

# **CIRCULAR PWS-5**

## Ground Water Under the Direct Influence of Surface Water (GWUDISW) Evaluation

2022 EDITION



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## 1. INTRODUCTION

The Montana Department of Environmental Quality (DEQ) classifies all water sources that serve or are intended to serve public water supply systems as surface water, ground water, or ground water under the direct influence of surface water (GWUDISW). Direct influence of surface water is that influence that causes a risk of pathogenic organisms (primarily large pathogens such as *Giardia lamblia* and *Cryptosporidium*) to transfer from surface water to a subsurface drinking water source.

This Circular describes the process by which DEQ evaluates those sources that are not classified as a surface water source to determine whether the source is ground water or GWUDISW.

Approval of plans and specifications for a public water supply system under ARM 17.38.101 does not constitute a decision by DEQ that a subsurface water source is ground water for purposes of this Circular or the Surface Water Treatment Rule. Regardless of plan and specification approval, all sources must be evaluated pursuant to the requirements of this circular and be issued a record of decision under Section 4.3.

## 2. WATER SOURCE CATEGORIES

All water sources for public systems must be classified as surface water, GWUDISW, or ground water.

### 2.1. SUBSURFACE WATER SOURCE

This Circular uses the term “subsurface water source” to describe a water source that is below grade and that has not been classified as ground water or GWUDISW.

### 2.2. SURFACE WATER

Surface water is all water that is open to the atmosphere and subject to surface runoff. ARM 17.38.202. Examples of surface water include, but are not limited to, rivers, ponds, lakes, ditches, canals, intermittent/ephemeral or perennial streams, wetlands, and natural or artificial surface impoundments that receive water from runoff.

For purposes of completing the preliminary assessment (PA) under Section 4.1, DEQ may exclude temporary surface water bodies that are unlikely to harbor or transport surface water organisms to the ground water. Examples of temporary surface water bodies that may be excluded from completion of a PA include storm water conveyances, puddles, and other small short-lived surface water bodies that contribute little or no water to the subsurface.

### 2.3. GROUND WATER UNDER THE DIRECT INFLUENCE OF SURFACE WATER

Ground water under the direct influence of surface water, or GWUDISW, is any water beneath the surface of the ground with significant occurrence of insects or other macroorganisms, algae, or large-diameter pathogens such as *Giardia lamblia* or *Cryptosporidium*, or significant and

relatively rapid shifts in water characteristics such as turbidity, temperature, conductivity, or pH which closely correlate to climatological or surface water conditions. ARM 17.38.202(3).

## **2.4. GROUND WATER**

For purposes of this Circular, “ground water” means any subsurface water source that DEQ has not determined to be surface water or GWUDISW.

## **3. APPLICABILITY**

This Circular applies to all public water supply systems with a subsurface water source (e.g., wells, springs, horizontal wells, infiltration galleries, etc.). Each subsurface source that serves a public water supply system must be evaluated and classified as ground water or GWUDISW. Sources that are available to serve a public water supply system—including, for example and without limitation, lag wells, emergency wells, and backup wells—are subject to the requirement of this Circular.

## **4. GWUDISW EVALUATION PROCESS**

As described in this section, DEQ evaluates all subsurface water sources using a preliminary assessment (PA). DEQ also may rely on other relevant materials, including but not limited to, photos of the water source and surrounding topography, well logs, aquifer test results, annular seal installation reports, geologic maps, groundwater studies, water quality data, historic rainfall data, river gauging data, engineering drawings, and other documents. A hydrogeologic assessment may be done as appropriate on a case-by-case basis. If necessary, a microscopic particulate analysis (MPA) will be conducted pursuant to this section.

DEQ may request the system owner to provide additional information to assist DEQ in completing the GWUDISW evaluation process. The system owner shall provide DEQ with the requested information. If the system owner fails to supply the requested information or other obligations in this circular, DEQ may make a decision based on available information about the potential risk of direct surface water influence. DEQ may require the system owner to take measures that DEQ determines are appropriate to protect public health.

### **4.1. PRELIMINARY ASSESSMENT**

The GWUDISW evaluation process begins with a PA. All PAs must be completed by DEQ as part of a site visit. DEQ will score water sources according to the criteria and scores in the table below.

Table of Preliminary Assessment Questions, Responses and Scores

Question	Responses	Score (points)
1. Type of subsurface water source.	Well	0
	Horizontal Well †	40
	Spring	40
† For purposes of the PA, "horizontal wells" includes infiltrations galleries.		
2. History or suspected outbreak of <i>Giardia</i> or other pathogenic organisms associated with surface water with the current system configuration.	No	0
	Yes	40
3. Number of <i>E. coli</i> -positive distribution samples in the last three years.	None	0
	One	5
	Two or more	10
4. Number of <i>E. coli</i> -positive source samples in the last three years	None	0
	One	20
	Two or more	30
5. Number of DEQ-verified complaints about turbidity.	None	0
	One or more	5
6. Hydrogeological Features: horizontal distance between source and the closest surface water.	>250 feet	0
	175-250 feet	10
	100-174 feet	20
	<100 feet	40
7. Does the well construction meet all three criteria? The well is (1) cased to at least top of the water bearing unit; (2) annular seal extends from ground level to a minimum of 25 feet in depth; and (3) the borehole diameter is at least three inches greater than the casing outside diameter from ground level to 25 feet depth.	Yes	0
	No	15
	Unknown	15
8. Well intake construction: depth below ground surface to the top of the well screen or open bottom casing.	>100 feet	0
	50-100 feet	5
	25-49 feet	10
	0-24 feet	15
	Unknown	15
9. Static water level depth below ground surface.	>100 feet	0
	50-100 feet	5
	25-49 feet	10
	0-24 feet	15
	Unknown	15

#### 4.1.1. Fewer than 40 points

Sources that score fewer than 40 points may be classified as ground water unless other information indicates that further review is necessary.

#### 4.1.2. Greater than 40 points

Sources that score more than 40 points will require further review. DEQ will conduct a thorough review of all available information. If the available information indicates that the source is not likely to be GWUDISW, DEQ may determine that further testing is not justified. If there is still a question as to surface water influence, DEQ may require completion of an MPA.

MPAs must be conducted on all springs, infiltration galleries, horizontal wells, and wells within 100 feet of surface water.

### 4.2. MICROSCOPIC PARTICULATE ANALYSIS

MPA testing is used to determine if surface water organisms are present in subsurface water sources. All MPA sample collection must be conducted by DEQ staff. The public water system shall be responsible for coordinating with a laboratory capable of conducting the MPA to secure the sample kit, shipping the samples to the laboratory, and paying for analysis and shipping costs.

DEQ will conduct MPAs pursuant to the *Consensus Method for Determining Groundwaters Under the Direct Influence of Surface Water Using Microscopic Particulate Analysis (MPA)*, Environmental Protection Agency, EPA 910/0-92-029 (Oct. 1992). In addition to the organism counts found in the sample, the MPA results are converted to a points score. The MPA scores, as defined by the *Consensus Method*, are as follows:

Low-risk	< 9 points
Moderate-risk	10–19 points
High-risk	>20 points

All subsurface water sources to be tested must be completely constructed and able to operate. DEQ may require the test source or, for systems with more than one source, other sources to be operating before or during the test. For subsurface water sources that are artificially recharged by surface water, the MPA must be completed during a recharge event.

In most circumstances, two MPAs must be completed—one in May or June and one in August or September. If, however, the first MPA result is 10 or more points, a second test is not needed for classification and will not be conducted. DEQ may also require additional tests in circumstances in which there is low confidence in the accuracy of a test result.

## **4.3. CLASSIFICATION**

### **4.3.1. Ground water**

A source may be classified as ground water if either (1) DEQ determines that direct surface water influence is not likely; or (2) both MPAs score fewer than 10 points.

DEQ will, as part of regularly scheduled sanitary surveys, inspect every source for any changes in and around the source. If such changes have occurred, a new PA will be completed. DEQ may reevaluate a ground water classification upon changes to the source environment, water quality, or construction. Examples of such changes include, but are not limited to, flooding of the source, moving of an existing surface water body, installation of a new artificial surface water body closer to the water source, *E. coli* positive sample results, or reconstruction of a spring box. In any of these cases, the process begins with a new PA based on the new configuration.

### **4.3.2. GWUDISW**

For water sources with MPA results, the MPA will be the basis for classification. While DEQ may consider a hydrogeological assessment or water quality analysis as relevant supporting information, DEQ will make all final classifications based on the results of the MPA.

Any subsurface water source with one MPA result of 10 or more points will be classified as GWUDISW, except in cases where it is highly probable the surface water indicators did not originate from the water source. A classification of a subsurface water source as GWUDISW based on a MPA result score of 10 or more points is final for that configuration of the source.

System owners with sources classified as GWUDISW must either (1) abandon the water source; (2) modify the source, the nearest surface water, or the area around the source to prevent direct surface water influence; or (3) treat the source water pursuant to the requirements of ARM 17.38.208 (Surface Water Treatment Rule).

Any change to the water system, whether abandonment, modification, reconstruction, or treatment, must be first approved by the DEQ Engineering Bureau pursuant to § 75-6-112, MCA, and ARM 17.38.101.

If modifications have occurred to the source, to the area around the source, or to the nearby surface water, DEQ will complete a new GWUDISW evaluation, starting with a new PA based on the changed circumstances. In such cases, an MPA always will be required to verify that the modification was successful in eliminating the direct surface water influence.

### **4.3.3. Record of Decision**

For ground water or GWUDISW classifications, DEQ will issue a record of decision (ROD) to the public water supply system. The ROD will include the system name and identification number, the water source name, the source water classification, and information supporting this decision. A ROD in which the water source is classified as GWUDISW will include the following statement:

This GWUDISW classification is a final decision for this configuration of the source. However, systems with sources classified as GWUDISW have the options to either abandon the water source; modify the source, the nearest surface water, or the area around the source to prevent direct surface water influence; or to treat the source water pursuant to the requirements of the Surface Water Treatment Rule, ARM 17.38.208.

A ROD in which the water source is classified as ground water will include the following statement:

A classification of ground water is not final and can be revisited should there be reason to suspect the source is susceptible to surface water influence (e.g., change in water quality, flooding, etc.), or with modification of the source or surrounding area.

## 5. Definitions and Acronyms

ARM: Administrative Rules of Montana

CFR: Code of Federal Regulations

*Cryptosporidium*: A single-celled, protozoan parasite that occurs primarily in vertebrates

DEQ: Department of Environmental Quality

*E. coli*: *Escherichia coli* (*E. coli*) bacteria that normally live in the intestines of healthy people and animals.

EPA: Environmental Protection Agency

*Giardia Lamblia*: A flagellated protozoan that colonizes the upper small intestines of many warm-blooded animals.

Infiltration gallery: A horizontal drain made from open jointed or perforated pipes, or a block drain which is laid below the water table and collects groundwater.

MPA: microscopic particulate analysis

PA: preliminary assessment

PWS: public water system

ROD: record of decision

SWTR: Surface Water Treatment Rule