

Developing a Spring

A photograph of a small, multi-tiered waterfall cascading over mossy, reddish-brown rocks. A person wearing a blue jacket and jeans is standing on the right side of the waterfall, leaning over to look at the water. The background shows a wooded area with bare trees and a wooden fence.

Mark Isaacson, RS
Midwest Workshop

What is a spring?

Definition from Private Water System Rules

"Spring" means a private water system where ground water flows naturally from rock or soil onto the land surface or into a body of water or a shallow aquifer that is intercepted at a depth of ten feet or less.

Why even consider developing a spring?

- Lack of adequate groundwater
drilled wells in the area produce little or no water
- No Public Water is available
- Shallow bedrock or other soil conditions exist which make installing a hauled water tank too difficult
- An existing spring is available for use that has acceptable conditions
- Homeowner idealism-"crystal clear spring water"

However, “spring water” has many problems which must be addressed.

- ◆ Springs are a shallow water source and easily contaminated
- ◆ Upslope land use and water activities will add pollutants to the water flow
- ◆ Inconsistent water source if spring is not active all year long
- ◆ Possibly dependent on rainfall for an adequate water flow during dry periods
- ◆ Challenging construction issues to direct spring water into a protected spring box
- ◆ Springs may migrate to other parts of the landscape

Existing Spring House



Inside Spring House



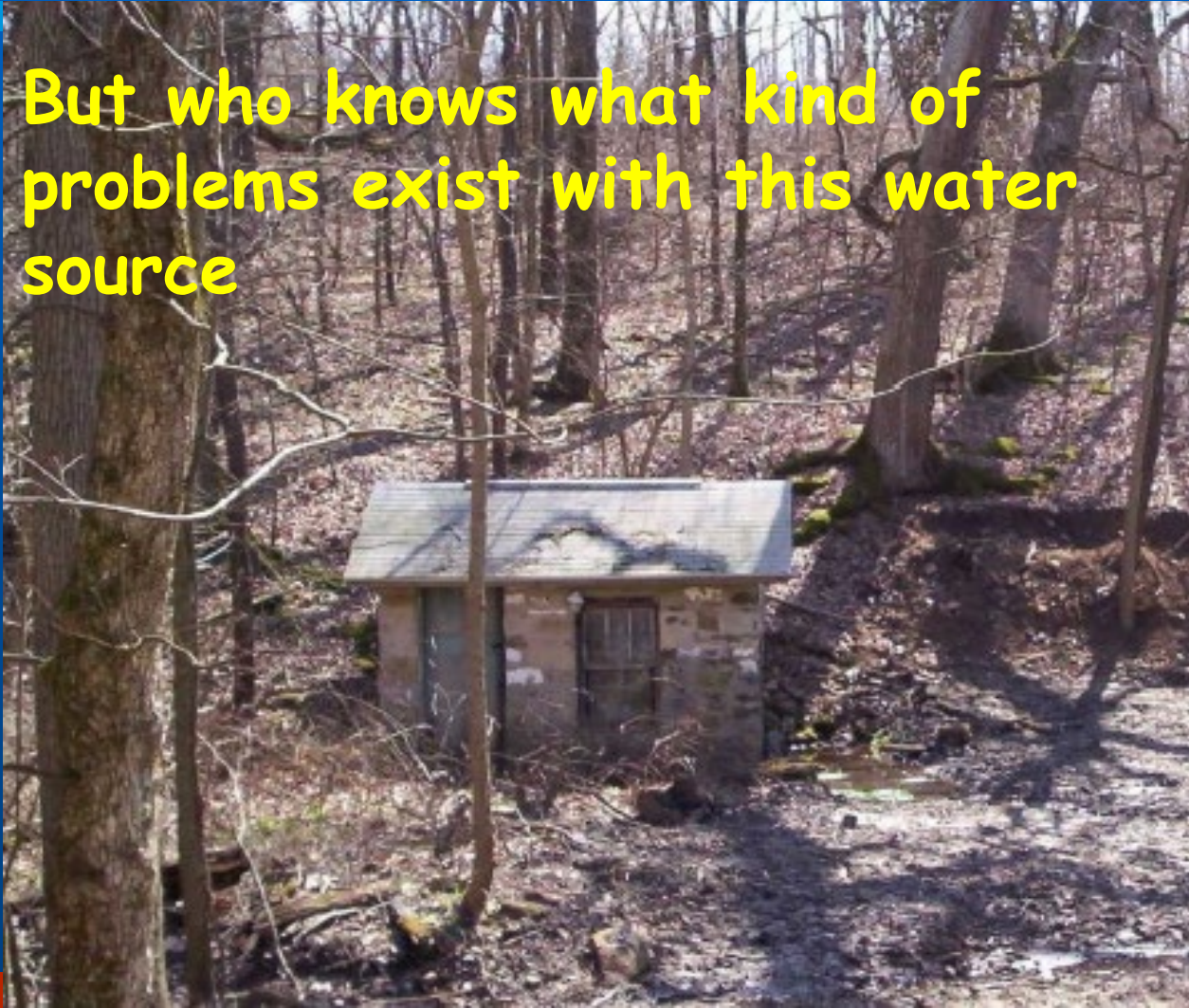
Spring Water is "Great"

Many Problems



A perfect little spring house

But who knows what kind of problems exist with this water source



Moss, leaves and plastic bags can add such flavor to your water

The spring flow is not covered or protected



Rust, dirt, cobwebs and insulation will add little "extras" to the water

The spring flow drains through the spring house uncovered and unprotected

03/17/2006



Rules for Springs

How to make spring water acceptable

Private Water System Rules

Section 3701-28-13 Construction and Surface Design of Springs

Highlights

- ◆ The land 200' upslope and 50' downslope of the spring must be under the control of the water system owner
- ◆ A diversion ditch is to be installed upslope of the spring
- ◆ The spring box must be of watertight construction
- ◆ The spring box shall have a secured cover
- The inlets and outlets to the spring must be screened
- ◆ A drain shall be provided to allow for cleaning
- ◆ The water shall be continuously disinfected and filtered

How does one design a spring using these limited guidelines and no on the job experience?

- ◆ Contact experienced PWS contractors for information on spring design-No spring had been designed or installed with a permit in Greene County for at least 20 years
- ◆ Search the Internet for website or other factsheets or construction information.
- ◆ Research books or magazines that discuss country living, Mother Earth News, Country Living, etc.
- ◆ Contact other local Health Departments for information

Overview of site after construction



03/17/2006

Glen Road Site, Miami Township, Greene County

- Homeowner had an existing spring house on site with a second natural spring next to the spring house
- No access to public water
- Limited groundwater resources, many dry holes due to very shallow bedrock (less than 5 feet)
 - Owner wanted to use the extra water flow for a geothermal heating system
- A local private water system contractor was willing to construct the spring

Development Plan for water supply

Collect water at the base of the spring flow and direct water to a concrete spring box

Drawings courtesy of NCSU Cooperative Extension Service

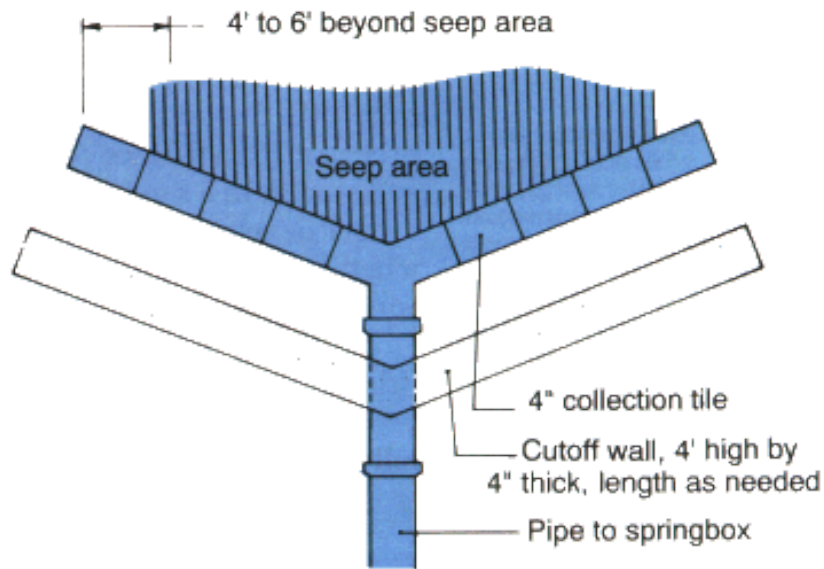


Figure 2b. Overhead view of a seepage spring.

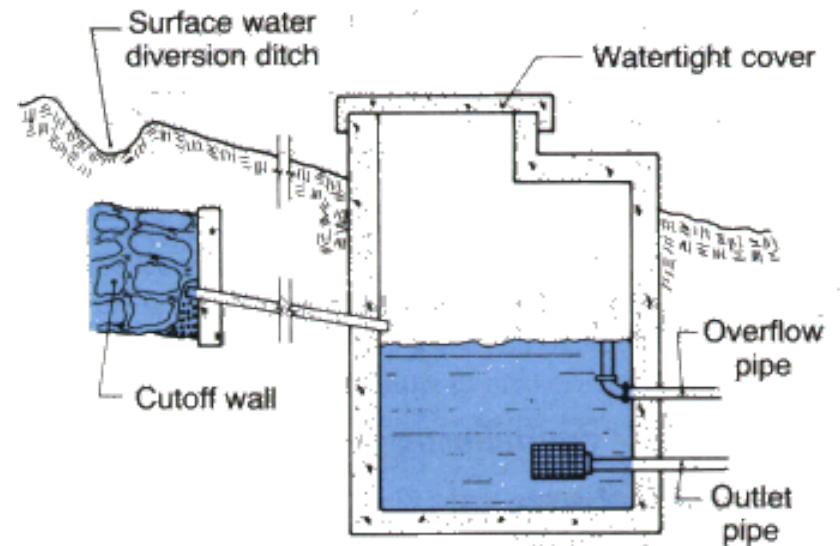


Figure 1a. Cut-away view of a concentrated spring.

Spring Box Construction

- ◆ PWS Contractor did not know how to size tank. This was his first spring
- ◆ The size of the tank was limited to a tank that could be moved with a large trackhoe due to space limitations at the site
- ◆ Spring had been tested to flow at least 15 GPM
- ◆ House was 3 bedrooms with 4 residents
- ◆ Water from spring was also to be used for a geothermal heating system
- ◆ A literature search had very little information on spring box sizing
- ◆ The typical water usage for this family was around 250 GPD
- ◆ A rough calculation was used to size the spring box
 $15 \text{ GPM} \times 60 \text{ minutes} = 900 \text{ GPH flow}$ -900 GPH divided by 4 to provide storage for 15 minutes of flow, equaled 225 gallons
- ◆ Installer would try to find a tank that would hold 225-250 gallons

Spring Box Detail



Base of spring area was excavated and leveled to provide an area for the piping manifold. Area was 8' by 8', 10 feet from old spring house.



Manifold was 7' of 4" PVC tile, with 1" holes drilled on 2 sides of tile, 6" apart. Gravel was 1" washed gravel and covered with geotextile fabric. Area was backfilled with 8-10" of soil. Piping met NSF 61 Rule



Site Preparation



11/14/2005

Hole for box dug and lined with gravel
Ditch dug to divert spring flow



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Placing spring box in hole



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Spring box set and leveled



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Adding lid using proper sealant



11/14/2005



Spring box in place, preparing
manifold area

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Manifold connected, gravel in place

11/14/2005



Connecting water line to foot valve



11/14/2005

Gravel area covered, spring box riser in place



11/16/2005

Final grading in place, still need to finish
overflow line



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Diversion ditch dug above spring to
divert surface water flow



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Completed
Spring and
Overflow
Spring flow
creates a
spring fed
stream that
runs year
around



View inside spring box, left is inlet,
right is outlet, both tiles are screened



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Spring construction final details and operation

- ◆ Homeowner needs to clean and protect overflow line to prevent damage and drain plugging. Spring box will need cleaning on a regular basis
- ◆ Jet pump and pressure tank were installed in basement
- ◆ Homeowner is using an approved UV Disinfection System
- ◆ Water sample was taken after installation and water was safe. UV Disinfection remains in use.
- ◆ Recommended yearly nitrate samples due to spring planting and use of land upslope of spring
- ◆ Spring has been in operation for 14 years with no unusual problems. Recent bacteria samples continue to be safe.

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♦ Special thanks to Eric Owen, homeowner and

♦ Roger Martin Excavating, PWS contractor for their cooperation