Springs and Cisterns

Sanitarian Training Class

The Basilica Cistern in Istanbul, built in in the sixth century A.D., could hold nearly three million ft$^3$ of water.
Manual of Environmental Health Procedures

- SW-252c
- Springs
- SW-252d
- Cisterns
- SW-252f
- Approved Well House Installation
- DW-38
- Individual Home Water Supply Chlorination
Procedure #H-12
Guidelines For Evaluating & Approving Water Supply And Sewage Disposal Systems For Home Loan Applications

7) All Spring And Cistern Water Supplies Are Required To Be Chlorinated By A Positive Feed-type Hypochlorinator Or By Means Of NSF Approved Ultraviolet Disinfection Units. These Systems Must Be Installed And In Use At The Time Of The Evaluation.
Springs

A Natural Situation Where Water Flows From An Aquifer To The Surface
Springs

McDowell County, WV
Springs

Berkeley Springs, WV
Springs as Water Supplies

Water Is Not Always Safe (Even If Clear)

Surface Water Influence Causes Contamination
  • Cloudy After Rainfall

Potential Surface Water Located In Limestone Country
  • Easily Contaminated By Surface Water

Yield From Spring May Fluctuate
Proper Construction Means:

• Water Tight Reservoir With Shoe Box Lid

• Pipe Into Hillside Should Be Minimum Of 5 Feet In Length And Sealed To Prevent Surface Water Entry

• Concrete Gutter Or Ditch On Hillside Above To Divert Surface Water (Not Always Concrete)

• 4 Pipes: Water Inlet, Outlet, Overflow And Drain
Springs

PROPERLY CONSTRUCTED SPRING

Surface-water diversion ditch
Asphaltic seal

Clay
Sand or gravel

Screen
Overflow
To storage

Drain

Bedrock
Springs - Infiltration Gallery
Approved
Well House Installation

- Vent
- Discharge Line
- Screen
- Sanitary Well Seal
- Ground Level
- Slope Away from Casing
- Optional Footer
- Non-Toxic Mastic Seal or Grout After Pad Cures
- Neat Cement Grouting Recommended
- Concrete Pad
- Drain
- 6" Min. Conduit
- 4" Min.
- 2' Min.
- Well Casing

WEST VIRGINIA DEPARTMENT OF HEALTH
Springs

Should Not Be Constructed Down Grade From:

- Leaching Privies
- Non-water Tight Sewers
- On-site Waste Water Disposal Systems
- Barnyards
- Other Sources Of Contamination
Springs

Maintenance and Operation

• Should Get Yearly Bacterial Sampling

• Should Be Emptied And Cleaned Quarterly

• Proper Cleaning Should Be With Brand New Mop Or Scrub Brush And Bleach Water

• Avoid Cleaners/Soaps

Use Care When Opening Lids On Spring Boxes ..... Snakes And Spiders
Cisterns

- Drinking Water From Catchment (Collection) Systems That Trap And Store Rainwater

- Some Water Supply Systems Use Surfaces Such As Rooftops To Capture Water

- Water Is Channeled To A CISTERN (Storage Tank)

- Used to be more prevalent
  - Historically Used By Both Greek And Roman Civilizations, As Well As By Pacific Island Inhabitants
Cisterns

- Float ball
- Float rod
- Inlet valve
- Inlet tube
- Handle
- Tank or Cistern
- Siphon
- Piston
Cisterns

• Should Be Located On High Ground

• Soil Should Be Graded To Direct Surface Water Away

• Water Tight Concrete Construction

• Manhole Lids Need To Be Shoe Box Type

• 4 Pipes
  • Inlet
  • Outlet
  • Over Flow
  • Drain
• **Storage Capacity Of A Rainwater Cistern Depends On:**
  - Amount Of Rainfall Available For Use
  - Roof-catchment Area Available For Collecting That Rainfall
  - Daily Water Requirements Of The Household
  - Economics

• **Minimum 6000 Gallon Capacity Recommended**

• **Roof Areas Vs Cistern Capacity**

• **Cistern Capacity Sizing Chart**
  - 1000 To 1200 Sq. Ft. = 7500 Gallons
  - 1200 To 1500 Sq. Ft. = 10,000 Gallons
  - 2000 Sq. Ft. And Up = 15,000 Gallons
Cisterns

- Roof Washer With Diversion Valve Is **Essential** To Divert The First Water From The Cistern

- Contaminants Collect On The Roof Surface Include:
  - Particles Of Lead
  - Atmospheric Pollutants
  - Bird Droppings

- Steps Taken To Prevent Contamination

- Degree Of Contamination Depends On
  - Length Of Time Since The Last Rainfall
  - Proximity Source Of Airborne Pollution
  - Local Bird Population
Roof-Catchment Cistern System
roof-wash diverter

- **Manually Operated Flap Valve**
  - Open: Roof water flows to waste
  - Closed: Roof water flows to cistern

*Diagram showing the operation of a roof-wash diverter.*

*TO CISTERN*
Cisterns Cont.

- Diversion Valve
- Entry to cistern
- First water exit
Cisterns Cont.

- Water pump with cover
- First Water Diversion
- Manhole cover
- Cistern tank top with manhole
Cisterns cont.