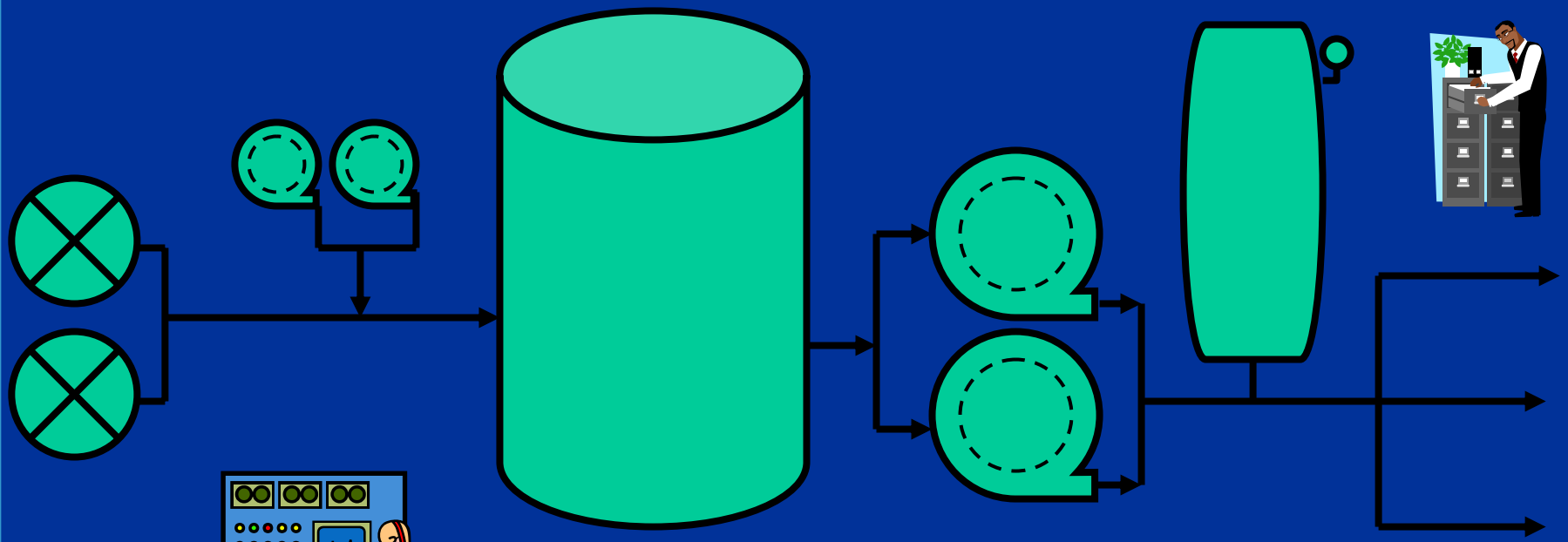
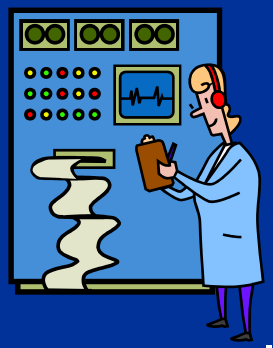
CONNECTICUT DEPARTMENT OF
PUBLIC HEALTH

Keeping Connecticut Healthy

What DPH Looks For During a Sanitary Survey



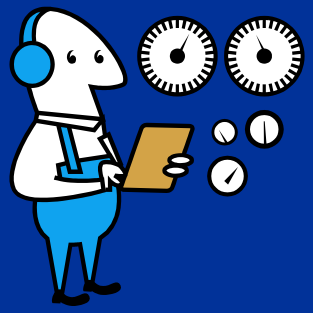


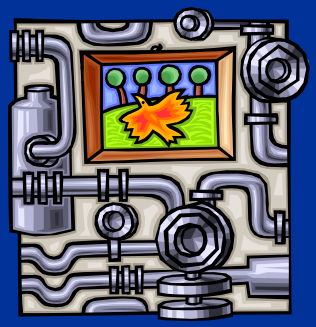
Ryan Tetreault
Sanitary Engineer 3
Drinking Water Section
Implementation & Response Unit

Sanitary Surveys

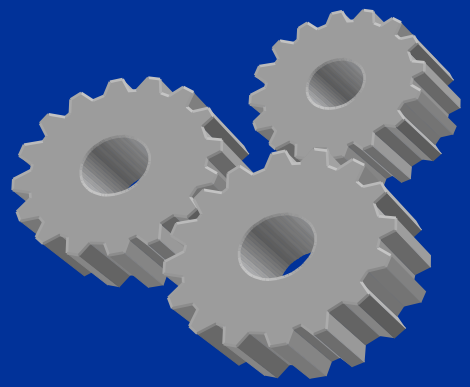
- Community PWS: Every 3 years
- NTNC PWS: Every 5 years
- TNC PWS: Every 5 years

- "Sanitary survey" means an onsite inspection of the water source, treatment, distribution system, finished water storage, pumping facilities and controls, monitoring and reporting data, system management and operation, and operator compliance with department requirements. Components of the sanitary survey may be completed as part of a staged or phased review process by the department within the established frequency.





Sanitary Survey – 8 Elements



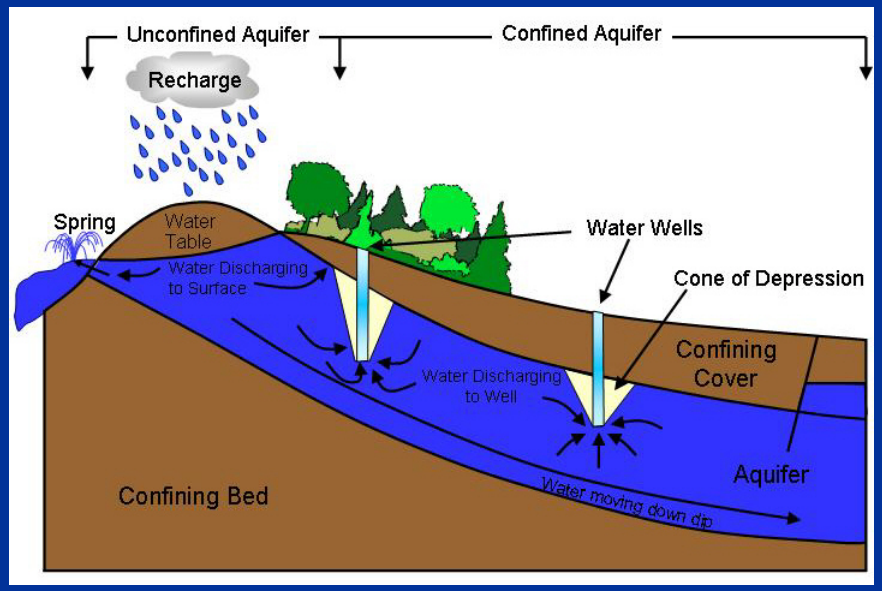
- Sources
- Treatment
- Distribution system
- Finished water storage
- Pumps, pump facilities, and controls
- Monitoring, reporting, and data verification
- System management and operation
- Operator compliance with state requirements

Sanitary Survey Element #1

Sources of Supply

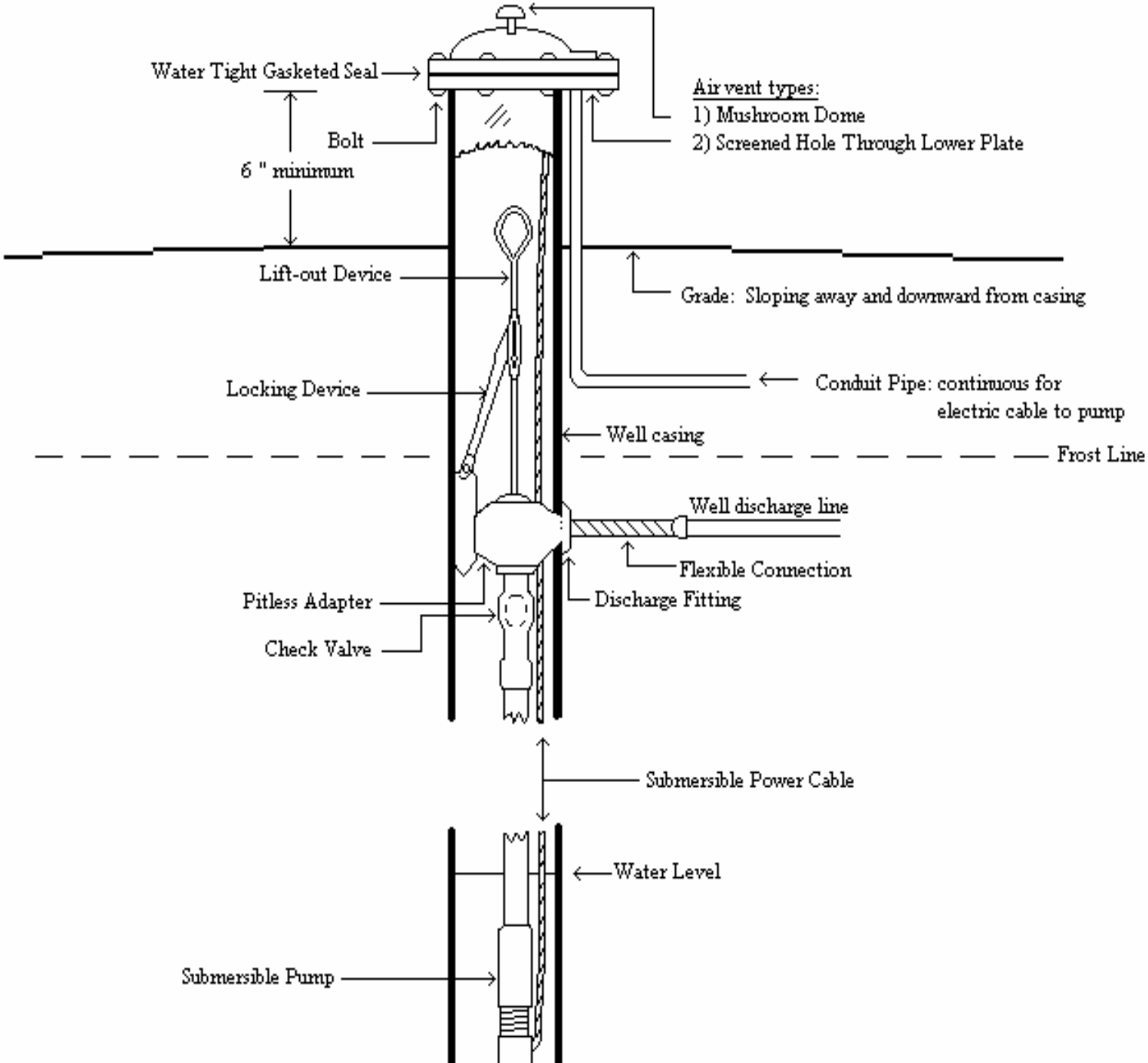
Types of Ground Water Supplies:

- Bedrock Drilled Wells
- Gravel Packed Wells
- Shallow Dug Wells
- Springs



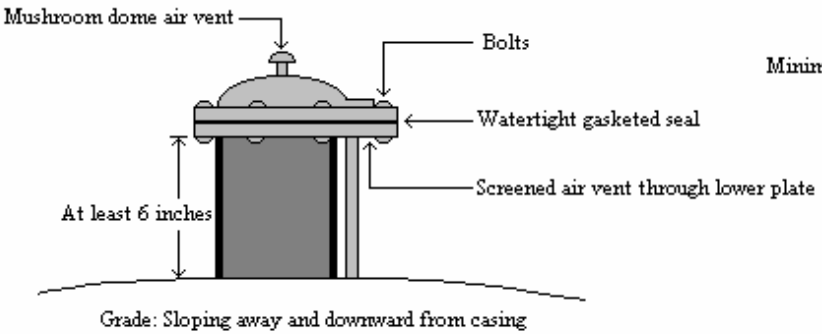
Construction Requirements
Drilled or Gravel Packed Wells

- Well head projects at least 6 inches above the established grade at the well.
- Well is not subject to surface wash.
- Well is equipped with a watertight well cap.
- Well is equipped with a shielded and screened air vent when the drawdown is 10 or more feet.
- Well casing is made of steel.
- Well casing has no flaws or defects.
- Well casing has watertight connections.

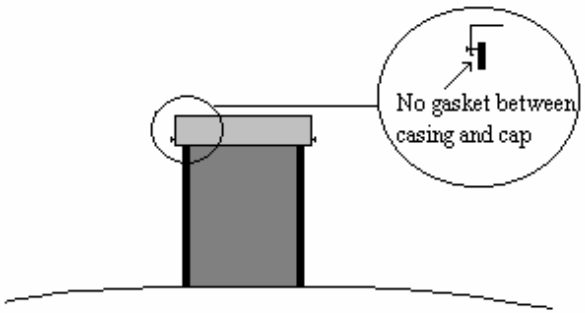

Water Tight Gasketed Seal
Bolt
6 " minimum
Air vent types:
1) Mushroom Dome
2) Screened Hole Through Lower Plate
Lift-out Device
Grade: Sloping away and downward from casing
Locking Device
Conduit Pipe: continuous for electric cable to pump
Well casing
Frost Line
Well discharge line
Flexible Connection
Pitless Adapter
Discharge Fitting
Check Valve
Submersible Power Cable
Water Level
Submersible Pump

Drilled Wells

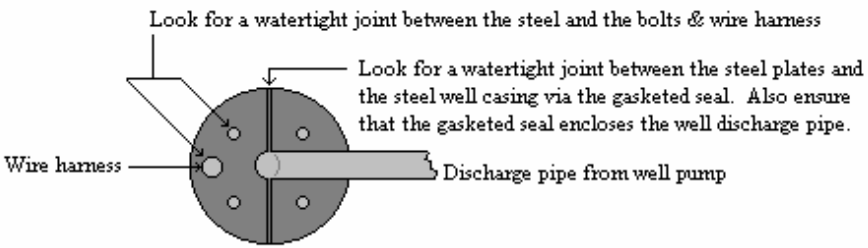
Typical construction of watertight well cap:



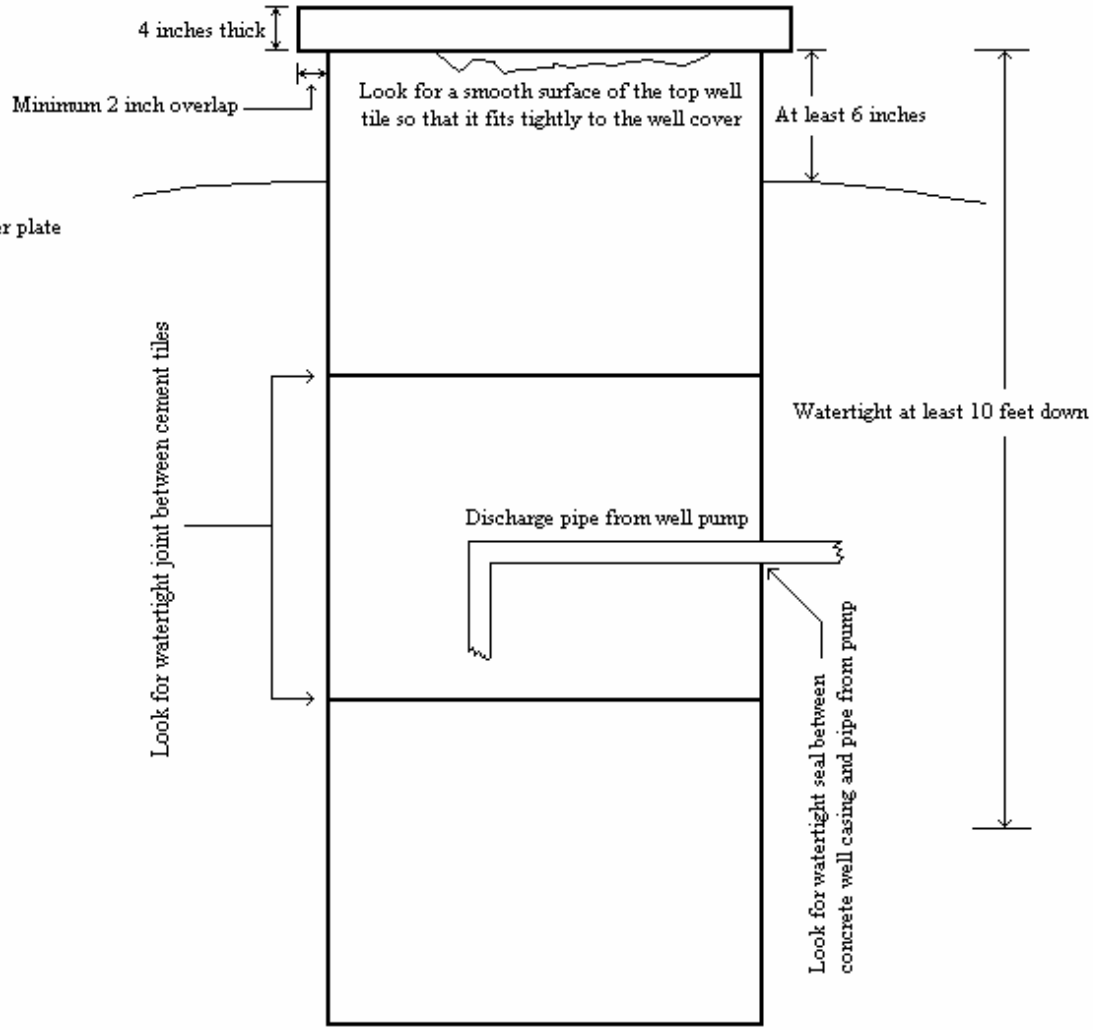
Typical construction of non-watertight well cap



Typical construction of split seal well caps designated for use when the well is not equipped with a pitless adapter unit: Top - Down View



Dug (Shallow) Wells



The well must be located on the high end of the property and protected from surface wash

Well casing has been extended and surrounding grade mounded to divert surface wash away from well casing

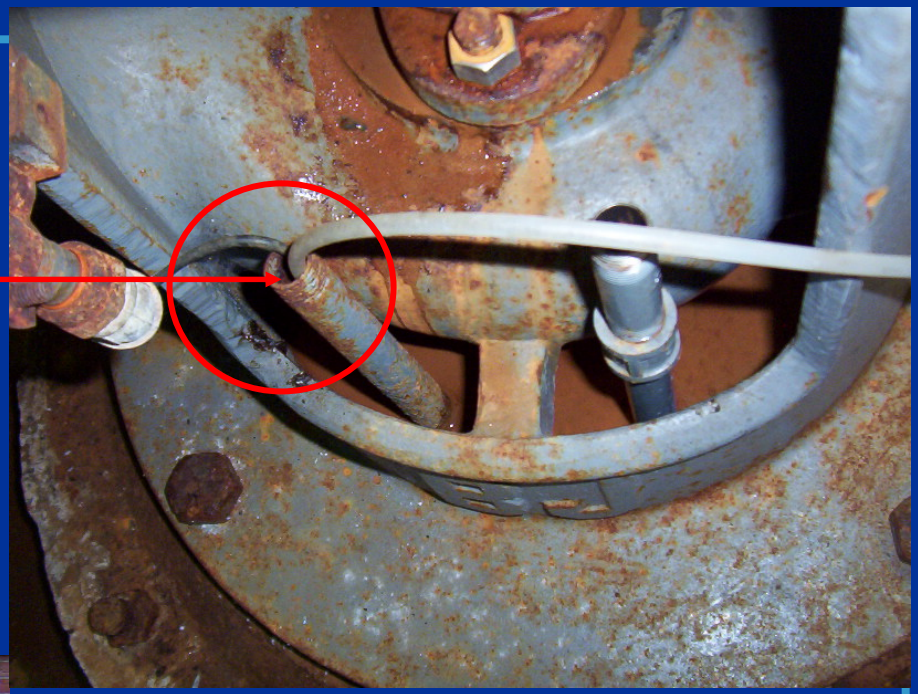
Well was located in basin of a drainage swale

Not a certified watertight well cap

Well casing is less than 6” above grade

No screened air vent

Connection is not watertight



PVC well casings are not allowed

Defective well casings

Connections to the well casing must be watertight

Electrical conduit separated

Construction Requirements

Shallow Dug Wells

- The casing must extent at least 6 inches above grade.
- The casing must be constructed of watertight concrete a minimum of 4 inches thick to a depth of at least 10 feet below grade.
- The well must have a reinforced concrete cover a minimum of 4 inches thick which overlaps the sidewalls of the well by a minimum of 2 inches.
- The well must have a watertight joint between the cover and sidewalls.
- If equipped with a manhole, it must have a minimum of 2 inches curbing above the concrete slab and a watertight overlapping cover.
- The manhole cover must be equipped with a lock or be bolted in place.

2 inches

The well casing must be constructed of watertight concrete a minimum of 4 inches thick…

…to a depth of at least 10 feet below grade

The joint between the cover and sidewalls must be watertight

Plastic wrap does not make it watertight!

Construction Requirements

Springs

- Must meet the same construction requirements of a shallow dug well
- Overflows must be screened
- Spring house must be properly sealed

Common Problems:

- Contamination most commonly occurs from inability to protect the spring from surface water contamination
- Spring houses also commonly provide shelter to insects and/or rodents resulting in contamination

Holes in building
structure can allow
insects or vermin
into spring house.

Evidence of insects
and/or vermin

Wooden roof structure is not watertight

Well Pits

Must meet RCSA Sections 19-13-B51h & i.

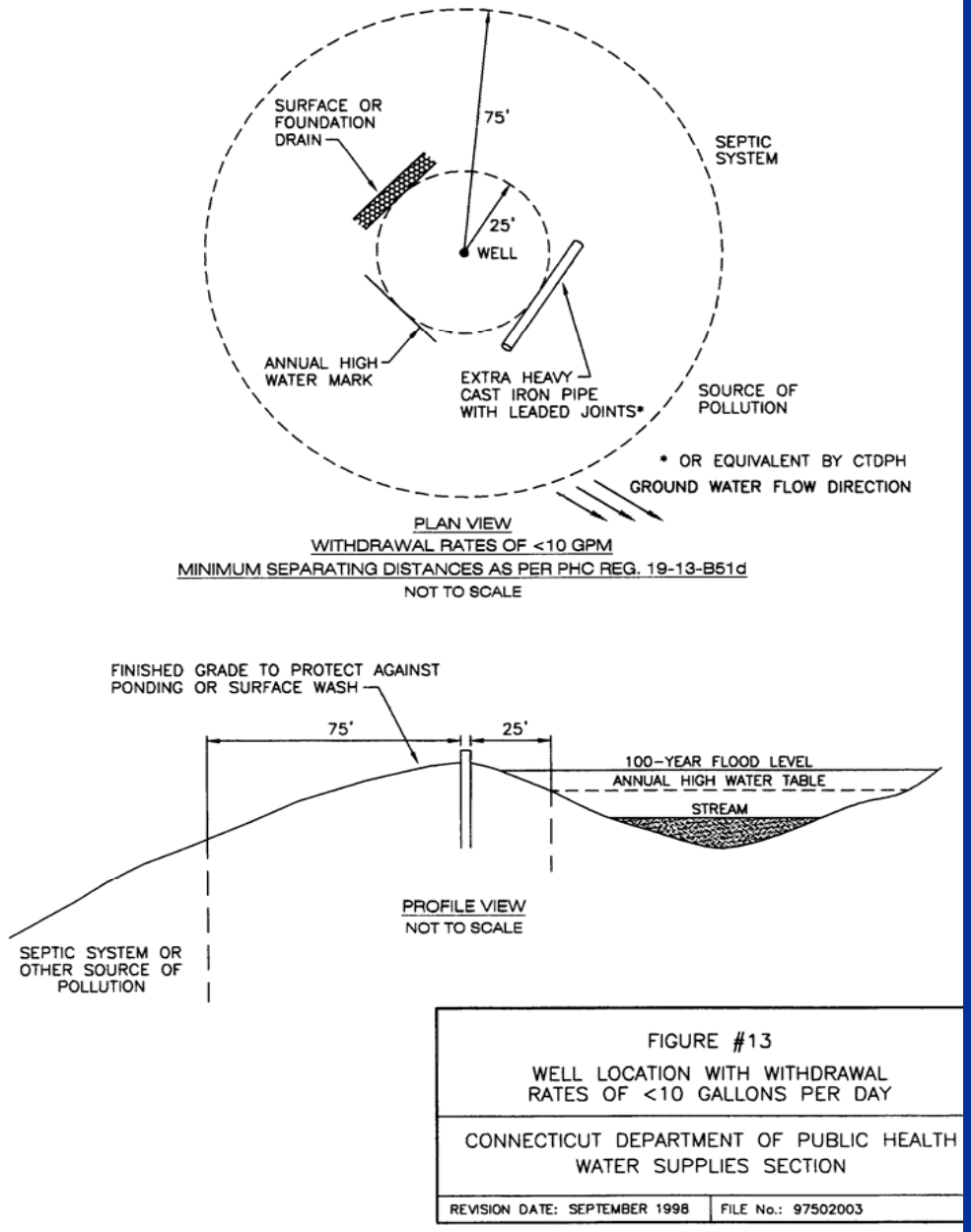
- Shall be avoided whenever practical
- Must be watertight or suitably drained to ensure dryness of the pit
- Must be accessible (not buried)
- When equipped with a drain, the drain must extend at least 25 feet from the pit and drain to daylight.
- The well pit drain must slope at least 1/8 inch per foot toward the outlet and be screened.
- The drain cannot be connected to any sewer drain, house drain, or storm drain.

Well Location

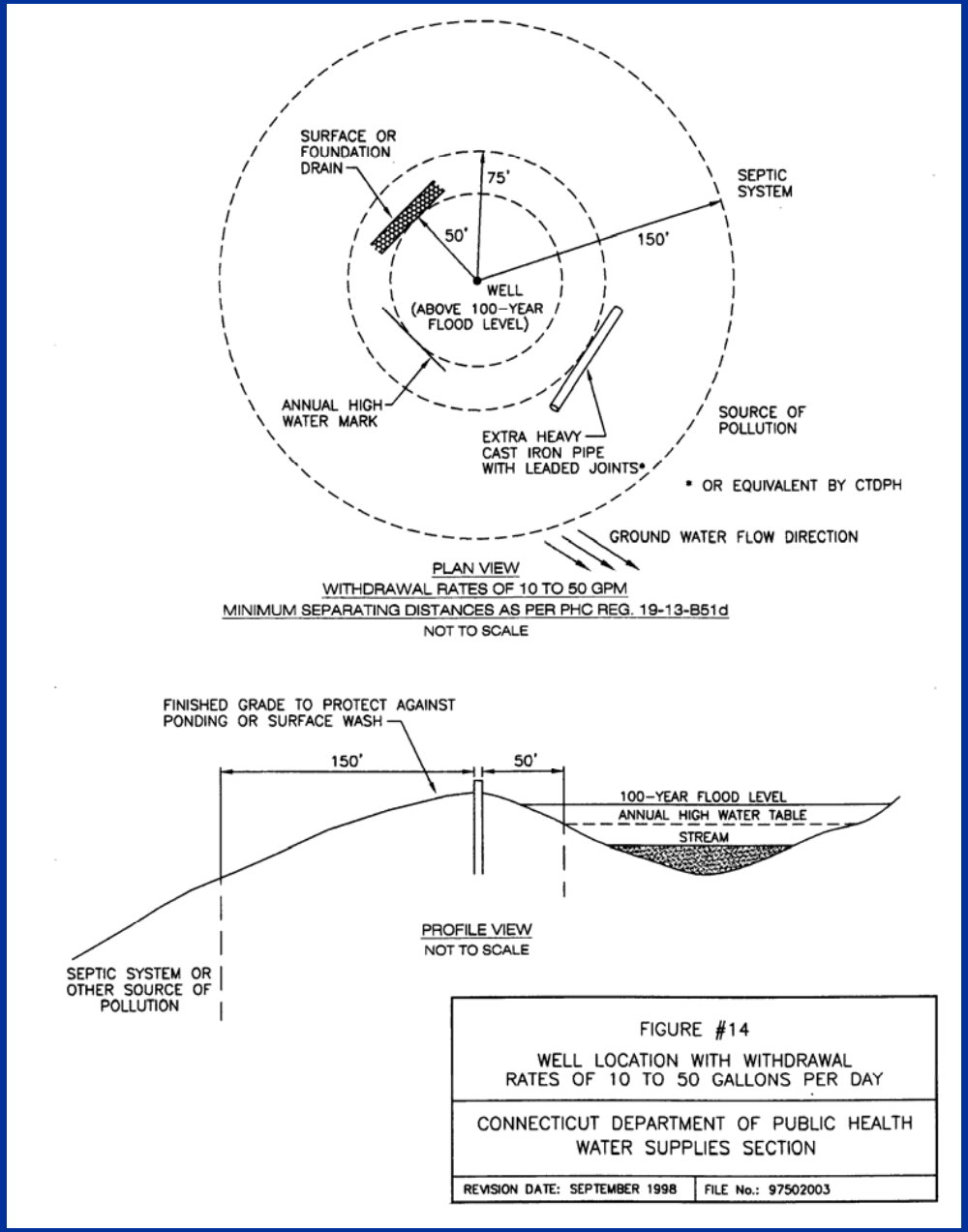
The well must be…

- located at the high point of property.
- be protected against surface wash.
- in an area as far removed from any known or probable source of pollution.
- in a direction away from groundwater flow from any existing or probable source of pollution.

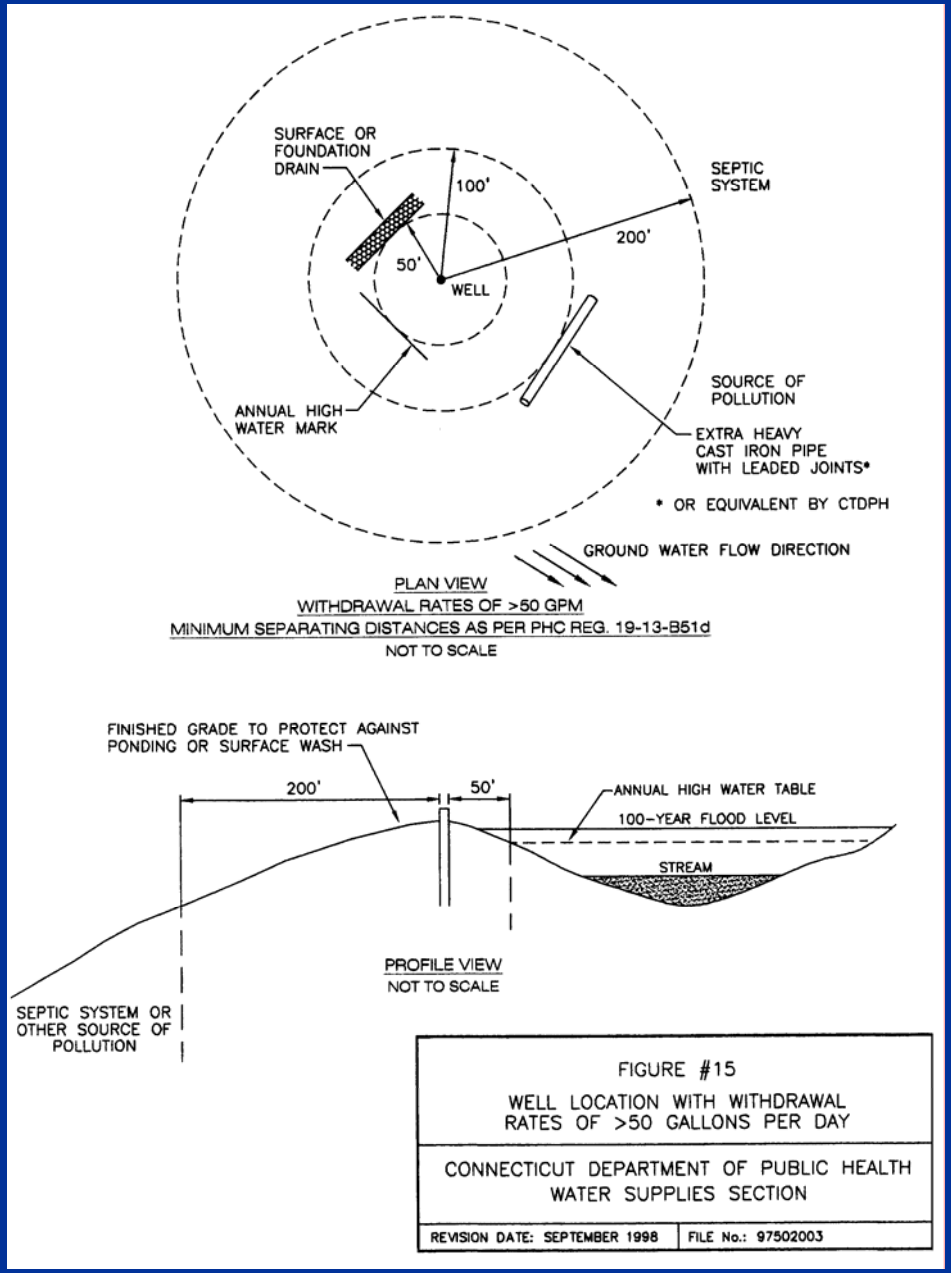
Well approved for a withdrawal rate less than 10 gallons per minute:



Well approved for a withdrawal rate between 10 to 50 gallons per minute:



Well approved for a withdrawal rate greater than 50 gallons per minute:



Common Sources of Pollution

- Subsurface sewage system
  - Septic systems
  - Sewer lines
- Fuel Tanks or Chemical Storage Tanks
- Industrial Waste
- Surface water, drains carrying surface water, or foundation drains.

Sanitary Survey Element #2

Treatment

- Approval of treatment before installation
- Treatment effectiveness
- Contact time
- Backup chemical injection pumps
- Chemical solution tanks maintained and sealed
- Sampling taps before and after treatment processes
- Treatment effluent logs
- Operation and maintenance
- ANSI/NSF standard 61 for drinking water chemicals
- Cross connections

FILTRATION

- What type of media is filter equipped with?
  - GAC
  - Calcite
  - Greensand
  - Birm
  - Multimedia
  - Other
- Number of filters and filter size?
- Does the treatment system backwash?
  - If so, automatically or manually?
- Does an air gap exist between potable water lines and any treatment automatic or manual backwash discharge lines?
- Can filtration be bypassed?

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CHEMICAL INJECTION

- What type of chemicals are being injected?
  - Chlorine
  - Sodium Hydroxide
  - Potassium Hydroxide
  - Soda Ash
  - Potassium Carbonate
  - Potassium Permanganate
  - Other
- Is the feed rate proportional to flow?
- Is the condition of the treatment tanks satisfactory?
  - Is secondary containment provided?
- Are replacement chemicals stored in containment
- Is there a device in place to disengage the feed pump in a no flow condition?
- Is there an air gap or backflow prevention on the make up water line for the chemical solution tank?
- What devices or methods are used for measuring treatment effluent?

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Drinking Water Section

Chemical solution tanks are not properly sealed

No secondary containment

WATER SOFTENERS

- Does the treatment system backwash?
  - Automatic
  - Manually
- What type of regenerate is used for this softening system?
  - Potassium chloride
  - Sodium Chloride
- Are the brine tanks maintained in a sanitary condition?
- Does the backwash line have an air gap?

ULTRAVIOLET LIGHT

- Does the water quality entering the unit meet UV guidelines?

Parameter	Maximum Allowable Limit
Iron	0.3 mg/L
Manganese	0.05 mg/L
Color	15 color units
Turbidity	1.0 NTU
Hardness	120 mg/L (as $CaCO_3$)
Hydrogen Sulfide	Non-Detectable
Total Suspended Solids	10 mg/L
Iron Bacteria	None

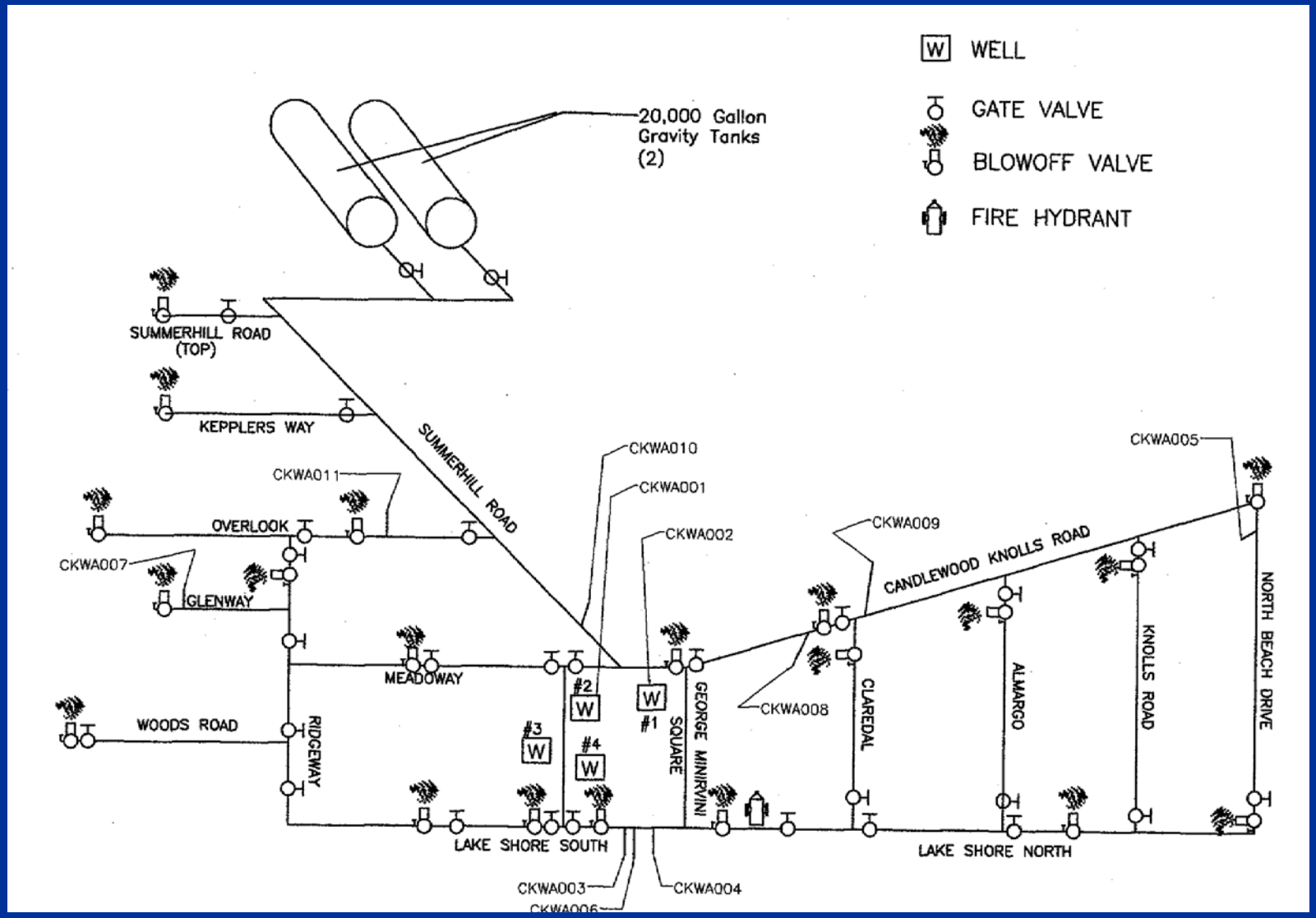
- Is the unit equipped with an intensity meter?
- Does the unit have alarms installed?
- Is there a bypass installed?
- Is there a 5-micron pre-treatment filter cartridge installed?
- Is there a spare lamp located on site?
- Is there a mechanical quartz jack wiper assembly installed?

Sanitary Survey Element #3

Distribution System

- Does the PWS have a sampling site plan with sampling points representative of water delivered to all customers?
- Does the PWS have an annual flushing program?
- Does the PWS maintain a minimum of 25 psi under normal conditions to all service connections?
- Does the PWS have a program to reduce the amount of unaccounted for water (i.e. leak survey, calibration of meters, etc.)?
- Does the PWS have a cross connection control program?
  - Have all categories of concerns been identified?
  - Have all cross connection violations been corrected?
  - Have all backflow prevention devices been tested?
- Are all pipes buried and/or protected from freezing?

Sampling Site Plan Map



Sanitary Survey Element #4

Finished Water Storage

Does the finished water storage tank have:

- adequate turn-over time?
- adequate protection of the water from contamination?
- a screened air vent and overflow to prevent the entrance of insects and other foreign matter?
- overflow pipes that are not directly connected to a sanitary sewers or to storm drainage systems?
- access ports to allow for an inspection and cleaning of the tank?
- a mechanism to flush or drain the tank?

Air vent

Sight glass

Manhole access port

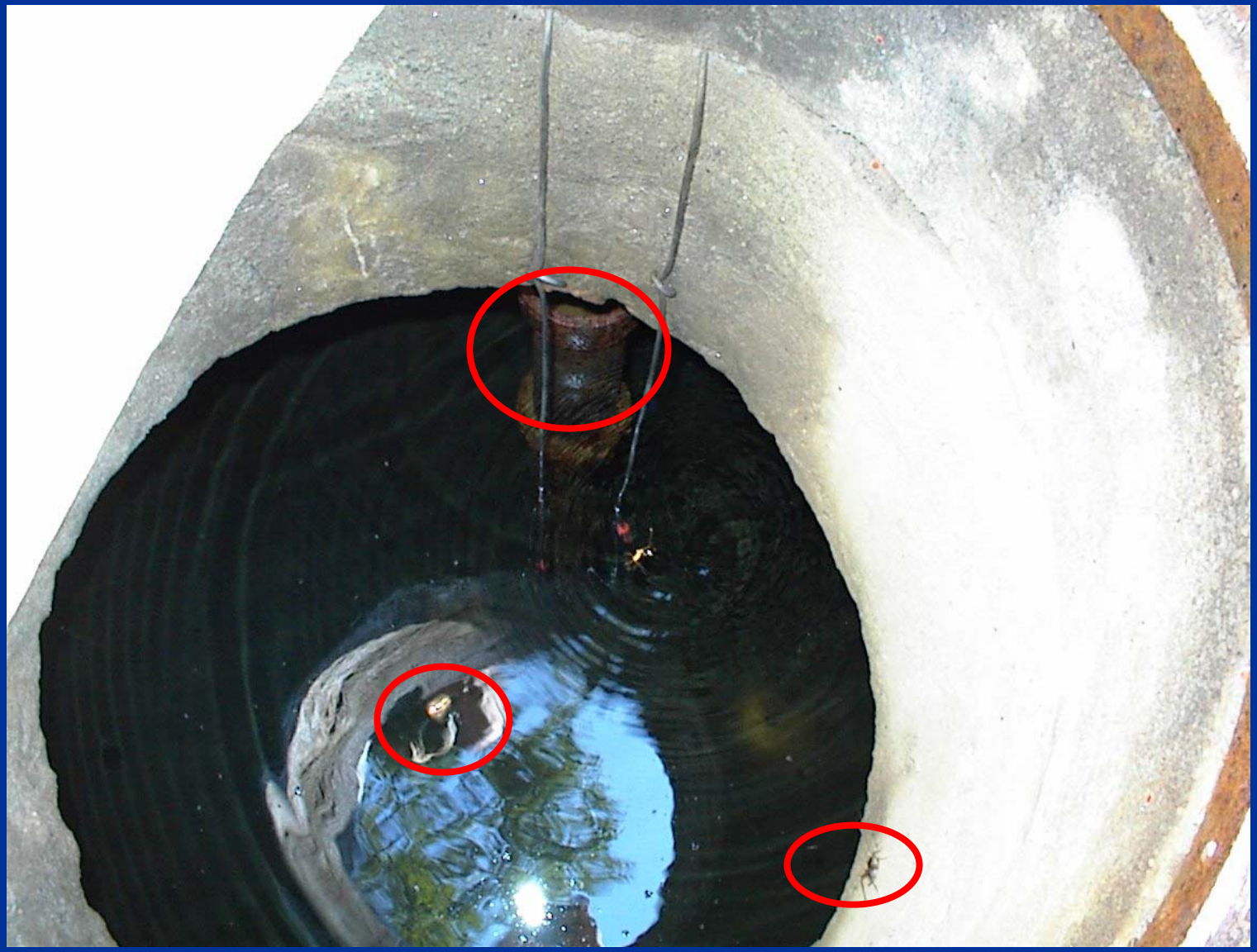
Tank drain

Over flow

Severely Damaged Concrete Tank

Underground Concrete Tank

Insects and Rodent in Tank



Imploded Atmospheric Tank

A vacuum condition was created when the air vent and overflow froze in the winter.

Tuberculation build-up inside a tank

Finished Water Storage

- In-Ground Finished Water Storage Tanks shall be located at least:
  - 50 feet from any part of the nearest subsurface sewage disposal system
  - 25 feet from the nearest watercourse or storm drain or other source of pollution
  - 50 feet from the nearest sanitary sewer unless the sewer is constructed in accordance with the Technical Standards for Subsurface Sewage Disposal in which the tank must be at least 25 feet from the sewer.
- Atmospheric storage tanks shall minimally be inspected once every 10 years for sanitary and structural integrity. The inspection report shall be retained for reference and be made available on request.
- Uncovered finished water tanks, basins and clear wells are prohibited.

Grease trap waste disposal line 22 feet from tank and oil lines within inadequate secondary containment 12 feet from tank

Sanitary Survey Element #5

Pumps, Pump Facilities, and Controls

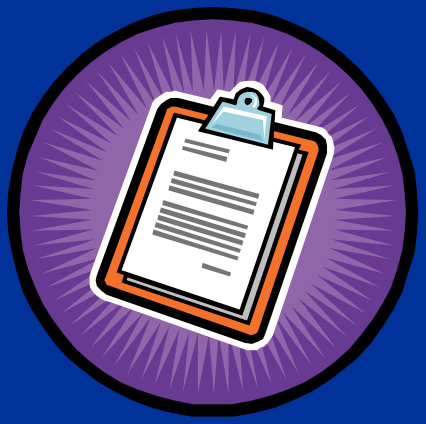
- Duplication of pumps
- Pumps should run lead/lag with alternating starts
- Pumps must supply enough water to meet system demands
  - Combined flow of wells pumps to supply Average Daily Demand
  - Transfer pumps sized to supply Peak Hour Demands
- Pumps should be sized to have adequate run times to avoid short cycling of the pump motor
- Pumps must be properly maintained

06/

Sanitary Survey Element #6

Monitoring, Reporting, and Data Verification

- Review of water quality testing schedule to check for any:
  - Monitoring/reporting violations
  - Outstanding public notification requirements
  - Inventory of water system facilities
  - Inventory of sampling locations
  - Contact updates
  - Certified operator assignments



- Record keeping requirements
  - Maps
  - Water quality results
  - Public notice documents
  - Water meter readings

Sanitary Survey Element #7

System Management and Operation

Maintaining system capacity

- Technical
- Managerial
- Financial

System Capacity

Technical

- Having the technical background or experience with operation and maintenance of a water system.
- Having knowledge of system infrastructure and operations
  - Locations of well sources
  - Well pump withdrawal rates
  - Size of storage tanks
  - Chemicals uses in treatment processes
  - Capacity of transfer pumps
  - Calculations of supply versus demand
  - Average and Peak Hour Demand rates

System Capacity

Managerial

- Familiar with the drinking water regulations
- Knowledgeable about the system infrastructure, operation, and maintenance
- Responsive to system needs
- Properly maintaining records
- Having standard operating procedures developed for the water system
- Maintaining certified operators on staff or through contract

System Capacity

Financial

- Adequate funds to maintain compliance
- Having a capital improvement plan
- Having a reserve fund for emergencies and system maintenance
- Having an asset management program
  - Understanding that water system is an asset that depreciates over time

Sanitary Survey Element #8

Operator Compliance with State Requirements

- Having an operator who is certified at the appropriate plant class level or higher
  - Small Water System
  - Distributions System Operators
  - Treatment Plant Operators
- Having certified operators who are designated by the system as the chief operator
- Submitting an Operator Verification Form to DPH to change or designate certified operator assignments
- Having a designated backup chief operator

Conclusion

- Inspect system infrastructure, possible sources of pollution, and fix any deficiencies identified in your own system evaluations or as documented in the last state sanitary survey inspection report.
- Evaluate system capacity, plan and budget for system improvements.
- Emphasize the importance of pure & adequate drinking water to those in a management or decision-making position.
- Ensure that you are involved in the decision making process as it may have an affect on the quantity and quality of the water delivered to customers.