Address for Nevada State Health Laboratory

TABLE 1. PRIMARY Standards Approved by the Nevada Division of Health.

Contaminant	Maximum Contaminant Level
Arsenic (As)	0.05 ppm[1]
Barium (Ba)	2.00 ppm
Fluoride (F)	4.00 ppm
Nitrate (NO_3)	45.00 ppm
Nitrate (N)[2]	10.00 ppm
Turbidity	1.0 turbidity units

[1]ppm (parts per million)
[2]Effective July, 1992

Source: Nevada Bureau of Health Protection Services

TABLE 2. SECONDARY Standards Approved by the Nevada Division of Health.

Contaminant	Maximum Contaminant Level
Chloride (Cl)	400.0 ppm[1]
Color	15 color units
Copper (Cu)	1.0 ppm
Fluoride (F)	2.0 ppm
Iron (Fe)	0.6 ppm
Magnesium (Mg)	150.0 ppm
Manganese (Mn)	0.1 ppm
pH	6.5-8.5 on scale
Sulfate (SO_4)	500.0 ppm
Total Dissolved Solids (TDS)	1000.0 ppm
Zinc (Zn)	5.0 ppm

[1]ppm (parts per million)

Source: Nevada Bureau of Health Protection Services

TABLE 3. Additional Water Characteristics.

Characteristic	Consideration
Alkalinity[3]	
Boron[2,3]	
Bicarbonate (HCO_3)[3]	
Calcium (Ca)[1,2,3]	High levels increase pH in water and soils.
Carbonate (CO_3)[3]	
EC (Electrical Conductivity)[3]	Measures salt concentration of water in μmhos/cm. 0 to 400 excellent 400 to 8,500 satisfactory over 8,500 objectionable
Hardness	0 to 75 ppm soft 75 to 150 ppm moderately hard 150 to 300 ppm hard over 300 ppm very hard
Magnesium (Mg)[1,2,3]	Laxative effect, quickly adjusted to by newcomers.
Potassium (K)[2]	Plant nutrient, adds to TDS. Consult personal physician for health application.
Silica[3]	
Sodium (Na)[3]	Consult personal physician for health application.

[1]Used to calculate hardness.
[2]Required for plant growth. Influence on humans or livestock from concentration in water not available. No known health risk. Too much boron is harmful to plants.
[3]Laboratory use.

Clarification or explanation of the information presented in these tables can be obtained by calling the Nevada Bureau of health Protection Services office in Carson City, 687-6615.

will help narrow the field of tests. A good understanding of past and present land use practices may lead you in the right direction. Find out what **pesticides** local agricultural operations are using or have used. You may want to test your well water for traces of these chemicals. If your property is , for example, located near an industrial area or underground storage tanks it would be logical to suspect solvents or fuels in the groundwater. In this case you may want to test water for **hydrocarbons**. Knowledge of the geology and naturally occurring materials can guide your decision about testing for other contaminants. For instance, **radon** has been discovered in ground water in different areas. If you suspect your house has lead in the plumbing, or lead in the solder used in fixtures, you may wish to have your water tested for **lead**. Lead can pose a severe health hazard to the young and old and should be considered when evaluating domestic wells. It is a good practice to run water to clear the pipes after 12-24 hours of no use. Consult local health officials regarding the presence of contaminants in your area.

What To Do About a Water Quality Problem

The private domestic well owner has four choices to consider if a problem with water quality is discovered.

• Better Protection of the Water Supply, "Wellhead Protection"

Well casings should be at least 12 inches above the concrete apron surface, at least 18 inches above final ground surface and have a properly vented sealed cap. Prevention of any contamination down and beside the well casing by use of a sanitary seal is critically important. Livestock should be kept away from the wellhead, and if a pump house exists, it should not be used for storage of potential contaminants.

• Eliminate the Source of Contamination

It is often difficult to identify the source of contamination to the water supply. Furthermore, once the source is eliminated it takes time to cure the problem since groundwater moves so slowly. First consider any obvious human-caused disturbances, chemical storage, or dumping sites. Next contact professionals in local health departments and environmental agencies for assistance.

• Change the Water Supply

If the water quality problem is localized or associated with the condition of the well, it may be advisable to drill a new well. If the aquifer is contaminated, however, it would not be prudent to tap a new well into the same source. Bottled drinking water may be necessary for food preparation and drinking. Only in severe cases would it be necessary to use other water for bathing or cleaning.

• Treat Water to Reduce Contamination Concentration

Many methods of water treatment are available. When evaluating treatment options, determine if they are designed to treat your specific problem, and check on efficiency in reducing the contaminant, as well as cost and maintenance requirements.

Nevada State Health Division
Bureau of Health Protection Services
Regional Offices:

Carson City (89710)
505 East King St., Rm. 103
687-4750

Elko (89801)
850 Elm Street
753-1138

Ely (89301)
Post Office Box 939
City Hall
289-3325

Fallon (89406)
190 West 1st Street
423-5136

Las Vegas (89301)
620 Belrose Street
486-5061

Reno (89503)
Nevada Health Laboratory
Nevada Division of Health
1660 N. Virginia Street
688-1335

Tonopah (89049)
Post Office Box 667
482-3997

Winnemucca (89445)
25 West 4th Street
623-6409

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What Do the Standards Mean? A Citizens Guide to Drinking Water Contaminants. 1990. Virginia Polytechnic Institute and State University, Blacksburg. 8-90-2M.

Prepared by: Steven Lewis, Extension Educator,
Douglas County, and
John Cobourn, Water Resource Specialist
University of Nevada Cooperative Extension

Fact Sheet 92 - 30

DRINKING WATER TESTING FOR PRIVATE WELL OWNERS

"Clean Water: We Can Make a Difference!"

University of Nevada Cooperative Extension

Private Well Water Quality is Your Responsibility

Water from private wells is not monitored for quality by government agencies. This means you are responsible for the safety of the drinking water you and your family use. Water testing ensures that the supplies are safe.

Results of your neighbor's water analysis cannot be used to describe your well's water quality. Each well should be evaluated separately because wells side by side may draw water from separate aquifers. To be safe and have peace of mind, test your well water and do it soon.

How Often Should You Test Well Water?

Test well water quality at least once each year for total coliform bacteria, and at least every three years for nitrate, pH and total dissolved solids (TDS). These characteristics will be discussed in more detail below. Test more frequently if these constituents are close to the standards. Testing for other contaminants may be desirable if there is reason to believe they may be present in the ground water.

There is More to Water Than H_20

Water is the universal solvent. It picks up and dissolves almost anything in its path. Pure water does not exist in nature. The well water we drink is impure. Minerals and other ingredients give water its flavor. Be sure that the contaminants in your water do not exceed "maximum contaminant levels" as approved by the Nevada State Health Division.

Routine Domestic Water Analysis

The Nevada Health Laboratory and private labs certified by Nevada health officials conduct routine domestic water chemistry analyses for domestic wells. This test is often required by lending firms for the sale of property to prove the well water is safe for human consumption. The routine domestic water analysis tests the level of arsenic, barium, flouride, nitrate and turbidity. These contaminants have maximum contaminant levels approved by the Nevada State Health Division which are considered primary health standards. TDS and pH are two important secondary standard contaminants evaluated by this test. Nitrate, pH, and TDS are useful as comprehensive indicators of water quality for these reasons:

Nitrate

Septic systems, livestock facilities, stored fertilizers or other nitrogen sources can cause nitrate contamination. High nitrate levels pose a particular health risk to infants, pregnant women and the elderly. Well water testing should be done at early pregnancy and several times before the infant is six months old. Blue baby syndrome is an infant complication caused by high nitrates that prohibits blood from carrying oxygen. The nitrate concentration of drinking water must be below 45 parts per million (ppm) reported as NO_3 or below 10 ppm reported as N.

pH

The pH is an indicator of acidity and alkalinity. A neutral pH is 7. Water that is below 6.5 pH is acidic and has corrosive properties that may eventually lead to plumbing corrosion. Water above 8.5 pH has an alkaline taste and may develop "incrustative" plumbing problems, building up deposits in water heaters and fixtures.

TDS

TDS is a measure of inorganic and organic substances dissolved in water. It is used to indicate an increase in one or more contaminants. Natural or human-caused activity such as mining or drilling may disturb the water-bearing strata and cause more materials to dissolve in water. Heavily salted roads, improperly lined landfills, junk yards, industrial activities, or chemical spills also may lead to increased TDS concentrations. TDS values above 1,000 ppm indicate problems. Further testing usually is required to pinpoint the exact problem. High TDS may result in offensive odors, tastes, colors and health problems.

Sampling Water for the Routine Domestic Analysis

The proper collection, handling and preservation of a water sample is crucial for an accurate water test. This procedure, as well as information on how to interpret results, is described in Cooperative Extension's fact sheet number 92-17, "How To Test Your Well Water and Understand the Results."

What to do With the Routine Domestic Water Sample

Water is analyzed by the Nevada Health Laboratory, or private labs listed in the telephone directory. If you choose a private lab, it is recommended that only those certified by Nevada health officials be used. Cost of the routine analysis will vary, so ask for rates in advance.

Analysis by the Nevada Health Lab requires completion of a form available from county public works departments or Bureau of Health Protection Services offices located throughout Nevada (see addresses provided). Water samples may be delivered or mailed directly to the State Lab.

Testing for Total Coliform Bacteria

Testing for total coliform bacteria should be done annually. This test indicates contamination of drinking water from fecal material of humans and warm blooded animals. It may also identify presence of soil and plant material contamination. Bacteria in water is a serious health problem. If the test confirms any coliform bacteria at all, it indicates the supply is unsanitary and may contain disease-causing organisms. Do not drink coliform bacteria laden water.

When Should the Total Coliform Bacteria Test Be Done?

Annually, or:

- If there is any noticeable change in water color, odor, or taste.
- If flooding occurs near a well.
- If any person becomes sick from a suspected water-borne disease.
- If there has been any maintenance of the water supply system.
- Whenever the water or system has been contaminated or suspected to be contaminated by human or animal waste.

Sampling Procedures for Total Coliform Bacteria

Contact the Nevada State Health Laboratory or any regional office of the Bureau of Health Protection Services and request a sample vial and sampling procedure instructions for this test. The sampling procedure is slightly different from the routine domestic analysis. Samples should be sent to the lab Monday through Wednesday to ensure their arrival before the end of the week. **Samples will not be analyzed if they are over 30 hours old.**

What Else To Test For

There may be other contaminants in your water that are not discovered in the routine domestic or total coliform bacteria tests. An educated guess of the possible contaminant(s)

NEMO NEVADA

"Protecting water quality through community planning"

Nonpoint Education for Municipal Officials

Fact Sheet-06-45

POW: Protecting Our Water ACTION GUIDE SERIES
ACTION GUIDE #4

What to Do About Household Chemicals

By Melody Hefner, NEMO Nevada Program Assistant, and Susan Donaldson, Water Quality Education Specialist, University of Nevada Cooperative Extension

Many common household products such as paint, paint thinners, drain and oven cleaners, as well as many cleansers, contain toxic chemicals. When improperly used or discarded, these products are a threat to public health and the environment.

"If your community does not already have a program for collecting household hazardous wastes, ask your local government to establish one."

Here are ways that you can help:

- Buy only what you need for the immediate job. A three-pack of drain cleaner at a discount warehouse store may cost less per can, but do you really need three bottles of drain cleaner in your home? Can you use up the product in a reasonable amount of time?
- Follow label directions for use. More is not better!
- Read labels and select nontoxic substitutes or less toxic alternatives whenever possible.
- Select phosphate-free, biodegradable detergents and cleaners to help reduce the amount of nutrients discharged to surface waters and groundwater.
- Choose water-based products whenever possible, as these are typically less toxic and biodegrade more rapidly than petroleum- or solvent-based products.
- Store any leftover products in their original containers in a location that maintains the suggested storage temperatures.
- Share unused products with friends and neighbors. Keep them in their original labeled containers.
- Never mix chemicals together.
- Don't burn or bury leftover chemicals or containers.

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➡ Do not dispose of toxic chemicals with regular household trash. Chemicals may leach from the garbage dump or landfill and contaminate groundwater resources.

➡ Do not pour toxic chemicals down any drain or dispose of them in the toilet. Both septic systems and treatment plants rely on bacterial processes to break down human wastes. Toxic chemicals can kill these beneficial bacteria, disrupting waste processing and increasing treatment costs.

➡ Never dispose of toxic chemicals in storm drains. Storm drains deliver these chemicals directly to streams and rivers, with no prior treatment. It's like dumping the chemicals directly into your local river!

➡ Never pour unwanted toxic chemicals on the ground. Direct dumping may overwhelm the ability of the soil to break down most toxic chemicals, and they will eventually contaminate surface waters and/or groundwater. **Properly dispose of these chemicals by taking them to a hazardous waste collection center. Call the Nevada Recycling Hotline, (800) 597-5865, go to http://ndep.nv.gov/recycl/hotline.htm, or contact your local county solid waste management office for information regarding hazardous waste collection in your area.** If your community does not already have a program for collecting household hazardous wastes, ask your local government to establish one.

Do you have surplus products?

How can you tell if the product you want to throw away is toxic and needs special disposal procedures? Read the label! The words **caution**, **warning** and **danger** can indicate that one or more of the ingredients in the product are harmful. The following list includes common household items that contain potentially hazardous ingredients.

➡ **Cleaning products:** oven cleaners, drain cleaners, wood and metal cleaners and polishes, toilet cleaners, tub, tile and shower cleansers, bleach, pool chemicals

➡ **Automotive products:** motor oil, fuel additives, carburetor and fuel injection cleaners, air conditioning refrigerants, starter fluids, automotive batteries, transmission and brake fluid, antifreeze

➡ **Lawn and garden products:** herbicides, pesticides, fungicides, wood preservatives

➡ **Indoor pesticides:** ant and cockroach sprays and bait, flea repellents and shampoos, bug sprays, houseplant insecticides, moth repellents, mouse and rat poisons and baits

➡ **Workshop or painting supplies:** adhesives and glues, furniture strippers, oil- or enamel-based paint, stains and finishes, paint thinners and turpentine, paint strippers and removers, photographic chemicals, fixatives and other solvents

➡ **Flammable products:** propane tanks and other compressed gas cylinders, kerosene, home heating fuel, diesel fuel, gas/oil mix, lighter fluid

➡ **Miscellaneous:** batteries, mercury thermometers or thermostats, fluorescent light bulbs, driveway sealer

Don't know where to recycle?

The following phone numbers and websites may help:

Nevada Department of Environmental Protection Recycling Hotline: (800) 597-5865 or http://ndep.nv.gov/recycl/hotline.htm.

Earth 911: (877) EARTH911 or http://nevada.earth911.org/usa/master.asp. Enter your ZIP code for local information.

Most toxic substances include disposal instructions on the label. Always read and follow the directions. For more information, access the Internet and search for the product name or manufacturer. Contact the manufacturer for disposal information.

For more information:

Contact the NEMO Project,
c/o Susan Donaldson, Ph.D.
University of Nevada
Cooperative Extension
5305 Mill St.
Reno, NV 89502

Tel: (775) 784-4848
Fax: (775) 784-4881

Internet:
www.unce.unr.edu/NEMO

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NEMO NEVADA

"Protecting water quality through community planning"

Nonpoint Education for Municipal Officials

Fact Sheet-06-49

POW: Protecting Our Water ACTION GUIDE SERIES
ACTION GUIDE #8

What to Do About Septic Systems

By Susan Donaldson, Water Quality Education Specialist, and Melody Hefner, NEMO Nevada Program Assistant, University of Nevada Cooperative Extension

Improperly installed or maintained septic systems can contaminate groundwater and surface water with nutrients and pathogens. By following the recommendations below, you can help ensure that your system continues to function properly.

"Improperly installed or maintained septic systems can contaminate groundwater and surface water with nutrients and pathogens."

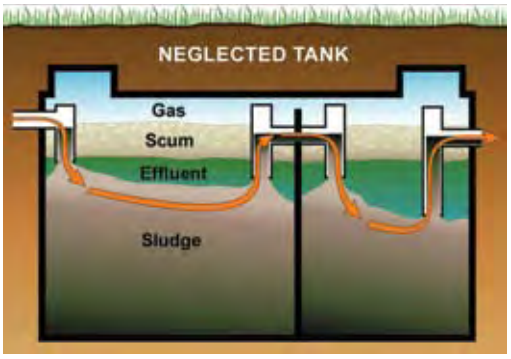
Recommendations for septic systems:

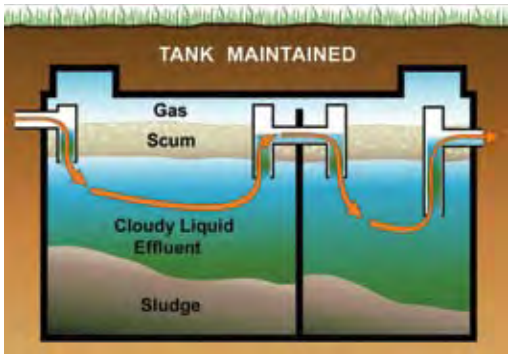
- Know where your septic tank and drain field or leach field are located. Do not park on, drive over, or build on top of your septic tank or leach field. Impermeable surfaces placed over the drain field will interfere with evaporation and air flow necessary for effluent treatment.
- Avoid using household drains to dump chemicals. These substances can destroy the bacteria in your septic tank.
- Do not use septic system additives. There is no scientific evidence that biological or chemical additives aid or speed up decomposition in septic tanks. Some additives may even harm the septic system or contaminate groundwater.
- Don't use toilets as trash cans! Excess solids may clog your drain field and necessitate more frequent pumping.
- Inspect your septic system annually and pump it out regularly.
- Avoid or reduce the use of your garbage disposal. Garbage disposals contribute unnecessary solids to your septic system. This will require you to pump your septic tank more frequently.
- Plant any new trees at least 25 feet away from your septic tank and leach field. Tree roots can crack pipes or obstruct the flow of wastewater through drain lines.
- Avoid or reduce the use of phosphate-containing detergents, which contribute to phosphorus pollution.
- Conserve water and stagger water use to moderate the water inflow to the septic system. This will reduce the chance of hydraulic overloading and septic system failure.

Septic systems require two things: proper bacterial action and periodic pumping.

Bacteria must be present in the septic tank to digest the organic solids. Normal household waste provides enough bacteria to digest the solids UNLESS the bacteria are killed. Bacteria are very sensitive to environmental changes and may be destroyed by common home-care products such as detergents, sink and tub cleaners, cleaning compounds, bleach, disinfectants, caustic drain openers, toilet cleaners, polishes, and acids. **Check the labels on these and other products used in the home. Look for products labeled "safe for use in septic systems."**

University of Nevada Cooperative Extension





How a septic system works

All septic systems function in the same general manner, piping household wastewater to a holding tank where solids are removed. Through bacterial action, some of the solids are digested and converted to liquid for discharge into a soil absorption area or leach field. The remaining solids are stored for future disposal. The modern septic tank is a watertight box usually made of precast concrete, concrete blocks, or reinforced fiberglass. When household waste material enters the box, several things occur:

❶ Organic solid material floats to the surface and forms a layer called scum. Bacteria present in the septic tank begin to biologically convert some or all of this material into liquid.

❷ Inorganic or inert solid materials that cannot be biologically converted, and the byproducts of bacterial digestion, sink to the bottom of the tank and form a layer called sludge.

❸ A cloudy liquid, called effluent, lies between the sludge and scum. This is the only thing in the septic tank that should move out of the tank and into the leach field.

When bacteria are not present to digest and liquefy the scum at the top of the septic tank, the scum will accumulate until it overflows, clogging the soil absorption area.

The sludge at the bottom of the septic tank is inorganic and inert material that is not biodegradable and will not decompose. If not removed on a periodic basis, it will accumulate and overflow, clogging the absorption area. Since there is no tank additive that will dissolve or eliminate the accumulation of sludge, **IT MUST BE PUMPED OUT.**

The frequency of pumping for a given septic tank will depend on the size of the tank, the number of people occupying the home, the frequency of garbage disposal use, and the condition of the system. Generally, a properly-designed tank of 1,000 gallons capacity that is used by a family of four people should be pumped about every three years. The table below provides recommendations for pumping intervals based on tank size and household size. Pumping of septic tanks should be performed by professionals who have the necessary equipment to do the job properly. They can be found in the Yellow Pages of your telephone directory under "Septic."

Failure to periodically pump can cause solids to overflow into the absorption area or leach field. This can clog the system and may force replacement of the absorption area at considerable expense and inconvenience. Typical leach field replacement costs are likely to exceed $5,000 and may be as much as $15,000 to $20,000 for engineered systems. Typical pumping costs are $200 to $400. Obviously, it is more cost effective to pump!

Tank Size (gallons)	Household Size (number of people)					
	1	2	3	4	5	6
	Years Between Pumping					
1000	12.4	5.9	3.7	2.6	2.0	1.5
1250	15.6	7.5	4.8	3.4	2.6	2.0
1500	18.9	9.1	5.9	4.2	3.3	2.6

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