



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

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(slides' content originally prepared by:
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Summary

- GWUDISW must meet the same treatment technologies as surface water.
- Disinfection is mandatory.
- Filtration is mandatory, unless the system meets the filtration avoidance criteria.

Does this meet the filtration treatment technology standard?



If disinfection is also provided
would this system be in
compliance with the SWTR?



Filtration definitions [40 CFR 141.2]

- Direct filtration means a series of processes including coagulation and filtration, but excluding sedimentation, resulting in substantial particulate removal.
- Conventional filtration means a series of processes including coagulation, flocculation, sedimentation, filtration resulting in substantial particulate removal

Filtration definitions [40 CFR 141.2]

- Diatomaceous earth filtration means substantial particulate removal in which a precoat of DE filter media is deposited on a support filter while water passes through the cake and additional DE is added.
- Slow sand filtration means a process involving passage a raw water through a bed of sand at a low velocity < 0.4 m/h resulting in substantial particulate removal by physical and biological mechanisms.

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

- Definition: Any water beneath the surface of the ground with significant occurrence of:
 - insects
 - other macroorganisms,
 - algae,
 - or large diameter pathogens such as *Giardia lamblia* [40 CFR 141.2]

OR

Ground Water Under the Direct Influence of Surface Water (GWUDISW) [continued]

- Definition: Any water beneath the surface of the ground with significant and relatively rapid shifts in water characteristics such as:
 - turbidity,
 - temperature,
 - conductivity, or
 - pH



that closely correlates to climatological or surface water conditions. [40 CFR 141.2]

Ground Water Under the Direct Influence of Surface Water (GWUDISW) [concluded]

- Direct influence must be determined for individual sources in accordance with criteria established by the State.
- Direct influence may be based on site-specific measurements or water quality and/or documentation of well construction characteristics and geology with field evaluation.

[40 CFR 141.2]

GWUDISW Regulations

- The Interim Enhanced Surface Water Treatment Rule, promulgated on 12/16/98, applies only to systems over 10,000 people adds *Cryptosporidium* to the GWUDISW definition.
- The Long Term Enhanced Surface Water Treatment Rule, due to be promulgated 11/2000, is expected to add *Cryptosporidium* to the GWUDISW definition for systems < 10,000 people.

GWUDISW Determination Deadline for Non Community Water Systems

June 29, 1999

[40 CFR 142.16(b)(2)(B)]



GWUDISW Determination Deadline for Non Community Water Systems

June 29, 1999

- States with drinking water primacy were required to submit a program description to EPA for approval on how the State will determine which ground water systems are GWUDISW. [40 CFR 142.16(b)(2)(B)]

GWUDISW Determination Deadline for Non Community Water Systems

- Most states did not meet the 6/29/99 deadline.
- Each state will have a slightly different methodology to determine whether a ground water system is GWUDISW.
- EPA has developed a preliminary assessment form to identify ground water systems that may be GWUDISW.
- The form has been adopted by most states.

EPA's GWUDISW Preliminary Assessment Form

- The form has a series of questions with point values associated with them.
- If a system scores ≥ 40 points a series of microscopic particulate analyses (MPA) should be performed.

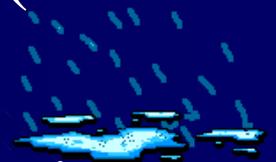


EPA's GWUDISW Preliminary Assessment Form

- Ground water source and its depth
 - well < 50 feet deep (5 points)
 - spring (10 points)
- History of microbiological contamination
 - acute MCL violation (30 points)
 - one MCL violation (5 points)
 - two MCL violations (10 points)
 - three MCL violations (20 points)

EPA's GWUDISW Preliminary Assessment Form

- Distance between surface water and well casing or spring
 - > 200 feet (0 points)
 - 100 - 200 feet points (5 points)
 - < 100 feet (10 points)
- Well or spring is located on floodplain at approximate elevation of surface water (20 points)
- Surface runoff drains towards well or spring



EPA's GWUDISW Preliminary Assessment Form

- Poorly constructed well or spring (15 points)
- Poor or no sanitary seal on well (15 points)
- Well or spring open to atmosphere (15 points)
- Leaks in casing or spring collection that allow entry of surface water (15 points)

GWUDISW Preliminary Assessment

- If the well or spring scores over 40 points, the identified deficiencies should be fixed prior to doing a series of MPAs.
- These deficiencies should have been identified during a sanitary survey, but few BLM facilities have had one performed.
- A water source that scores ≥ 40 points is at high risk of having water that is contaminated with *Giardia* or *Cryptosporidium*

Preparing a Spring for an MPA

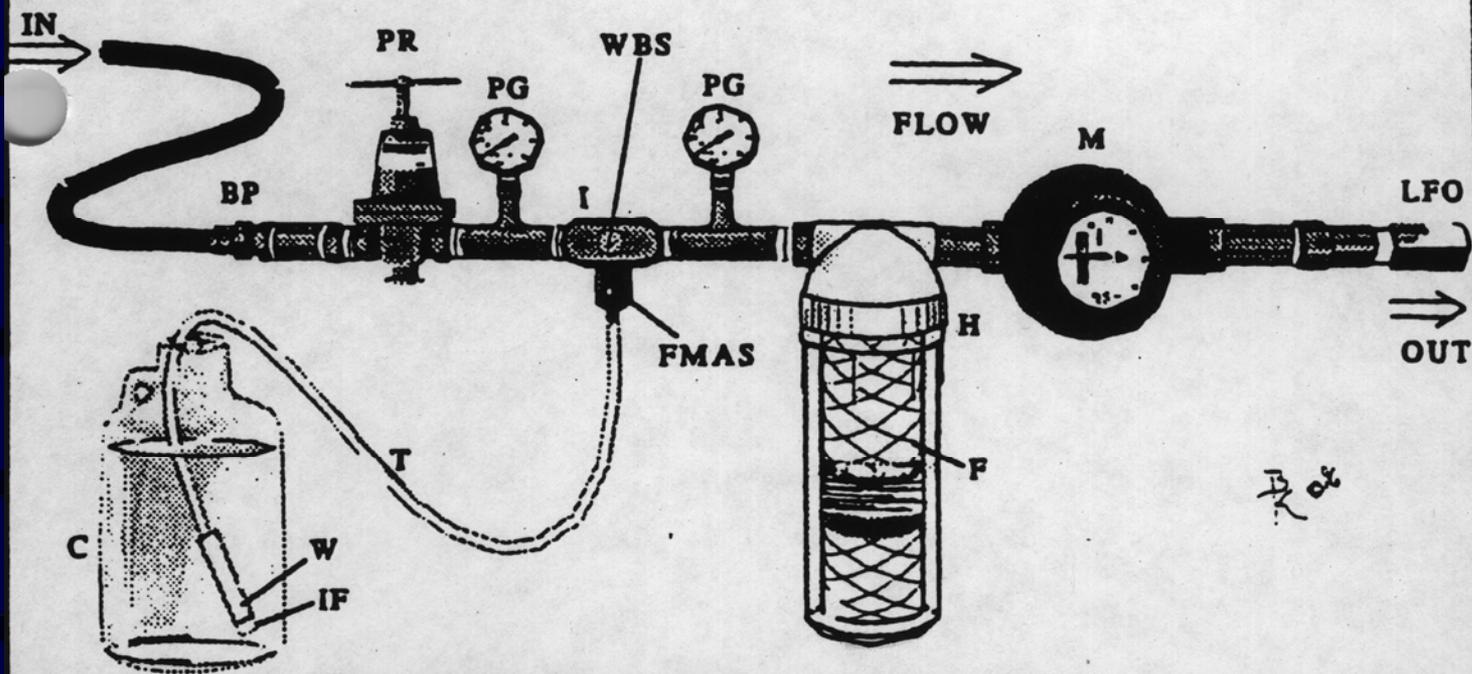
- Spring box should be thoroughly scrubbed, disinfected, and flushed.
- Let the spring sit undisturbed for one to two days prior to taking the MPA sample.

MPA Sampling

- MPA sampling should be contracted out because of the specialized equipment necessary and the large volume of water that must be sampled.
- Recommended sample volume, 1,000 gallons collected over an 8 to 24 hour period.
- Sample flow rate should be 1 gpm.
- Filter pressure should be held at 10 psi.
- Samples should be collected directly from the source prior to any treatment and not from the distribution system.

MPA Sampling Equipment

- Inlet hose with backflow preventor
- Pressure regulator and gauge
- 1-micron filter and housing
- Water meter
- Flow control valve
- Discharge hose
- Sample pump and source of power
- Dechlorination equipment if a sample cannot be taken prior to chlorination



EQUIPMENT

1. Inlet hose (washing machine hose)
2. Backflow preventor (BP)
3. Pressure regulator (PR)
4. Pressure gauge (PG)
5. Filter housing (H) Fulflo LT10
6. 1 micron nominal porosity filter (F) Parker Hannifan M39R10A
7. Meter (M)
8. Limiting flow orifice (LFO) 2L/min. (0.5 gal/min)

Additional Equipment for chlorinated samples:

9. Carboy (C) for...

MPA Sampling

- A minimum of two samples should be collected:
 - in the spring following a heavy rain or snow melt



- in the summer during an extended period of dryness

MPA Sample Holding Time, Preservation and Shipping

- Sample can be refrigerated at 2 to 5 °C for up to 15 hours before shipping.
- Sample cannot be frozen.
- Wrap the sample in bubble wrap and place in an insulated cooler.
- Place blue ice packs around by not in direct contact with the sample.
- Avoid using ice and do not use dry ice.

MPA Analytical Procedure

- The filter is processed using a non-EPA certified method that is outlined in EPA manual, “Consensus Method for Determining Groundwaters Under the Direct Influence of Surface Water Using Microscopic Particulate Analysis (MPA)”

MPA Analysis

- The key to an MPA analysis is an experienced microbiologist who will count and record all the bio-indicators and particulates and interpret the results.



MPA Results

- The relative risk is evaluated and scored:
 - > 20 = high risk
 - 10 - 19 = moderate risk
 - < 9 = low risk
- If the initial MPA score is low, the State may still require a second MPA test.

MPA Results

- If the MPA score is medium to low the State may require:
 - annual MPA testing
 - dye tests
 - comparison of turbidity, pH, conductivity and temperature between the well or spring and the nearby surface water
- A State may require chlorination of a well or spring even if the MPA score is low to medium.

MPA Results

- Many states do not consider the MPA test to be conclusive and want long term turbidity, pH, conductivity, and temperature monitoring of the surface water and drinking water source performed.

MPA Results

- If the MPA score is high risk, the State will require filtration and disinfection of the well or spring within 18 months.
- If a BLM water source is determined to be GWUDISW the water source should be:
 - properly abandoned
 - or
 - all water taps clearly labeled “NON POTABLE” and the information about *Giardia* and *Cryptosporidium* posted

Filtration and Disinfection

- If the water source meets the filtration avoidance criteria only disinfection must be provided.
- Failure to install the required treatment technologies within 18 months will result in the system being placed on an Administrative Order with an enforceable schedule by the State or EPA.
- A certified treatment operator is required.