

Top 10 Deficiencies at Small Public Water Systems



Alex Tabatabai
Sanitary Engineer
Compliance Unit
CT DPH Drinking Water Section

Top 10 Deficiencies

1. Well Construction
2. Well Location
3. Well Pit
4. Treatment
5. Storage Tanks
6. Distribution System / Pump Station

Top 10 Deficiencies (cont)

7. Operation and Maintenance
8. Water Quality
9. Supply and Demand
10. System Capacity
 - 💧 Managerial
 - 💧 Financial
 - 💧 Technical

Well Construction

💧 Types of Ground Water Supplies:

- Bedrock Drilled Wells
- Gravel Packed Wells
- Shallow Dug Wells
- Springs/Spring Houses

Drilled/Gravel Packed Well

- Well head projects less than 6 inches above the established grade at the well.
- Well subject to surface wash.
- Well not equipped with a watertight well cap.
- Well vent neither equipped nor shielded and/or screened.
- Well casing not made with steel.
- Well casing has flaws or defects.
- Well casing does not have a watertight connection.

Not a certified watertight well cap

No air vent

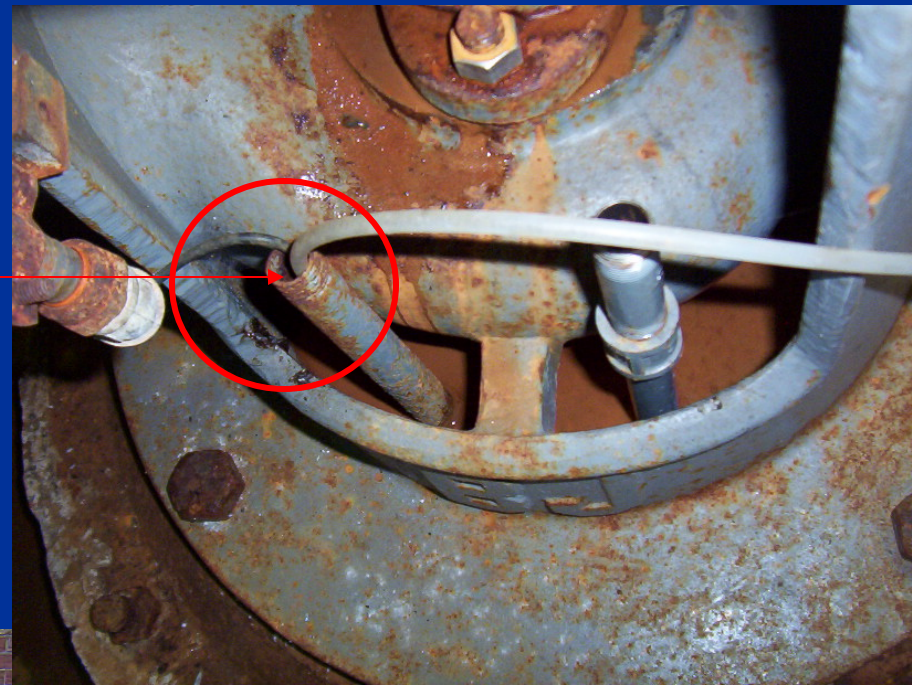


Less than 6" above grade

Subject to surface wash (depression around well)



Not watertight



PVC Well
Casing

Electrical conduit carrying pump wires Is not watertight



Defective casings



Shallow Dug Well

- ⦿ Not extended at least 6 inches above grade.
- ⦿ Not constructed of watertight concrete a minimum of 4 inches thick to a depth of at least 10 feet below grade
- ⦿ Does not have a reinforced concrete cover a minimum of 4 inches thick which overlaps the sidewalls of the well by a minimum of 2 inches.
- ⦿ Does not have a tight joint between the cover and sidewalls.
- ⦿ If equipped with a manhole, it does not have a minimum of 2 inches curbing above the concrete slab and a watertight overlapping cover.
- ⦿ The manhole cover is not equipped with a lock or not bolted in place.

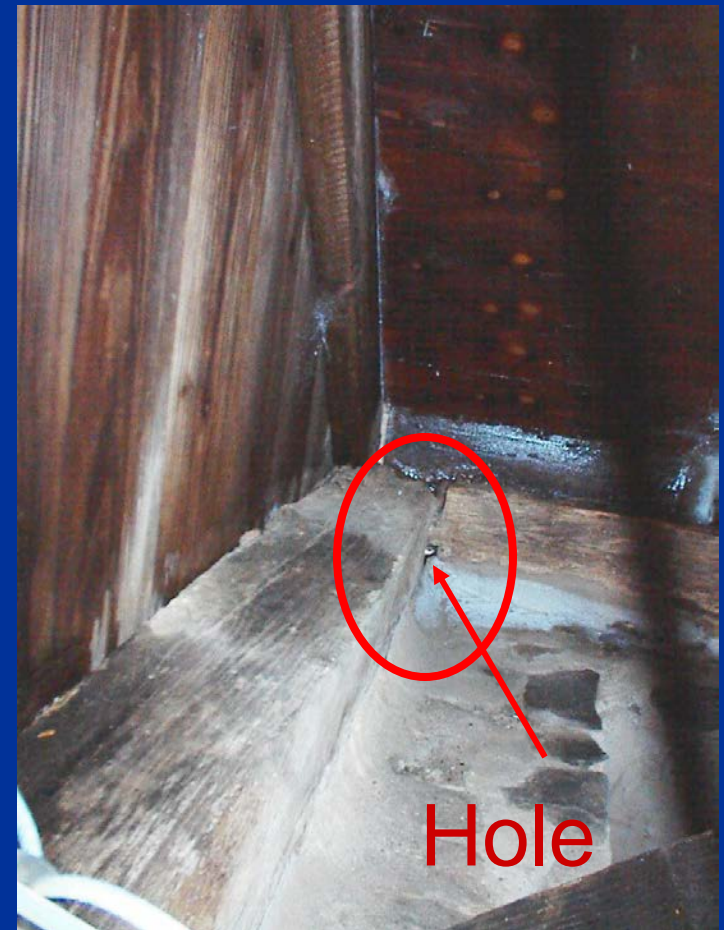




Springs

- 💧 Not meeting the same construction requirements of a shallow dug well.
- 💧 Inability to protect the spring from surface water contamination.
- 💧 Providing shelter to rodents, animals, insects.
- 💧 Overflows not screened.
- 💧 Spring house not well sealed.

Spring house next to pond



Well Location

- 💧 Not at the high point of property.
- 💧 Not protected against surface wash.
- 💧 Close proximity to any known or probable source of pollution.
- 💧 In a direction from groundwater flow from any existing or probable source of pollution.

Swamp next to well



Well located at low point of property.

Typical Sources of Pollution

- 💧 Subsurface sewage system.
- 💧 Fuel Tanks or Chemical Storage Tanks (above ground or below ground) and associated fuel lines.
- 💧 Agricultural applications – fertilizers.
- 💧 Disposal Site for Refuse.
- 💧 Industrial Waste.



Minimum Separation Distances

Well Capacity	<10 GPM	10-50 GPM	>50 GPM
Sewage System	75 ft.	150 ft.	200 ft.
Surface Water	25 ft.	50 ft.	50 ft.
Storm Drain	25 ft.	50 ft.	50 ft.
Foundation Drain	25 ft.	50 ft.	50 ft.
Other Pollution Sources	75 ft.	150 ft.	200 ft.

Well Pit

- ❖ Does not meet RCOSA Sections 19-13-B51h & i.
 - ❖ Not watertight construction (cover, sidewalls, base).
 - ❖ Buried well pits.
 - ❖ Does not have gravity drainage system discharging to the ground surface only (cannot be connected to any sewer drain, house drain, or storm drain).











Water Treatment

- 💧 Treatment effectiveness
- 💧 Contact time
- 💧 Flow-paced and backup chemical injection pumps
- 💧 Tight seal of chemical tank
- 💧 Monitoring
- 💧 Operation and Maintenance





Water Storage Tanks

- 💧 Inadequate turn-over time.
- 💧 Inadequate protection of the water from contamination, either construction and/or location.
- 💧 Inadequate sanitary manner - sediments / debris / animals / other foreign matter inside tank.
- 💧 Not equipped with screened vents and/or overflows.
- 💧 Overflow pipes directly connected to a sanitary sewers or to storm drainage systems.
- 💧 10-year atmospheric storage tank inspection - Poorly performed or not performed at all – inspection report inadequate
 - 💧 Follow DWS Tank Inspection Guidelines
 - 💧 DWS preparing a checklist of minimum items to be addressed for the inspection

Severely Damaged Concrete Tank



Underground Concrete Tank



Inadequate Vent/Overflow Pipe Allows Surface Wash Flow Into Tank



Vent/Overflow Pipe Broken



Insects and Rodent in Tank



Insects and Rodent in Tank



Imploded Atmospheric Tank



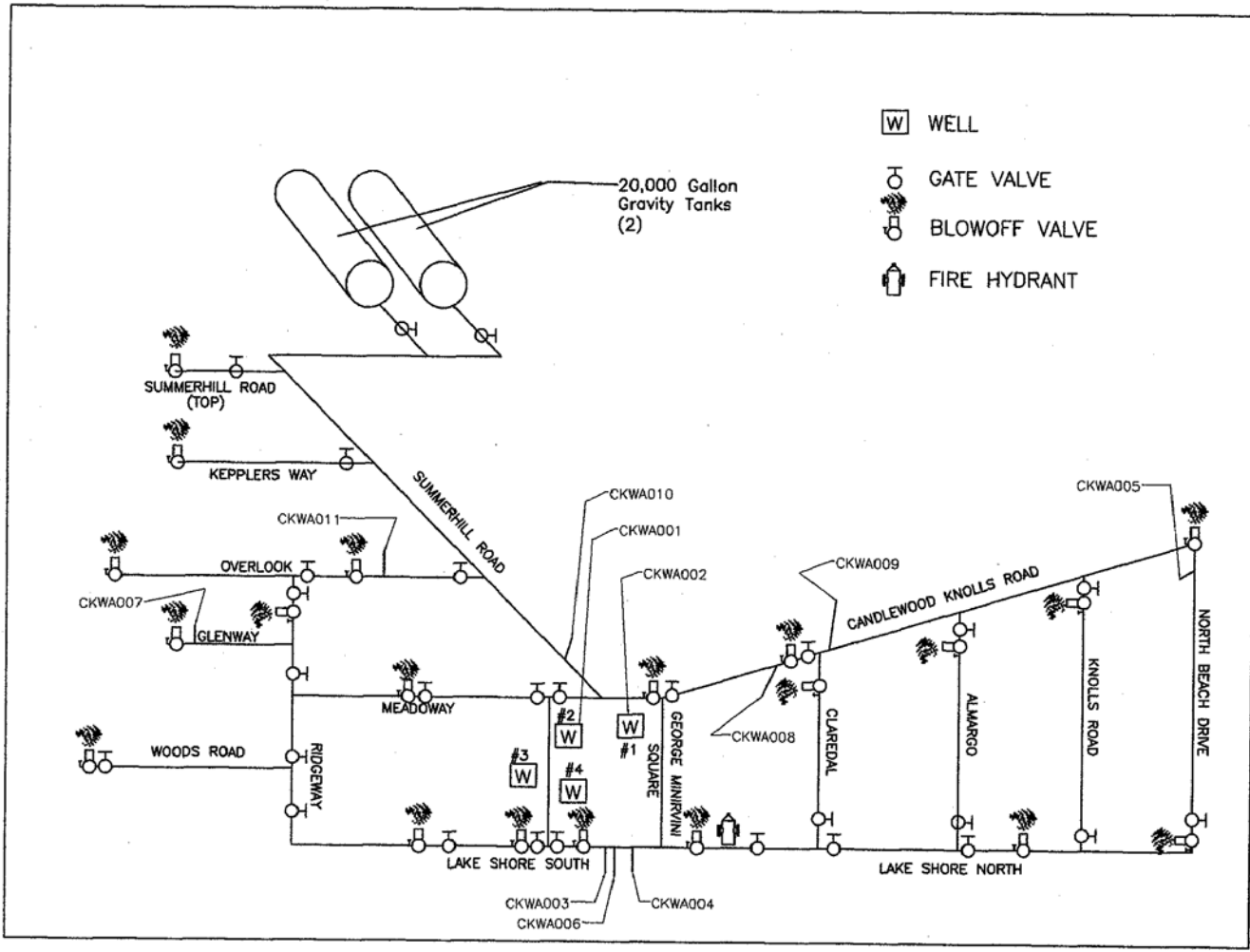
Created vacuum condition when the air vent and overflow froze in the winter.



Tuberculation build-up inside tank

Distribution System

- ⚡ Does not have a well represented sampling site plan.
- ⚡ Does not know where the valves are – does not exercise valves.
- ⚡ Does not conduct annual flushing program.
- ⚡ Does not maintain a minimum of 25 psi under normal conditions to all service connections.
- ⚡ Does not have a program to reduce the amount of unaccounted for water (i.e. leak survey, calibration of meters, etc.).
- ⚡ Potential cross-connection with unapproved sources and/or other contaminated sources.
- ⚡ Inadequate frost prevention of distribution pipes.



- W WELL
- GATE VALVE
- BLOWOFF VALVE
- FIRE HYDRANT

Figure A1: Water System Schematic

Pump Station

- 💧 Inadequate venting system and/or drainage.
- 💧 Lack of redundant pump.
- 💧 Inaccessibility.
- 💧 Cross Connection.
- 💧 Inadequate operation, maintenance, and management practices.





Supply vs. Demand

- 💧 Not monitoring production meters at least weekly to measure the amount of water delivered to the distribution system.
- 💧 Not maintaining system safe yield to meet existing demand (RCSA Section 19-13-B102(o)).
- 💧 Not maintaining supply capacity to meet peak hour demand (RCSA Section 19-13-B102(p)).
- 💧 Not notifying DPH when hauling potable water to supplement system.

Operation and Maintenance

- ⦿ Not properly maintaining pumps, storage tanks, other appurtenances, and distribution system.
- ⦿ Not properly designating responsibilities to another certified operator.
- ⦿ Not properly calibrating the testing equipment.
- ⦿ No asset management: no funds available for critical or regulatory upkeep.
- ⦿ Not properly operating and monitoring treatment.
 - ⦿ Chlorine residual
 - ⦿ pH
 - ⦿ Phosphate

Water Quality

- 💧 MCL violations
 - 💧 Total Coliform
 - 💧 E. coli
 - 💧 Nitrate/Nitrite
- 💧 Action level exceedance
- 💧 Monitoring and reporting

System Capacity

💧 Managerial

- Not familiar with the Drinking Water Regulations.
- Not knowledgeable about the system infrastructure, operation, and maintenance.
- Not responsive to system needs (if it ain't broke, don't fix it).
- Not properly maintaining records.
- Does not have standard operating procedures developed for the water system.

System Capacity (cont.)

💧 Financial

- Inadequate funding to maintain compliance.
- Does not have a capital improvement plan.
 - Does not have a reserve fund for emergencies and system maintenance.
- Inadequate asset management.
 - Does not realize that the water system is an asset that depreciates over time.
 - Does not take care of facilities and equipment to maintain this asset.

System Capacity (cont.)

💧 Technical

- Does not have a technical background or experience with operation and maintenance of water system.
- Does not have a certified operator for the necessary guidance and support.
- Inexperienced and noncompliant certified operator.
- Not familiar with system infrastructure, operation, and maintenance.
- Inadequate supply and demand management.

Conclusion

- 💧 Evaluate system capacity, system infrastructure, possible sources of pollution, and fix any deficiencies identified in your evaluation or the state sanitary survey.
- 💧 Emphasize the importance of pure & adequate drinking water to those in a management or decision-making position.
- 💧 Ensure that you are involved in decisions affecting the water system.
- 💧 Ground Water Rule
 - Compliance effective December 1, 2009.
 - Correct significant deficiencies within 120 days.



Contact Information

- 💧 Drinking Water Section
410 Capitol Ave, MS# 51-WAT
P.O. Box 340308
Hartford, CT 06134-0308
www.ct.gov/dph/publicdrinkingwater
Phone: 860-509-7333
Emergency Phone: 860-509-8000
Fax: 860-509-7359
- 💧 Environmental Protection Agency (EPA)
<http://water.epa.gov/>

Feedback

💧 Questions???

💧 Comments???

