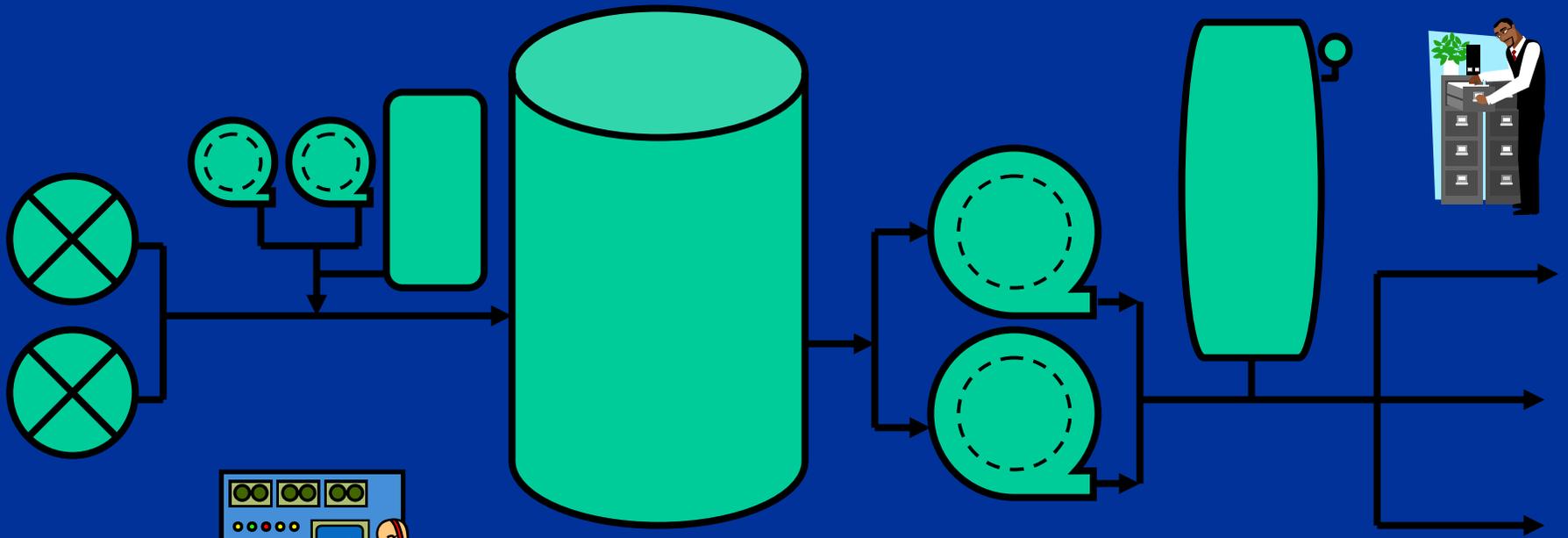


The Eight Elements of a Sanitary Survey

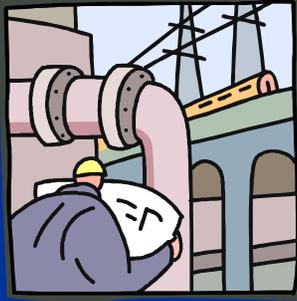
Identifying Violations and Significant Deficiencies



Ryan Tetreault
Sanitary Engineer 3
Drinking Water Section
Compliance – North Region 2

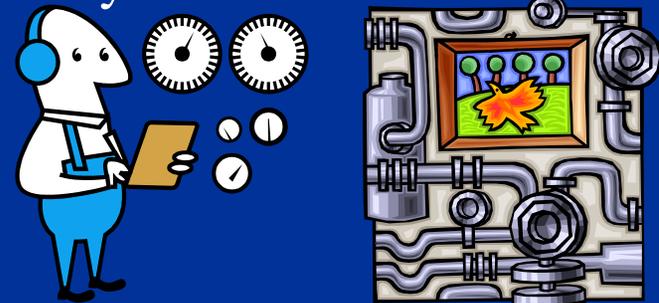
Drinking Water Section

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.



Drinking Water Section

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

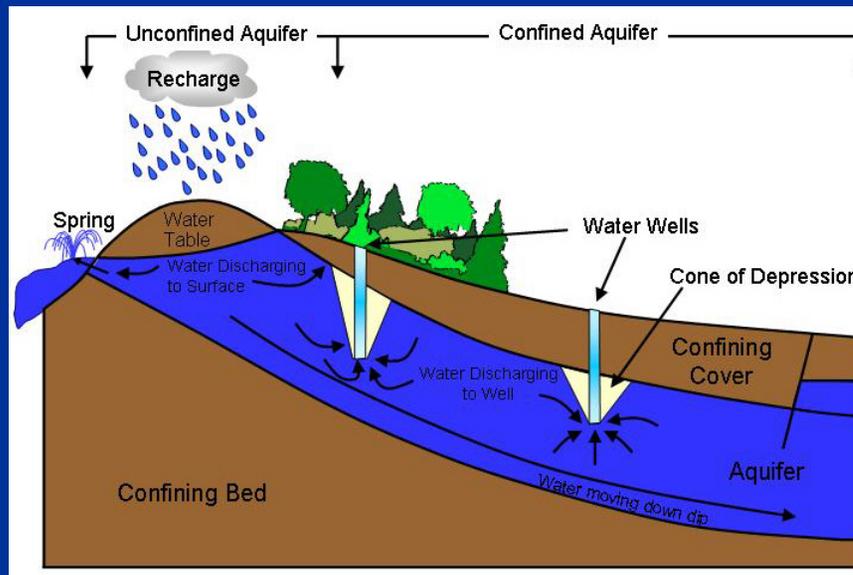


Sanitary Survey Element #1

Sources of Supply

Types of Ground Water Supplies:

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



Drinking Water Section

Regulatory 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 and all connections to the well casing are watertight.
- 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 pits are either watertight or suitably drained in compliance with code requirements to ensure dryness of the pit.
- Well meets required separation distances to systems for disposal of sewage or other sources of pollution, sewer lines, the high water mark of a surface water body, drains carrying surface water, or foundation drains based on the wells withdrawal rate.
- Well is not at risk for being under the direct influence of a surface water body (GWUDI).

Regulatory Requirements

Dug Well Construction

- 💧 The casing must extend 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.



Regulatory 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 increased risk of contamination.

Well Pits

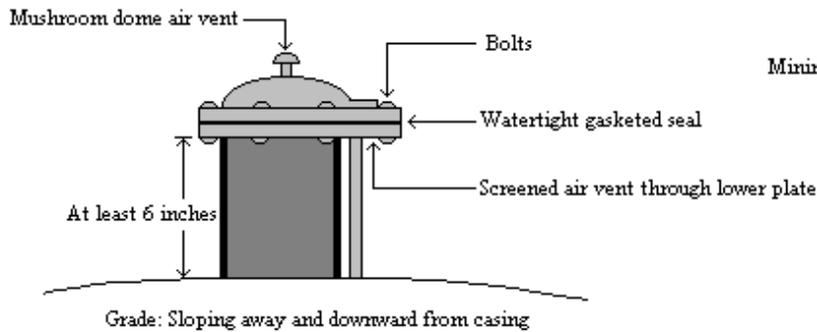
Must meet RCOSA Sections 19-13-B51h & i.

- ◆ 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.

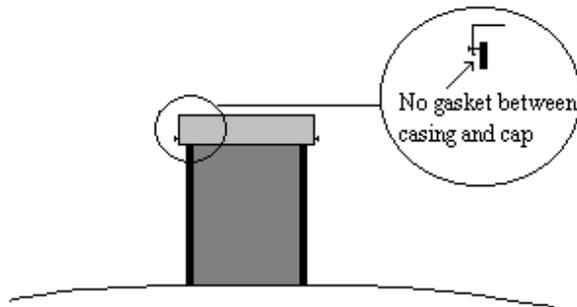
Drilled Wells

Dug (Shallow) 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

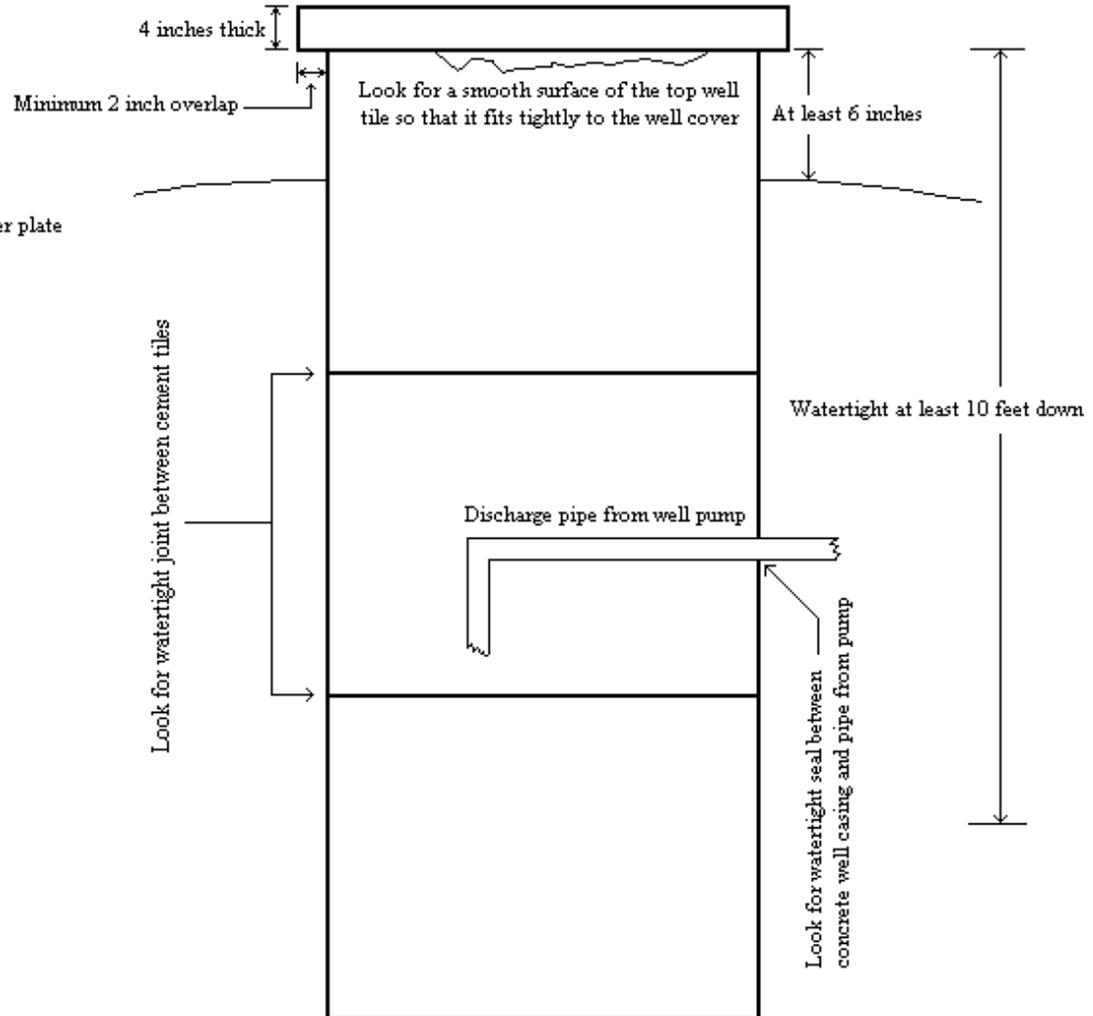
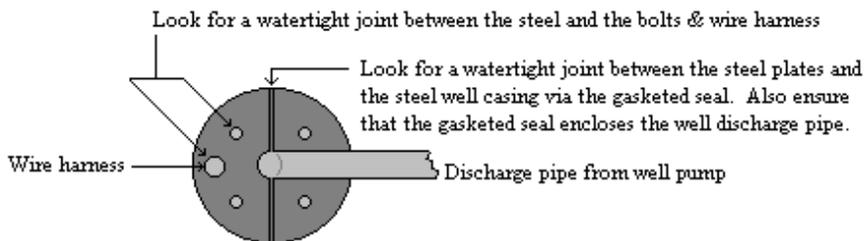
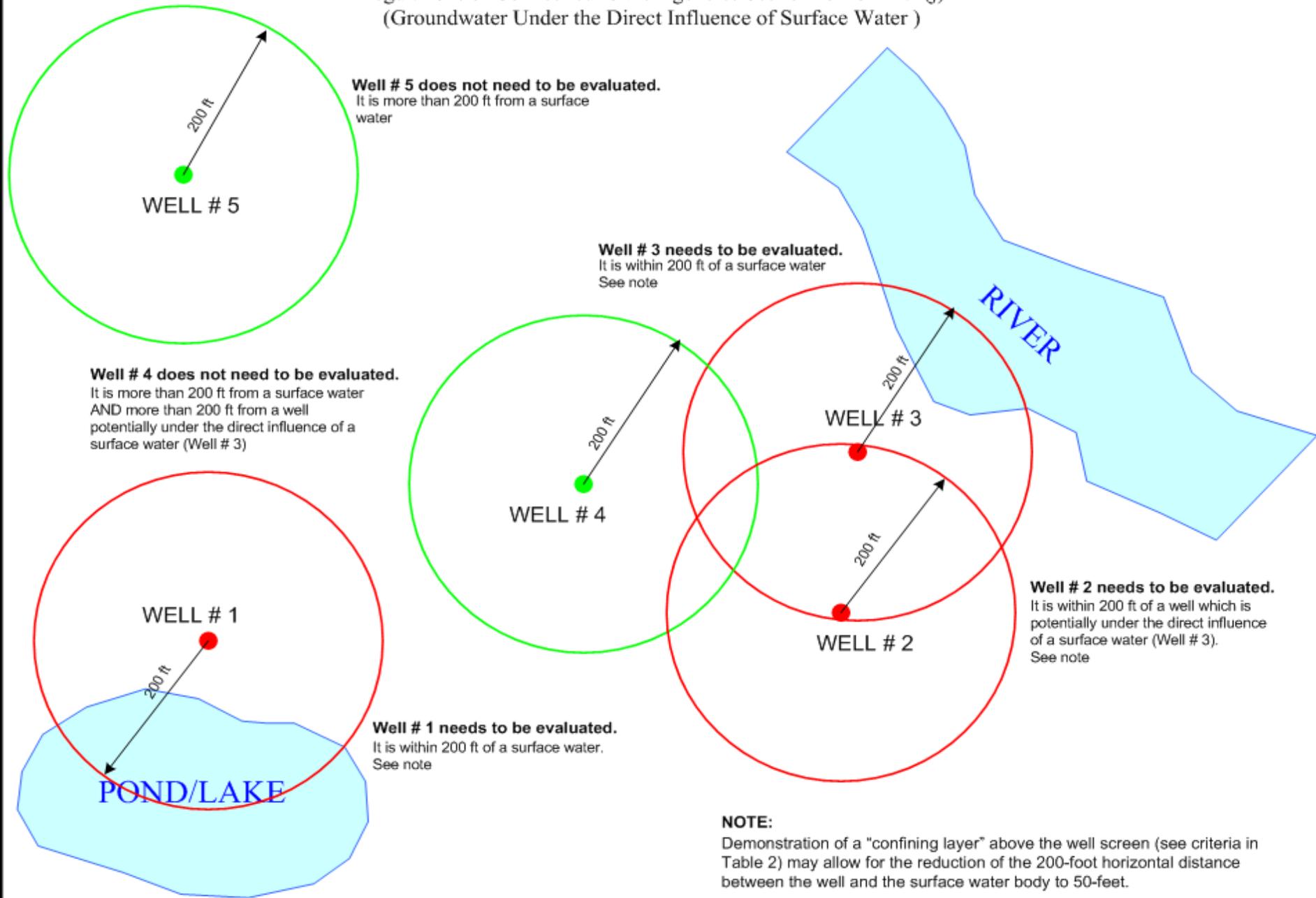


Figure 1-

EXAMPLE OF WELLS NEEDING EVALUATION UNDER THE SURFACE WATER TREATMENT RULE

Regulations of Connecticut State Agencies Section 19-13-B102(j)

(Groundwater Under the Direct Influence of Surface Water)



Well # 5 does not need to be evaluated.
It is more than 200 ft from a surface water

WELL # 5

Well # 4 does not need to be evaluated.
It is more than 200 ft from a surface water
AND more than 200 ft from a well
potentially under the direct influence of a
surface water (Well # 3)

WELL # 4

Well # 3 needs to be evaluated.
It is within 200 ft of a surface water
See note

WELL # 3

RIVER

Well # 2 needs to be evaluated.
It is within 200 ft of a well which is
potentially under the direct influence
of a surface water (Well # 3).
See note

WELL # 2

Well # 1 needs to be evaluated.
It is within 200 ft of a surface water.
See note

WELL # 1

POND/LAKE

NOTE:

Demonstration of a "confining layer" above the well screen (see criteria in Table 2) may allow for the reduction of the 200-foot horizontal distance between the well and the surface water body to 50-feet.

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

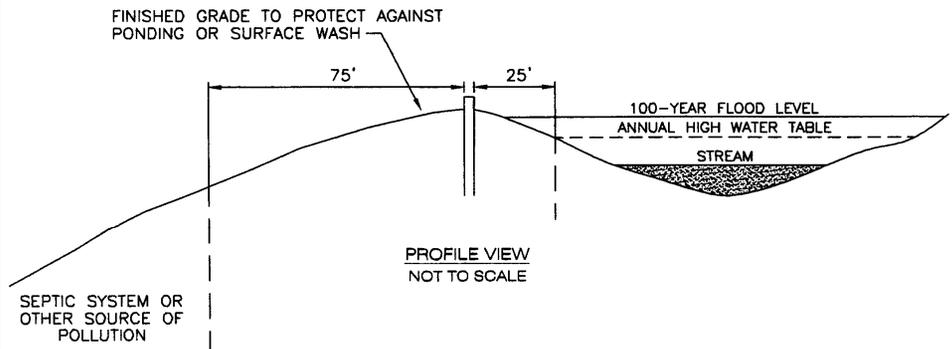
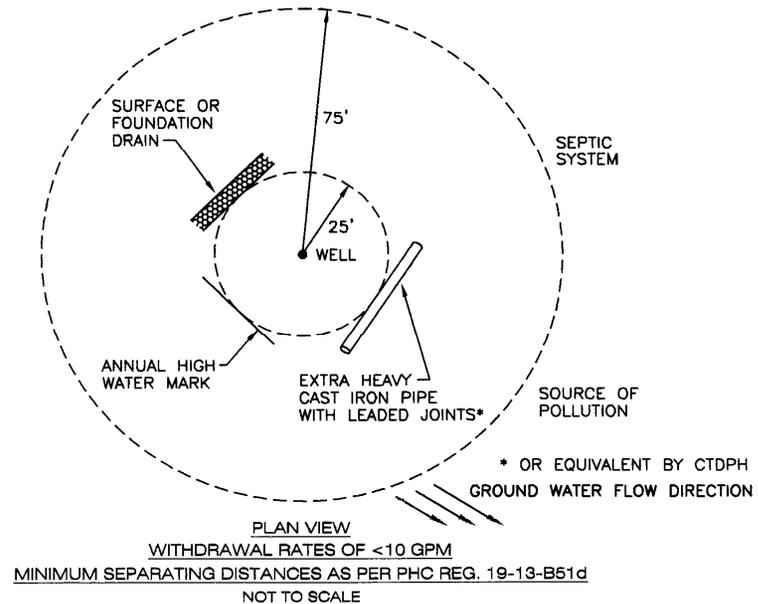


FIGURE #13
 WELL LOCATION WITH WITHDRAWAL RATES OF <10 GALLONS PER DAY
 CONNECTICUT DEPARTMENT OF PUBLIC HEALTH
 WATER SUPPLIES SECTION
 REVISION DATE: SEPTEMBER 1998 | FILE No.: 97502003

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

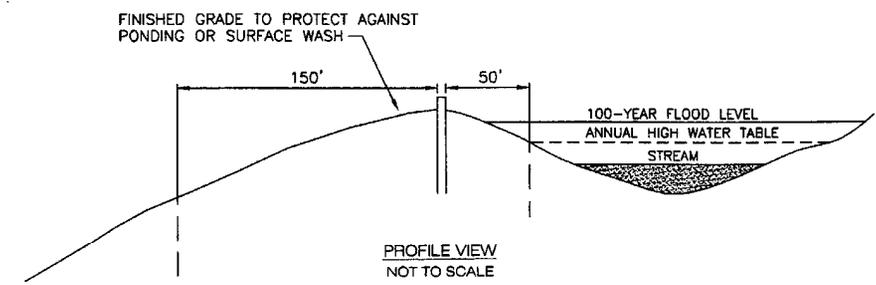
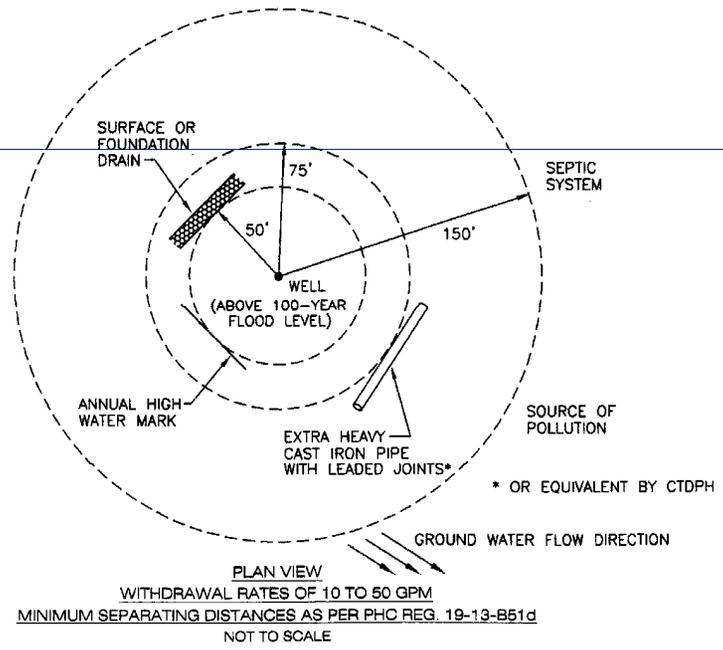


FIGURE #14
 WELL LOCATION WITH WITHDRAWAL RATES OF 10 TO 50 GALLONS PER DAY
 CONNECTICUT DEPARTMENT OF PUBLIC HEALTH
 WATER SUPPLIES SECTION
 REVISION DATE: SEPTEMBER 1998 | FILE No.: 97502003

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

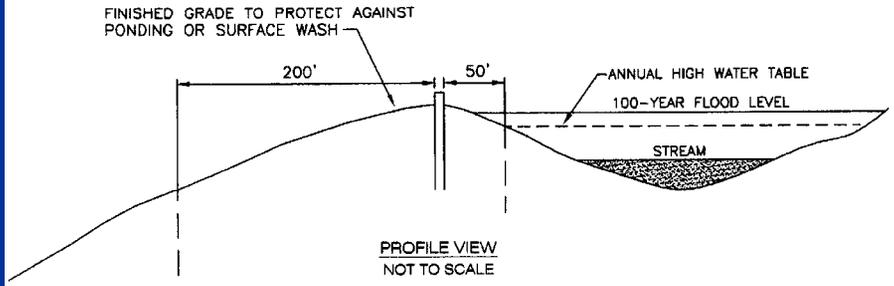
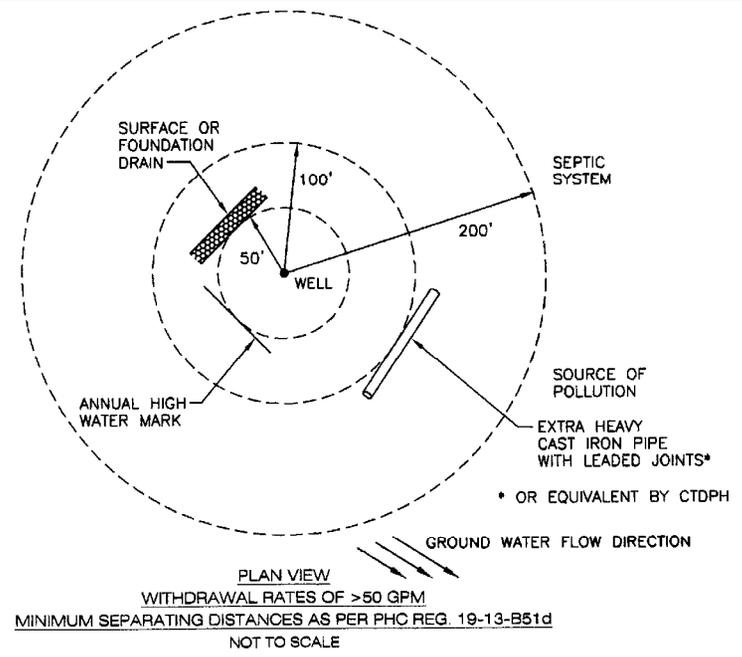


FIGURE #15
 WELL LOCATION WITH WITHDRAWAL
 RATES OF >50 GALLONS PER DAY
 CONNECTICUT DEPARTMENT OF PUBLIC HEALTH
 WATER SUPPLIES SECTION
 REVISION DATE: SEPTEMBER 1998 FILE No.: 97502003

What are the regulatory violations?



1. RCSA 19-13-B51j (a) – Well cap is not sealed watertight to the well casing.
2. RCSA 19-13-B51f (a) – The well casing is not free from defects or flaws.

Are there any significant deficiencies?



1. The well casing is not free from flaws or defects and/or exhibits signs of significant deterioration indicating that the sanitary or structural integrity of the casing is impaired.
2. Equipment, piping or appurtenances, including well caps, are not joined watertight to the well casing at the point of entrance to the well.

What are the regulatory violations?



1. **RCSA 19-13-B51h (i) – Well pit is not watertight or suitably drained**
2. **RCSA 19-13-B51j (b) – Air vent is not 12 inches above possible high water level.**



What are the significant deficiencies?



1. The well pit is not constructed and/or maintained watertight (including all conduits, piping, appurtenances or similar connections) or suitably drained via a gravity drain (or a sump pump system if a gravity drain is not feasible) to insure dry, sanitary conditions.
2. The well vent is not provided with sufficient vertical clearance to prevent submergence from any possible high water level.

What are the regulatory violations?

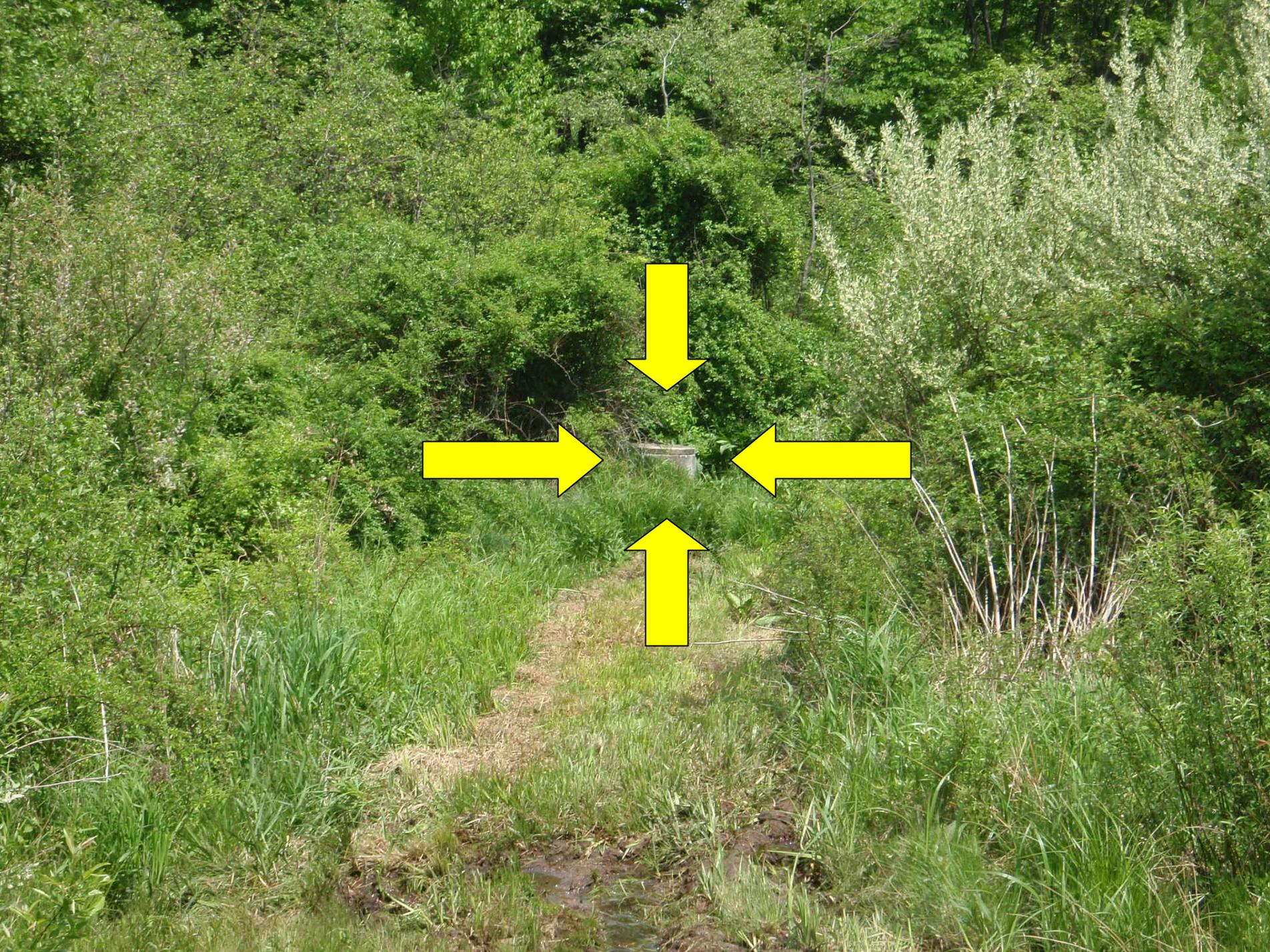
1. **RCSA 19-13-B51d (b)(3)** – The well (withdrawal rate 40 gpm) is not located at least 50 feet to the high water mark of a surface water body.
2. **RCSA 19-13-B102d (1)** – The well is not located above the level of the 100 year flood.

03/07/2008

What are the significant deficiencies?



1. The well is subject to flooding as it does not meet the requirements of RCSA Section 19-13-B51d pertaining to the separating distance to surface water.







What are the regulatory violations?

1. **RCSA 19-13-B51f (b)** – The casing of the dug well is not 4 inches thick and is not constructed of watertight concrete to a depth of at least 10 feet below the ground surface.
 2. **RCSA 19-13-B51g** – The cover of the dug well is not 4 inches thick and does not overlap the casing by at least 2 inches.
 3. **RCSA 19-13-B51d (a)(3)** – The dug well is not located at least 25 feet from the high water mark of a surface water body.
- * **GWUDI study or other approved corrective action would be required if well was to remain as a source of supply.**

What are the significant deficiencies?



1. The well is subject to flooding as it does not meet the requirements of RCSA Section 19-13-B51d pertaining to the separating distance to surface water.
2. A watertight joint is not provided between the casing and cover of the dug well.
3. The opening, manhole or hatch installed in a dug well cover is not curbed, sealed watertight and/or overlapping to prevent the entrance of any foreign matter or substance.
4. The casing or side walls of a dug well do not extend at least ten feet below the ground surface.



Sanitary Survey Element #2

Treatment

- 💧 Approval of treatment before installation
- 💧 Reason for treatment
- 💧 Treatment effectiveness
- 💧 Contact time
- 💧 Duplicate or backup chemical injection pumps
- 💧 Chemical solution tanks sealed and sanitary
- 💧 Sampling taps before and after treatment processes
- 💧 Treatment effluent logs
- 💧 Operation and maintenance logs
- 💧 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?

CHEMICAL INJECTION

- ◆ What type of chemicals are being injected?
 - ◆ Chlorine
 - ◆ Sodium Hydroxide
 - ◆ Potassium Hydroxide
 - ◆ Potassium Carbonate
 - ◆ Potassium Permanganate
- ◆ 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?

What are the regulatory violations?

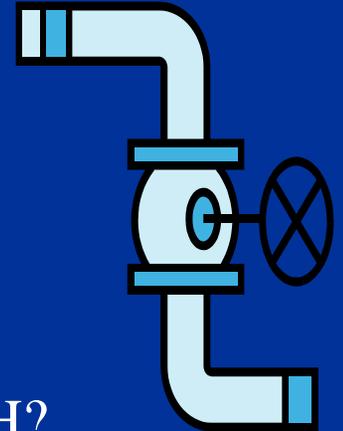


1. RCSA 19-13-B38a (b) – An air gap is required between all potable water lines and equipment or systems which may be subject to contamination.

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?
 - 💧 Has the cross connection report been submitted to DPH?



What are the possible significant deficiencies associated with a public water system's Distribution System?

1. Documented cases that areas exist in the distribution system that experience low or negative pressures under normal operating conditions.
2. Unprotected cross-connection with unapproved or contaminated sources.
3. Documented cases where the PWS failed to effectively disinfect water mains, storage tanks, or other pipe or structure that conveys potable water following construction or repair work.





Sanitary Survey Element #4

Finished Water Storage

Regulatory Requirements

- ☉ All finished water tanks must be adequately constructed to protect them from contamination and prevent the entrance of storm water and precipitation.
- ☉ Vents and overflows must be provided and suitably protected and screened to prevent entry of insects, birds or other foreign matter.
- ☉ 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.



Finished Water Storage

Regulatory Requirements (continued)

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.

What are the regulatory violations?



1. RCSA 19-13-B102f (5)(a): ...Finished water storage tanks, basins and clearwells shall be properly constructed in a sanitary manner to prevent stormwater and precipitation from entering; and vents and overflows shall be provided and suitably protected and screened to prevent entry of insects, birds or other foreign matter.

What are the significant deficiencies?



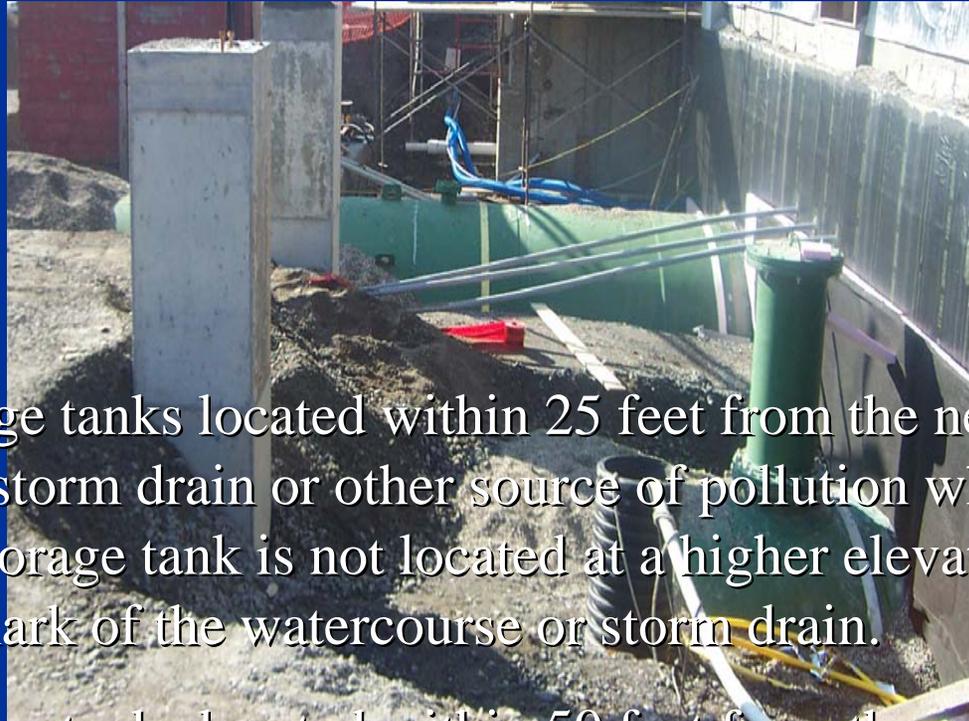
1. Vents and overflows not provided or not suitably protected with a screen, flap valve, or duckbill valve to prevent entry of birds, vermin, or other foreign matter.

What are the regulatory violations?

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



What are the significant deficiencies?



1. In-ground storage tanks located within 25 feet from the nearest watercourse or storm drain or other source of pollution where the bottom of the storage tank is not located at a higher elevation than the highest water mark of the watercourse or storm drain.
2. In-ground storage tanks located within 50 feet from the nearest sewage disposal system or sanitary sewer where the bottom of the storage facility is not located at a higher elevation than the top of the sewage disposal system or sanitary sewer. (If the sanitary sewer is constructed in accordance with the technical standards for subsurface sewage disposal systems pursuant to RCSA Section 19-13-B103d, the 50 foot separation distance may be reduced to 25 feet.)

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 well 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 should be properly maintained

What are the possible significant deficiencies associated with a Public Water System's Pumps, Pump Facilities and Controls?

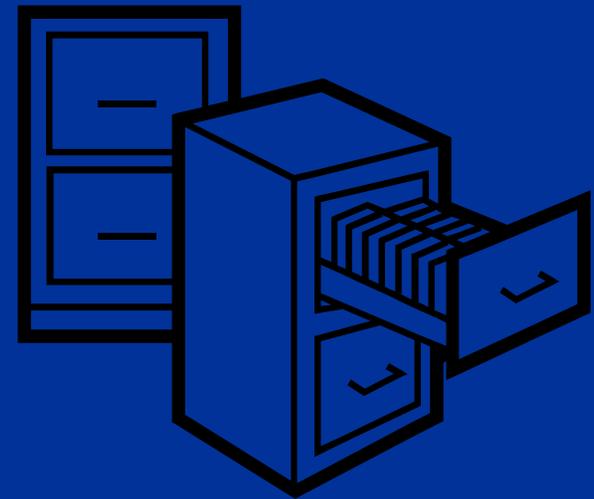
1. Lack of redundant mechanical equipment, including but not limited to pumps, to provide uninterrupted flow if a PWS with a single pump does not have an adequate contingency plan to provide uninterrupted flow.
2. Inadequate pump capacity if a PWS has a documented history of water outages and/or low pressure attributed to insufficient pump capacity.



Sanitary Survey Element #6

Monitoring, Reporting, and Data Verification

- ◆ Review of the 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
- ◆ Record keeping requirements
 - ◆ Maps
 - ◆ Water quality results
 - ◆ Public notice documents
 - ◆ Water meter readings
 - ◆ Treatment effluent logs
 - ◆ Customer complaints
 - ◆ Records of actions taken to correct violations





Record Keeping Requirements

RCSA Section 19-13-B102(1)

Item to maintain on record	Time frame
Total coliform bacteria test results	Five years
Chemical test results	Ten years
Actions taken to correct violations	Three years
Sanitary survey reports and responses to such	Ten years
Records concerning a variance granted to the water system	Five years
Maps and records showing location of mains, hydrants and other facilities (community water systems)	Integrated map to be filed and updated every five years
Complaint log (community water systems)	Three years following resolution
Lead and copper records	Twelve years
Cross-connection control records	Five years
Consumer confidence reports (community water systems)	Five years
Filter turbidity measurements (typically for larger community water systems served by surface water)	Three years
Public notices issued and certification forms	Three years
Meter readings (community water systems)	Readings taken weekly from each source of supply



Review of Water Quality Monitoring Schedule

Water System Facility: DISTRIBUTION SYSTEM (WSF ID: 00600)

Sampling Point: Select from Inventory of Active Sampling Points for WSF ID: 00600

<i>Analyte / Analyte Group (Code)</i>	<i>Monitoring Requirement</i>	<i>Monitoring Period</i>	<i>Seasonal Collection Period</i>	<i>Status</i>
Total Coliform (3100)	1 every quarter	1/1/09 - 3/31/09		PN Due 6/27/2009
Total Coliform (3100)	1 every quarter	4/1/09 - 6/30/09		PN Due 9/25/2009
Total Coliform (3100)	1 every quarter	7/1/09 - 9/30/09		
Total Coliform (3100)	1 every quarter	10/1/09 - 12/31/09		
Total Coliform (3100)	1 every quarter	1/1/10 - 3/31/10		
Physical Parameters (PPS)	1 every quarter	1/1/09 - 3/31/09		PN Due 5/28/2010
Physical Parameters (PPS)	1 every quarter	4/1/09 - 6/30/09		PN Due 8/26/2010
Physical Parameters (PPS)	1 every quarter	7/1/09 - 9/30/09		
Physical Parameters (PPS)	1 every quarter	10/1/09 - 12/31/09		
Physical Parameters (PPS)	1 every quarter	1/1/10 - 3/31/10		

Public Notification Requirements

Maximum Contaminant Level Violations (MCL)

<i>Analyte / Analyte Group (Code)</i>	<i>Monitoring Period</i>	<i>Violation Tier</i>	<i>Public Notification Required</i>	<i>Public Notification Performed</i>	<i>Certification Due</i>	<i>Certification Received</i>
Total Coliform (3100)	4/1/07 - 6/30/07	2	7/26/2007		8/5/2007	
Total Coliform (3100)	7/1/07 - 7/31/07	2	8/31/2007		9/10/2007	
Total Coliform (3100)	8/1/07 - 8/31/07	2	9/14/2007		9/24/2007	

Note: Violation Tier 1: Public Notification required no later than 24 hours after the system learns of the violation.
 Violation Tier 2: Public Notification required no later than 30 days after the system learns of the violation.
 Violation Tier 3: Public Notification required no later than 365 days after the system learns of the violation.
 Public Notification Certification of Compliance is required no later than 10 days after completing the Public Notification Requirements..



What are the possible significant deficiencies associated with Monitoring, Reporting, and Data Verification?

1. Failure to collect and analyze total coliform repeat samples after an E. coli positive routine sample.
2. Failure to analyze a positive total coliform sample for E.coli/Fecal coliforms.
3. Failure to conduct source monitoring under the provisions of the groundwater rule.
4. Failure to provide Tier 1 Notice as stipulated in regulation.

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



Significant Deficiency for System Management and Operation

1. Inadequate follow-up to deficiencies noted in previous assessment/survey.

Examples Include:

- 💧 Failure to provide a written response to the previous sanitary survey report.
- 💧 Failure to implement corrective actions identified in a sanitary survey report response.



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

Certified Operator Requirements

- 💧 [RCSA Section 25-32-9a](#): Every Community and Non-Transient Non-Community Public Water System must have an operator who is certified at the plant's class or higher and who shall be designated by the system as the chief operator.



- 💧 Chief Operators shall have “Direct Responsible Charge”
- 💧 “Direct Responsible Charge” means active, daily responsibility for the operation of a plant, distribution system, or small water system.



Operator Compliance with State Requirements

Public Water System owner



Regulatory Violation: RCSA Section 25-32-9a



...Every community and non-transient non-community water system shall have at least one operator who is certified at the plant's class or designated by the agency



Operator Verification Form

STATE OF CONNECTICUT
 DEPARTMENT OF PUBLIC HEALTH
 OPERATOR VERIFICATION FORM

General Information:
 Each Community or Non-Transient Non-Community Public Water System (PWS) regulated pursuant to the Distribution System Act or other water system regulations shall designate a certified operator. A certified operator shall be designated by the PWS and shall be certified by the Drinking Water Section (DWS) in accordance with the provisions of the Distribution System Act, Section 25-32-9a to 25-32-14 of the Regulations of Connecticut State Agencies.

The PWS must designate a "chief operator" for each of its water treatment plants, distribution systems and small water systems. A chief operator is a certified operator who has direct responsible charge (daily responsibility) for the operation and maintenance of a treatment plant, distribution system, or small water system.

You may obtain a list of certified operators who are available for contract work from the web site <http://www.ct.gov/dph> (click on "PROGRAMS AND SERVICES" and "Drinking Water").

PWSs should use this form to notify the DWS of any certified operator changes for its system. A representative of the PWS and the certified operator of record must sign this form.

SYSTEMS UNDER ADMINISTRATIVE CONTACT VERIFICATION
 If an operator is not certified, the PWS must submit this form to the DWS.

From: _____ To: _____
 Signature: _____ Title: _____ Date: _____
 Operator Name: _____

DATE OF CHANGE (C)	CERTIFIED OPERATOR NAME	CLASSIFICATION (C)	CERTIFICATION NUMBER	ANY OPERATOR (Y, N)

Signature by the Certified Operator is not required if the operator is being added to the record.

Phone: (800) 500-7333
 Telephone Device for the Deaf: (860) 500-7391
 Dept. of Public Health, Drinking Water Section
 410 Capitol Avenue, AGS #1196AT
 P.O. Box 330550, Springfield, CT 06134
 An Equal Opportunity Employer

Association

A significant deficiency will be noted if a public water system does not have a certified operator in direct responsible charge.

Agency fails to have a certified operator.



Thank You

Presenter Information:

Ryan Tetreault, Sanitary Engineer 3
Connecticut Department of Public Health
Drinking Water Section
410 Capitol Avenue, MS#51WAT
P.O. Box 340308
Hartford, CT 06134

Email: Ryan.Tetreault@ct.gov

Phone: 860-509-7333

Fax: 860-509-7359