SECTION 3
SAFE DRINKING WATER

This fact sheet addresses the importance of protecting your drinking water sources from contamination and how *you* can make a difference with *Best Management Practices (BMPs)*. BMPs are actions you can take to protect our natural resources. **The ultimate goal of this information is to prevent drinking water contamination.**

1. Read the facts and information in the following pages.
2. Fill out the Risk Assessment Worksheets in order to analyze your property's specific needs.
3. Fill out the Action Worksheet, then **take action!**

Is Your Drinking Water Safe?

Most people take a safe drinking water supply for granted. We assume the water coming out of the faucet is safe. Unfortunately, this assumption is not always correct. It is recommended that households located near surface water have their private water supply tested regularly to confirm it is safe to drink. If your water is treated by a municipal water treatment plant, it still important to protect surface and groundwater to prevent the risk of contamination.

The most obvious concern with unsafe drinking water supply is the health risk to your family and guests. Contamination from wastewater, septic system, or an outhouse is a potential source of bacteria, viruses, and parasites that can cause gastrointestinal problems or transmit contagious diseases. Wastewater also contains high levels of nitrates which can present a serious health risk to infants.

Drinking water wells should be tested annually, especially if you own an infrequently-used vacation home or draw from shallow groundwater. In addition, many vacation dwellings use surface water for the household water supply. Surface water presents a different set of risks; information on safety considerations and testing for surface water is available from the Panhandle Health District (PHD) or Idaho Department of Environmental Quality (IDEQ).

Property and resale value are other reasons to make sure your water supply is clean. At the time of property transfer, most lenders will not provide financing for the purchase of property without a well test that meets the Environmental Protection Agency's Primary Drinking Water Standards for several contaminants.

Drinking Water Sources

Public Water Systems are community or non-community systems that have at least 15 service connections or regularly serve an average of 25 individuals at least 60 days of the year. These public systems are regulated by IDEQ following Idaho Rules established through the federal Safe Drinking Water Act. Public systems typically are governed by a community board of directors and will have a licensed system operator. Typically, water is from drilled wells, but sometimes the drinking source is from surface water. Testing contaminants is done on a regular basis and includes a wide array of compounds. .

Non-Community public water systems are regulated by PHD with required water testing, and include facilities such as restaurants, motels, schools, and office buildings.

Non-Public (private) water systems serves less than 25 people and has less than 15 service connections. Water is typically from drilled wells. Private systems do not have a regulating agency, and do not rely on a water provider to ensure that water is safe to drink; that is the responsibility of the individual home owner or the owners of a small cluster of homes serviced by the well.

Surface Water is extracted from the lake or streams into individual homes/cabins. This water is not recommended for drinking unless treated.

Protect Your Drinking Water

It is solely the homeowner's sole responsibility to protect their individual drinking water supply. Only public systems, which serve more than 15 connections or at least 25 individuals daily for at least 60 days of the year are regulated to meet State and Federal Drinking Water Regulations. If your home is served by a source other than a public system, either by an individual well or extraction from surface waters, then it is your responsibility to provide a safe drinking water supply. Preventing contamination of both groundwater and surface water is very important. Both play an important role in supplying drinking water to many households.

Surface Water

IDEQ does not recommend using surface water as a drinking water supply unless it is treated, but there are a significant number of homes/cabins which extract water from the lake or nearby streams for household use. Besides bacteria, surface waters can also contain single-cell protozoa, *Giardia* and *Cryptosporidium*, whose cysts are intestinal parasites and are considered a waterborne disease. The cysts reside in the digestive tract of mammals and are transmitted through the fecal-water-oral route. Ingestion of the cysts by humans can lead to severe intestinal disorders.

Use of surface water for drinking should go through a two-step treatment process. The water should be filtered to 1 micron to remove most of *Giardia* and *Cryptosporidium* cysts. Water should then be disinfected to kill bacteria and viruses. Water can be disinfected by boiling, using chlorine, or with ultraviolet light. **Contact PHD for more information on using surface water for drinking, (208) 415-5200; or IDEQ, (208) 769-1422.**

Well Location

Whether a well taps water just below the ground surface or hundreds of feet deep, its location at the ground surface is a crucial safety factor. A well down-slope from a leaking fuel tank or a failing septic system runs a greater risk of contamination than a well on the uphill side of these pollution sources. **The general rule for protecting the water supply is to keep a well up-slope and far from potential sources of contamination.** When determining the proper well location you will need to consider soil type, slope, surface drainage, groundwater flow, and potential contaminates. PHD, IDEQ, and IDWR are all available to assist you with proper well location.

Separation Distances

Idaho Department of Water Resources (IDWR) Well Construction Standard Rules requires that constructed wells must meet all site and distance requirements set forth by PHD and IDEQ. Idaho Rules require a minimum distance of 100 feet from a septic drainfield to a well (Figure 3-1). This separation distance allows for natural protection provided by the soil. Soil type will ultimately determine a safe distance. For more information please contact PHD (Resource Directory page 3-7).

Any condition likely to cause groundwater contamination should be improved, even if your well is far away from the potential source. Whether or not drinking water is affected, groundwater and surface water contamination is a violation of Idaho law. Be sure to consider possible contamination sources on *adjacent* property.

Note: There is no specific distance that will guarantee that the well will not be affected. Keep in mind that separation distances listed by the State are minimums. You may want to choose greater separation distances in some cases, depending on factors at your well site.

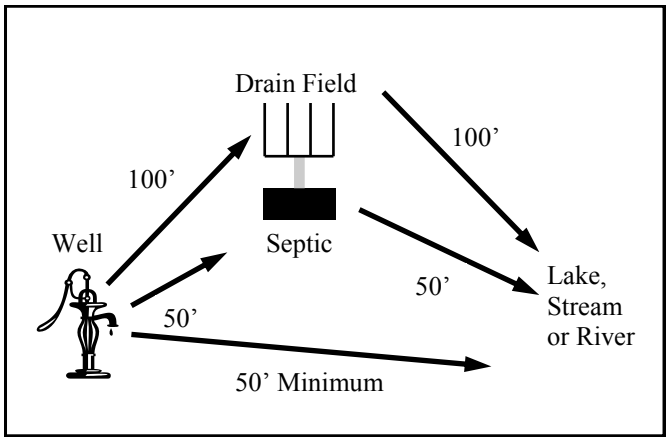


Figure 3-1 *Panhandle Health District minimum separation distance requirements between drinking water wells and possible sources of contamination.*

New Wells

New wells are expensive, but they are good investments for the future. Getting the most from such an investment means locating the well away from contamination sources and working to maintain the quality of the well. Some simple principles are:

- Use a licensed well contractor for installing new wells or sealing unused wells.
- Prior to drilling, make sure groundwater is not already contaminated.
- When planning development on your lot, leave enough room for future expansion to avoid crowding the well. Let your well contractor know your future plans.
- Follow at least the required minimum distances from potential contamination sources that are set by PHD, as well as any other local ordinances, when locating your new well (Figure 3-1 on page 3-2).

Well Construction and Safety

Proper well design reduces the risk of contamination by sealing the well from anything that might enter it from the surface (Figure 3-3). Poor design can allow a well to become contaminated by letting rain or snowmelt reach groundwater without filtering through the soil. All surface runoff should be diverted away from the well (Figure 3-4). Wells located in pits, or constructed without grout or a sanitary well seal, can allow surface water to carry bacteria, pesticides, fertilizer, or petroleum into your drinking water supply.

Casing Safety

The well driller installs a steel pipe (casing) during construction to prevent collapse of the borehole. All openings in the casing should be sealed, and if water pipes exit through the side of the casing, they must do so through an approved fitting called a *pitless adapter.*

The space between the casing and the sides of the borehole provides a direct channel for surface water and contaminants to reach groundwater. To seal off that channel, the driller fills the space with grout (cement or a type of clay called bentonite). The grout seal should extend at least 18 feet in depth from the ground surface. The ground surface needs to be sloping away from the well in all directions (Figure 3 -4). This ensures surface water will flow away from the well.

You can visually inspect the condition of your well casing for holes or cracks at the surface, or look down inside the casing with a light or mirror. If you can move the casing by pushing against it, you have a problem with your well casing's ability to keep out contaminants.

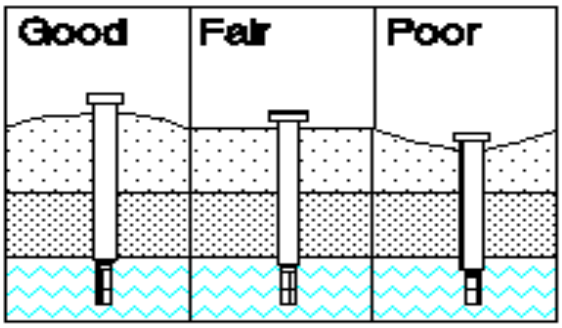


Figure 3-4 *Comparison of well placements at ground surface. With proper placement ground surface will slope away from well.*

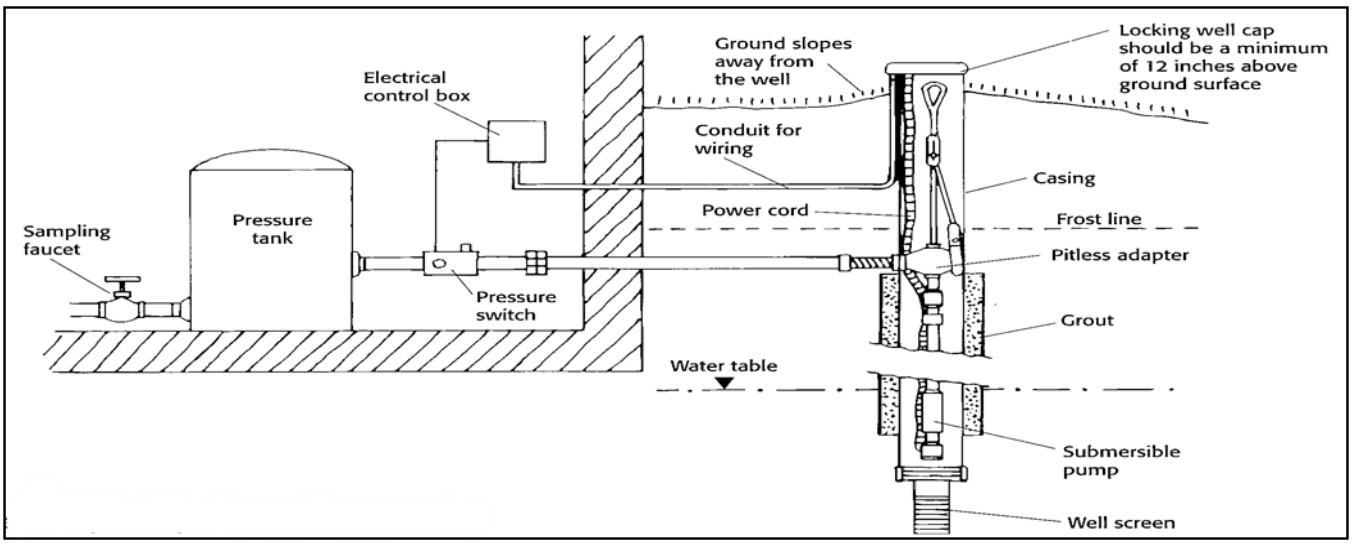


Figure 3-3 *A properly constructed drilled well.*

You can also check on the condition of your well casing by listening for water draining down into the well (pump should not be running). If you hear water, there could be a crack or hole in the casing, or your casing does not extend down to the water level in the well. Either situation puts your drinking water source at risk.

To prevent contaminants from getting down inside the well casing, the driller installs a tight fitting, vermin-proof well cap to prevent easy removal by children or entry of insects or surface water. Well regulations require a vermin-proof seal for all private wells (not all wells have caps; some may have pumping equipment attached at the surface). The cap should be firmly installed, with a screened vent incorporated into it so that air can enter the well. If your well has a vent, be sure that it faces the ground, is tightly connected to the well cap, and is properly screened to keep insects out. Check the well cap to see that it's in place and tightly secured. Electrical wires entering the well should be in an approved conduit.

Idaho wells are required to have a durable, watertight casing that **extends to a minimum depth of 18 feet below ground level.** This ensures that water is filtered through soil and geologic materials before entering the well. Since most contamination comes from the surface, grouting and casing the well deeper, can provide greater protection. You may want to consider exceeding the minimum casing depth. Typically, the casing extends one to two feet above surrounding land to prevent surface water from running down the casing or on top of the seal and into the well.

Idaho well regulations require that at least 12 inches of casing pipe extend above the final grade of the land. The siting of a well in areas that are subject to flooding is strongly discouraged. Check with Idaho Department of Water Resources (IDWR) for regulations concerning casing construction and minimum specifications (Resource Directory page 3-7). The IDWR keeps well construction reports (well logs) on file. You may contact IDWR for a copy.

Well Age

If you have an older well, you may want to have it inspected by a licensed well driller. Older well pumps are more likely to leak lubricating oils, which can contaminate the groundwater.

In addition, older wells are also more likely to have a thinner casing that has corroded through. Even 30-40 year-old wells with modern casings are subject to corrosion.

Backflow Prevention/ Cross Connections

Anti-backflow devices can be placed on all faucets with hose connections. Air gaps should be maintained between hoses or faucets and the water level during all activities. Otherwise, you risk having contaminated water from laundry tubs, sinks, washing machines, pressure washers, outside hydrants, livestock tanks, and hot tubs flowing back through the plumbing contaminating your water supply. Water supplies that have cross-connections between them (connections between two otherwise separate pipe systems, such as potable and non-potable) also put your drinking water at risk.

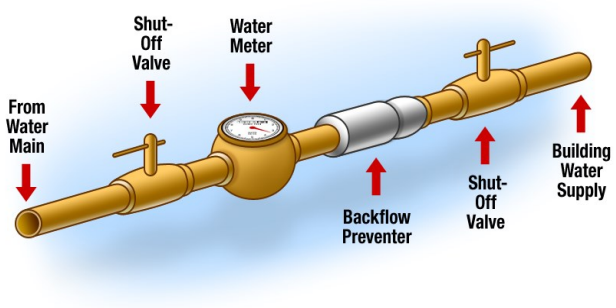


Figure 3-5 *Schematic drawing of a typical backflow prevention device.*

Home Water-Treatment Systems

If you are a waterfront homeowner responsible for the safety of your drinking water, use caution when choosing from the multitude of available home water-treatment systems. First, make sure any treatment unit is certified by the National Sanitation Foundation (NSF). Home systems can be quite expensive, and you may be sold a system that is treating water for a host of compounds that are not a concern around your watershed and conversely does not treat for a compound that may be of specific concern. If you are drinking surface water, make sure your system is NSF certified for cyst reduction.

There have been excellent articles in Consumer Reports on safe water and home treatment systems. The two most common are the Granular Activated Carbon and the membrane filtration.

Well Maintenance

You wouldn't let a car or tractor run too long without an oil change, and likewise, your well deserves the same attention. Good maintenance means testing the water every year, keeping the well area clean and accessible, keeping potential contaminants as far away as possible, and annually having a qualified well driller check the well mechanics.

- Test the water annually for nitrate and coliform bacteria.
- Establish a "well protection zone." Keep hazardous wastes such as paints, fertilizers, pesticides, oil and gasoline far away from your well. Keep livestock operations at least 50'from your well.
- Disinfect the well and plumbing system following maintenance on the well or pump and after appliances or plumbing fixtures are repaired or replaced.
- Maintain septic systems properly, and pump septic tanks regularly. See Section 4: Wastewater Treatment.
- Avoid diverting surface drainage to well areas where it may seep into your drinking water.
- Immediately replace or repair wells in which the casing is no longer watertight because of damage or corrosion.
- Keep your well records in a safe place.
- Get your water tested anytime there is a change in taste, odor, or color (PHD (208) 415-5200).
- If you have an older well, have it inspected by a licensed well driller. Older wells are more likely to leak lubricating oils and be corroded.
- Locate your well on ground higher than contamination sources, such as fuel tanks, livestock lots, septic systems, and pesticide mixing areas.
- Build soil up around well so that all surface water drains away.
- Avoid areas that are prone to flooding.
- Make the well accessible for pump repair, cleaning, testing, and inspections.

Unused Wells

Many rural homesteads have unused wells. It is not uncommon to visit a homestead and find three or four wells, with only one or two currently in use. No one knows how many of these wells are in Idaho, although estimates range in the thousands.

If not properly filled and sealed, these wells can provide a direct conduit for surface water carrying contaminants to enter groundwater without filtering through soil or can allow contaminant movement from one aquifer to another. In addition to these wells being a threat to groundwater, large open wells pose safety hazards for people and animals. The landowner, under Idaho law, is responsible for properly abandoning wells and test holes.

Locating Unused Wells

You may not know the history of your property and old well locations may not be obvious. Pipes sticking out of the ground around the homestead or under an old windmill are the most obvious places for finding unused wells. A depression in the ground may indicate an old well. Also, wells were often drilled in basements of houses, under front steps, or near old cisterns.

Proper Well Abandonment

The IDWR administers the laws regulating the abandonment of wells (Resource Directory page 3-7). Well drillers and landowners are required to follow these laws so that the potential for aquifer contamination can be reduced. Knowledge of the geology of the well site and special equipment is often required to remove old pumps and piping and to properly install sealing material inside the well. Use of inappropriate materials and methods can lead to well settling, collapse, and continued groundwater contamination.

Costs for well abandonment will vary with the well depth, diameter, and geology of the area. However, spending a few hundred dollars to properly abandon an old well near your home may prevent contamination of your drinking water.

You may perform proper well abandonment work on your own land, or an Idaho licensed well driller can also be hired to close these wells. Regardless of who does the work, the minimum regulatory requirements must be met. A local well driller can be helpful given their experience with well construction materials, and typically they have a working knowledge of the geology of the well site.

Water Testing

Keep an eye on water quality in existing wells by testing them annually. Wells should be tested immediately after construction and then at least once annually for nitrates and coliform bacteria. Well testing is particularly important for shallow wells, dug wells, sand-point wells, and wells that have shown contamination.

The water should also be tested:

- Before using a well that has not been used for a long time.
- When family or guests experience recurring or unexplained stomach illness.
- If there are individuals who may be at increased risk like infants and pregnant or nursing women.
- If your neighbors find a particular contaminant in their water.
- If you note a change in water taste, odor, color, or clarity.
- If you have a spill or back siphon of chemicals or petroleum products near your well or on your homestead.
- When there has been a significant change in land use in the area.
- If the presence of an old landfill has been discovered nearby.

What Do I Test For?

A good initial set of tests for a private well includes hardness, pH, conductivity, corrosivety, chloride, nitrate, coliform bacteria, and sometimes lead, arsenic, zinc, copper, and other metal contaminants.

Another primary contaminant is **nitrate**. Nitrate occurs naturally in many watersheds. Nitrate levels above 10 mg/L (the federal drinking water limit) should not be consumed by infants under one year of age or pregnant women. High nitrates in groundwater often stem from agricultural activities such as fertilizing and manure from animal feed lots.

Lead in drinking water can be a health concern particularly for children and pregnant women. The lead level should not exceed fifteen ppb (parts per billion). Sample for lead if you have lead pipes or copper joints with lead solder, or if you draw from surface water. Soft or acidic water can accelerate leaching of lead from the plumbing system.

Annually test for **total coliform bacteria** which is the standard bacteriological test conducted on drinking water supplies. The presence of **total coliforms** is an indicator of system vulnerability. Total coliform bacteria are a group of closely related bacteria genera, where some species are found in fecal matter, and some species are found in soil and plant material. If your drinking water sample shows the presence of total coliforms, many laboratories will automatically test for the presence of fecal coliforms. Presence of fecal coliforms indicates fecal contamination of the water source, either through an animal source or from septic systems. **If fecal coliforms are present, the water does not meet drinking water standards**. Certain bacteria and viruses from fecal sources are pathogens, that when ingested can cause intestinal disorders and diseases (hepatitis for example). A short term fix for coliform contamination is boiling water, a long term solution is disinfection of the supply (chlorination or the use of ultra-violet light).

Laboratory tests for other possible contaminants can be quite expensive so you will probably not have them done unless you suspect a specific problem. For example, you may want to test for volatile organic chemicals (VOCs) if there has been a nearby use, spill or deposit (in dump or landfill) of oil, petroleum, or solvent. The same circumstances can be stated for pesticides.

High concentration of **iron** in groundwater will cause stained porcelain and may be unpleasant to taste, but it is not a harmful compound.

Follow the lab's instructions for water sampling to assure accuracy of the results. Use only the container provided and return the samples promptly. Bacteria sample bottles are sterile and must be returned to the lab within a short specified time limit. Request that drinking water methods be used to test your water. You may also want assistance in interpreting test results. Contact PHD or IDEQ (Resource Directory 3-7).

Call PHD or IDEQ to learn more about having your drinking water tested.

(Resource Directory page 3-7)

Resource Directory

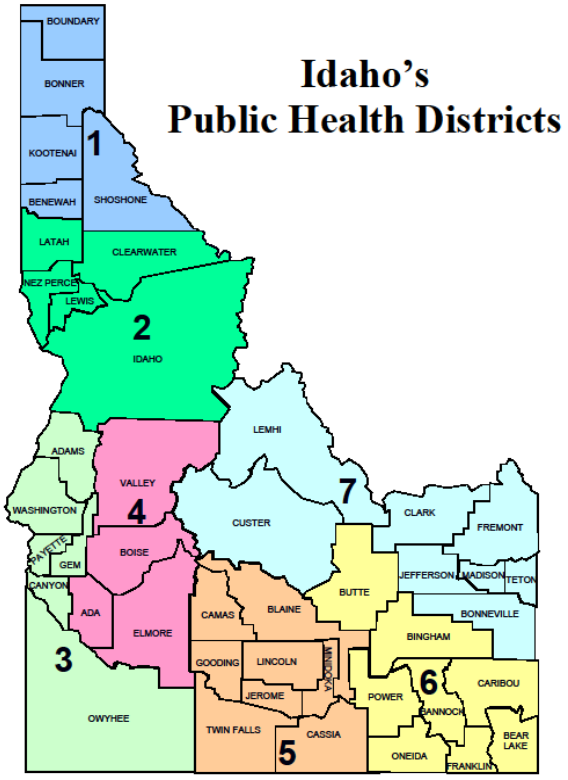
Panhandle Health District, Environmental Health
Bonner County Office
322 Marion
Sandpoint, ID
(208) 265-6384

Idaho Department of Environmental Quality
Coeur d'Alene Regional Office, Drinking Water
2110 Ironwood Parkway
Coeur d'Alene, ID 83814
(208) 769-1422

Idaho Department of Water Resources
Coeur d'Alene Regional Office
7600 N. Mineral Drive, Suite 100
Coeur d'Alene, ID 83815
(208) 762-2800

Environmental Protection Agency
www.epa.gov/safewater/

Panhandle Health District (PHD) is one of seven health districts in the state of Idaho. In 1970, the Idaho Legislature recognized the value a formal public health structure would provide to Idaho residents. That year, the Legislature created the health districts to ensure that all Idahoans have access to local public health services.



References

Figure 3-3 Correct well construction
http://extension.missouri.edu/p/EQM103F
(Accessed April 9, 2012)

Figure 3-3 and 3-4 Well location diagrams
http://www.uiweb.uidaho.edu/wq/wqbr/wqbr25.html.
(Accessed April 8, 2012)

Figure 3-5 Backflow prevention diagram
http://www.hdrinc.com/sites/all/files/assets/knowledge-center/publications/sdwa-wall-chart-2011.pdf
(Accessed April 8, 2012)

RISK ASSESSMENT WORKSHEETS
Safe Drinking Water

Assessment Sheet 1: Drinking Water Well Location
The assessment table below will help you identify potential environmental risks related to your drinking water. For each question indicate your risk level in the right-hand column. Some choices may not correspond exactly to your situation. Choose the response that best fits. When finished turn to the **Action Worksheet** on page 3-11 and record your medium and high-risk practices. Your goal is to lower your risks. Use the BMP recommendations in Section 3: Safe Drinking Water Supply to help you decide how to best reduce pollution.

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Position of well in relation to contamination sources	Well is upslope from all potential pollutants sources. No surface water runoff reaches well. Surface water diverted from well area.	Well is level to down slope from potential sources. Some surface water runoff may reach well.	Well is downhill from pollution sources or in a depression. Surface water runoff reaches well.	☐ Low ☐ Medium ☐ High
Separation distances between well and pollution sources (suggested minimum separation distance is 100 feet)	Distances from potential pollution sources meet or exceed all minimum requirements.	Some but not all distances from potential pollution sources meet minimum requirements.	Distances from most or all potential pollution sources do not meet minimum requirements.	☐ Low ☐ Medium ☐ High
Soil type	Class C-soil is fine-textured like clay loams or silty clay.	Class B-soil is medium-textured like silt or loam.	Class A-soil is coarse-textured like sand, sandy loam, or gravel.	☐ Low ☐ Medium ☐ High

Assessment Sheet 2: Well Construction and Maintenance
Use the table below to rate your risks related to well construction and maintenance.

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Well age	Constructed since Idaho well guidelines were enacted in 1987. Well inspected annually.	Well is about 20 years old and is inspected every 2 or 3 years.	Well was installed over 50 years ago, and I don't remember the last time it was inspected.	☐ Low ☐ Medium ☐ High
Casing height above land surface	Casing extends 12 or more inches above the surface. If the area floods, casing is above flood levels.	Casing is at the surface or up to 12 inches above the surface.	No casing present. Hand dug well. Pump at or below ground surface.	☐ Low ☐ Medium ☐ High
Condition of casing and well cap	No holes or cracks are visible. Cap is tightly attached. A screened vent faces the ground. No space around the pitless adapter.	Casing showing visible stress fractures. Cap is loose, and no screen is present.	Holes or cracks are visible. Cap is loose or missing. Running water can be heard or seen. Ground around casing is sunken.	☐ Low ☐ Medium ☐ High
Casing depth and surface seal (see well log for this information)	Casing extends below water level in well and is more than 18 feet below surface. At least 18 feet of surface seal is in place, or into the confining layer above the aquifer in which the well is completed.	Surface seal missing or less than required depth (an 18 foot surface seal is required for all new well installations. Placement of a surface seal in all wells is required).	No surface seal.	☐ Low ☐ Medium ☐ High
Backflow protection	Anti-backflow devices (such as check valves) installed. No cross-connections between water supplies.		No anti-backflow devices. Air gap not maintained. Cross-connections between water supplies.	☐ Low ☐ Medium ☐ High
Water testing	Regular annual testing. Records indicate consistent, satisfactory water quality. Bacteria, nitrate, and other tests meet standards.	Regular testing. Bacteria, nitrate, and other tests do not meet standards some of the time but are closely monitored.	No water testing. Water taste, clarity, and smell change throughout the seasons.	☐ Low ☐ Medium ☐ High
Unused wells	There are no unused wells, or there are unused wells that are properly sealed.	There are old wells partially used, but are maintained to keep out contaminants.	Unused, unsealed wells, near the lake or drinking water well.	☐ Low ☐ Medium ☐ High

Assessment Sheet 3: Drinking Water Source and Conveyance System
Use the table below to rate your risks related to drinking from the lake and its tributaries. Note: IDEQ does not recommend drinking from lakes or any other surface water source without an approved treatment process.

	LOW RISK	MEDIUM RISK	HIGH RISK	YOUR RISK
Drinking water source	Deep groundwater (over 20 feet deep). Properly constructed drilled well.	Shallow ground water (under 20 feet). Hand dug, or driven point well.	Lake or any other surface water source (streams, creeks, ponds). Pump and a pipe that extend into the water.	☐ Low ☐ Medium ☐ High
Separation distances between surface water and pollution sources (suggested minimum separation distance is 100 feet)	Distances from potential pollution sources meet or exceed all minimum requirements.	Some, but not all, distances from potential pollution sources meet minimum requirements.	Distances from most or all potential pollution sources do not meet state minimum requirements.	☐ Low ☐ Medium ☐ High
Home water-treatment system for surface water	A two-step treatment system. Water is fine filtered through a membrane filter certified by the NSF for Giardia and Cryptosporidium Cysts. Water is disinfected by boiling, using chlorine, or by ultraviolet light.	Granular activated carbon filter (generally a good filter, but water should be disinfected.	No treatment or a screen or a t-shirt wrapped around the end of the pipe.	☐ Low ☐ Medium ☐ High
Water testing	Regular annual testing. Records indicate consistent, satisfactory water quality. Bacteria, nitrate, and other tests meet standards.	Tested once in the last 5 years. Bacteria, nitrate, and other tests do not meet standards some of the time but are closely monitored.	No water testing. Water taste, clarity, and smell change throughout the seasons.	☐ Low ☐ Medium ☐ High

ACTION WORKSHEET
Safe Drinking Water

Write all high and medium risks below.	**What can you do to reduce the risks?**	**Set a target date for action.**
Sample: Water hasn't been tested for 5 years. Does not taste like it used to.	Contact IDEQ or PHD for information on water testing.	One week from today: