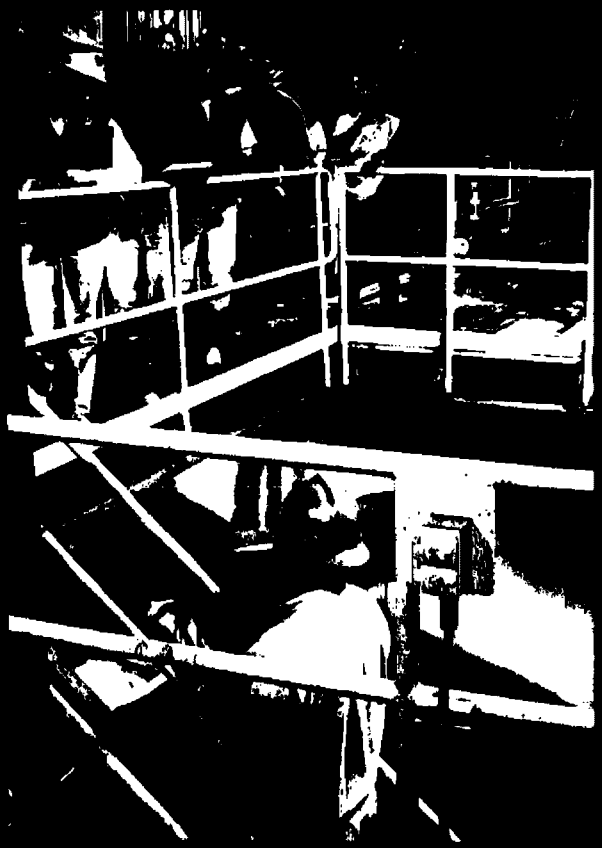
# nking Water
# pector's Field Reference

For Use When Conducting a Sanitary Survey of a Small **Ground Water** System



DWA

2004 Edition

Office of Water
(4606)
EPA 816-R-03-023
December 2003

4/7/04

# Contents

# Introduction

## Definition of a Small Water System

EPA frequently analyzes compliance trends of public water systems based on 5 size categories: Very Small (serving a population of 25 – 500 persons), Small (serving 501 – 3,300 persons), Medium (serving 3,301 – 10,000 persons), Large (serving 10,001 – 100,000 persons), and Very Large (serving more than 100,000 persons). Within the federal regulatory program, a small water system is defined as one that regularly serves a population of 3,300 or fewer persons.

## Definition of Sanitary Survey

### Definition

A sanitary survey is defined in 40 CFR 141.2 as "an on-site review of the water source (identifying sources of contamination using results of source water assessments where available), facilities, equipment, operation, and maintenance and monitoring compliance of a public water system for the purpose of evaluating the adequacy of such sources, facilities, equipment, operation, and maintenance for producing and distributing safe drinking water."

# Organizing Equipment

## Field Test Equipment

**Recommended Equipment.** Recommended types of field test equipment include, but are not limited to, the following:

- Portable pH meter (digital, not analog)
- Residual chlorine test kit (hand held colorimeter or portable spectrophotometer)
- Camera with automatic time stamp
- Binoculars
- Flashlight.

**Check Your Equipment.** Prior to the on-site inspection, sanitary survey inspectors should ensure that field equipment is in good repair. Preventive maintenance is essential for all types of equipment. Equipment that is broken, dirty, in disrepair, out of calibration, or otherwise improperly maintained will not provide accurate, dependable, or reproducible data. For best results, follow the manufacturer's specifications for preventive maintenance.

**Check Standards.** Of equal importance are standards for the field test equipment. The inspector should check expiration dates and keep up with and use current standard testing methods and calibration procedures.

## Personal Protective Equipment and Safety Precautions

**Inspector Safety.** Another aspect of the sanitary survey is safety. This is a concern for the field inspector as well as for the operating staff of the system. Safety hazards include:

- Electrical shock
- Exposure to chemicals
- Drowning
- Entering confined spaces
- High-intensity noise
- Sprains and strains due to lifting
- Slips, trips, and falls

**Safety Equipment.** Prior to the on-site inspection, the sanitary survey inspector should ensure that personal protective equipment is available. We acknowledge that many state agencies do not provide this equipment, however, the inspector may wish to provide some of the equipment and ensure that items such as respirators are available at the site. The most frequently used equipment and the necessity of each is as follows:

- **Safety hats** provide protection from falling objects and overhead obstructions in pipe galleries. They can also be used as a means of identification.

- **Goggles** provide eye protection from chemicals and flying objects. They may need to be supplemented by full face shield when working around some chemicals.

- **Gloves** provide protection against injuries from chemicals and equipment. Rubberized materials are preferred over leather or cloth gloves.

- **Steel-toed safety shoes** provide protection from falling objects.
- **Respirators** protect the wearer from inhaling dust, Hanta virus, organic vapors, and other chemicals. This equipment is used where the atmosphere is not oxygen-deficient.
- **Self-contained breathing apparatus** provides protection in oxygen-deficient atmospheres (e.g., confined spaces).

## Relationship with Operator and Top Management

Establishing a good relationship with the operational personnel is important to the success of the survey. The operator of the small water system occupies a unique position in the water supply industry. In most cases, the operator is responsible for all aspects of the system, from operation of the plant to budgeting for equipment. In small systems, the operator may also be responsible for other services in the community (e.g., wastewater treatment or road repair). Consequently, the operator may have basic working knowledge of his water system and processes, but not necessarily knowledge of the regulatory requirements.

## Documentation and Follow-up

### Documentation

The sanitary survey report is an important tool for tracking compliance with the Safe Drinking Water Act and for evaluating the system's compliance strategy. Perhaps more important, it provides a record that will support enforcement actions and allow future inspectors to track progress. It also provides information much needed during emergencies and when technical assistance providers are on site. It is the inspector's responsibility to the water system and to the public to provide an accurate and detailed description of improper operation or other system deficiencies in a sanitary survey report. The report should contain:

- The date the survey was conducted and by whom.
- The names of those present during the survey, besides the inspector.
- A schematic of the system and, when possible, photographs of key components.
- The survey findings and a discussion of any differences in the findings presented in the debriefing and the final report.
- A list of all significant deficiencies with specific recommendations for correction and with deadlines for competition.
- The inspector's signature.
- A list of all other sanitary deficiencies, in order of priority, that should be addressed to enhance water system operations and safety.

## Follow-up

The inspector should complete certain activities as follow-up:

- Finalize documentation and prioritization of all sanitary deficiencies that were identified during the on-site investigation.
- Complete the formal sanitary survey report, including options for correcting the sanitary deficiencies and sources of technical assistance. Also identify any differences between the findings in the written report and the oral debriefing.
- Notify appropriate organizations of the results.

- Follow up on questions asked by water utility personnel.

The sanitary survey report constitutes the official notification of the evaluation results. Important information, such as violations or required corrective actions, must be documented in the sanitary survey report. The report itself can be as brief as a letter. if few deficiencies are found, but it must be detailed enough to convey to the water utility what deficiencies exist and what must be done to correct them. The report should describe the problems in basic terms and explain the reasons they must be corrected. An explanation of how a problem adversely affects the system is more likely to motivate the system operator to correct it. When significant violations are found, however, a compliance schedule, consent agreement, administrative order, or litigation may be necessary to ensure prompt and proper correction.

# 1. Regulations

1. Is the information in the state files on population served and number of service connections accurate?

2. Is the information on the status of the system correct (i.e., is it large enough to be classified a public water system, and is its classification as a community water system, transient non-community water system, or non-transient, non-community water system correct)?

3. Is the system in compliance with various provisions of the national primary drinking water regulations, including siting of facilities, coliform monitoring, filtration and disinfection, lead and copper corrosion control, organic and inorganic contaminants, and direct and indirect additives?

4. Has the system modified its source, treatment process, chemicals used, or distribution system without state approval?

5. Is the system using chemicals and coatings approved by American National Standards Institute/National Sanitation Foundation or another third party?

6. Is the system staffed by qualified operators?

7. Are appropriate records maintained?

8. Is the system complying with conditions set forth in any waivers, variances, exemptions, or orders?

9. Does the system have a written monitoring plan for disinfectants and disinfection byproducts?

10. Was the system required to prepare a disinfection profile and, if so, is it available for review?

# 2. Water Sources

## Quantity

1. What is the total design production capacity?
2. What is the present average daily production?
3. What is the maximum daily production?
4. Is the safe yield sufficient to meet current and future demands?
5. Is the quantity of the source adequate?
6. If permits are required, is the facility operating within the limits? Are permits available?
7. Does the system have an operational master meter?
8. How many service connections are there?
9. Are service connections metered?
10. Does the system have interconnections with neighboring systems or a contingency plan for water outages?
11. Does the system have redundant sources?

12. Are there any abandoned, unused, or auxiliary sources?

### Sanitary Deficiencies - Quality

1. Does the system monitor raw water quality?
2. Is the source adequate in quality?
3. Is the system using the highest quality source available?
4. Is there a trend of decreasing raw water quality that would suggest the need for a new source or changes in treatment in the future?
5. Does monitoring of raw water quality indicate an immediate, significant sanitary deficiency?

### Source Protection

1. Is the watershed or aquifer-recharge area protected?
2. What is the size of the protected area, and who owns it?
3. What is the nature of the protection area?
4. How is the area controlled?

5. Has management surveyed the area?

6. Is there an emergency spill response plan?

### Sanitary Deficiencies Related to Wells

1. Is the well in a confined or unconfined aquifer?

2. Is the site subject to flooding?

3. Is the well located near any immediate or potential sources of pollution?

4. How deep is the well?

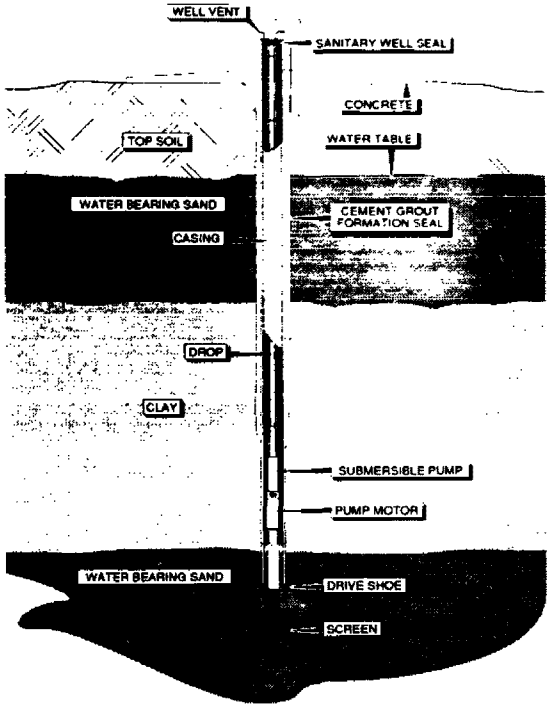
5. Is drawdown measured?

6. What is the depth of the casing?

7. What is the depth of the grouting?

8. Does the casing extend at least 18 inches above the floor or ground?

9. Is the well properly sealed?



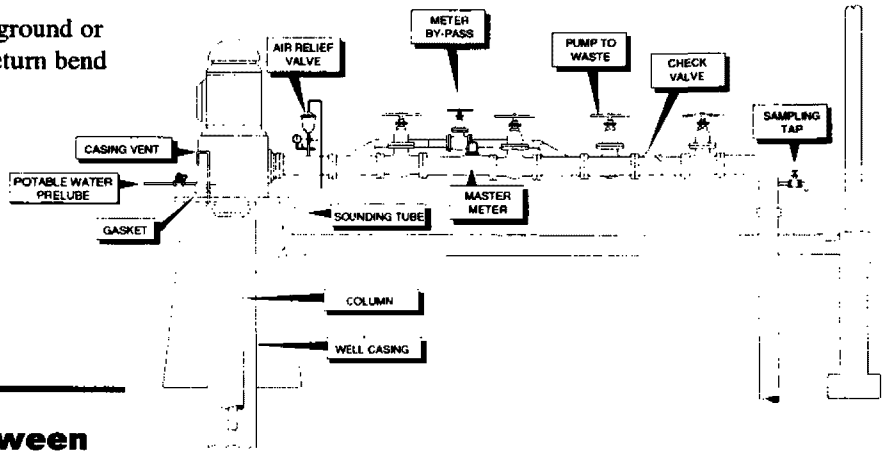

**Drinking Water Well Components**

10. Does the well vent terminate 18 inches above the ground or floor, or 3 feet above maximum flood level with return bend facing downward and screened?

11. Does the well have a suitable smooth-nozzle raw-water sampling tap?

12. Are check valves, blow-off valves, and water meters maintained and operated properly?

13. Is the upper termination of the well protected?

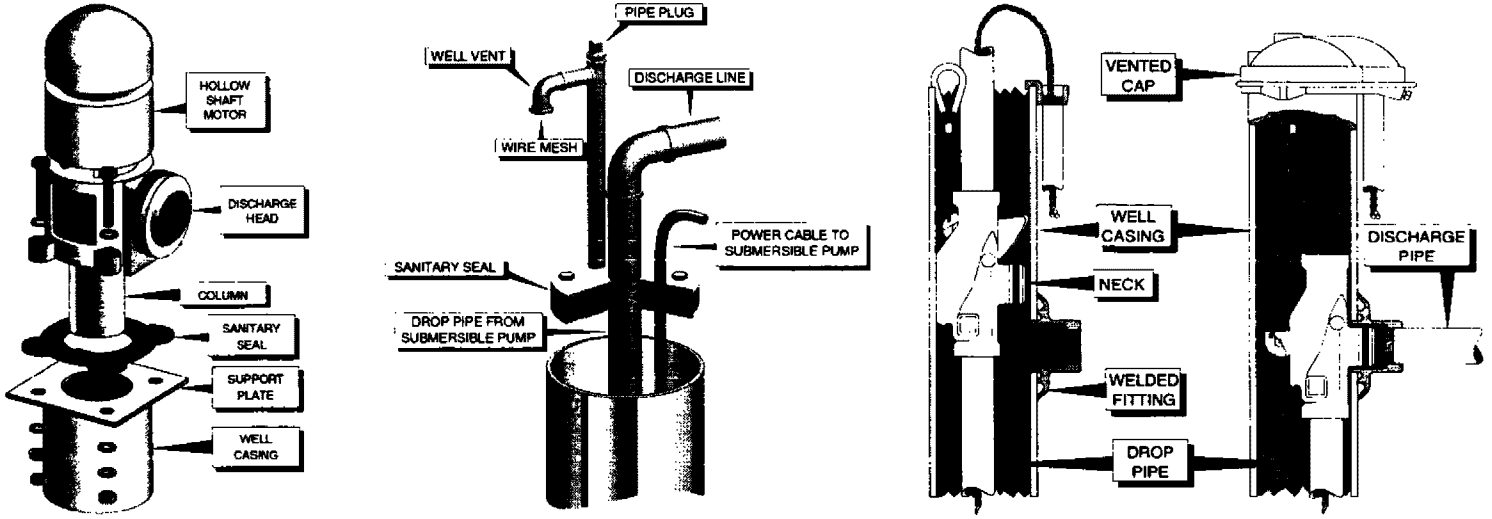



**Typical Lineshaft Turbine Installation**

## Sample Minimum Distances Between Wells and Pollution Sources

| Source | Feet from Well | Remarks |
|---|---|---|
| Watertight Sewers | 50 | Consult the state regulatory agency for special local requirements. |
| Other Sewers | 100 | |
| Septic Tanks | 100 | |
| Sewage Field, Bed, or Pit | 200 | |
| Animal Pens and Yards | 200 | |

Source: *Small Water Systems Serving the Public,* Chapter 5.




**Three Typical Wellhead Designs**

14. Is lightening protection provided?

15. Is the pump intake located below maximum drawdown?

16. Are foot valves and check valves accessible for cleaning?

## Sanitary Deficiencies Related to Springs

1. Is the recharge area protected?

2. What is the nature of the recharge area?

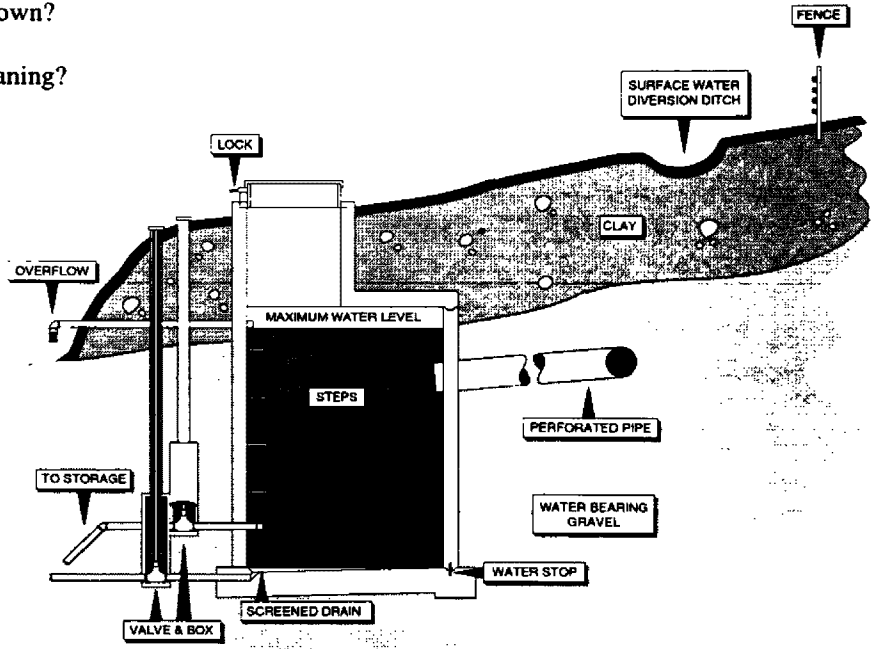
3. Is the site subject to flooding?

4. Is the supply intake adequate?

5. Is the site adequately protected?

6. Is the spring box properly constructed?

7. What conditions cause changes to the quality of the water?

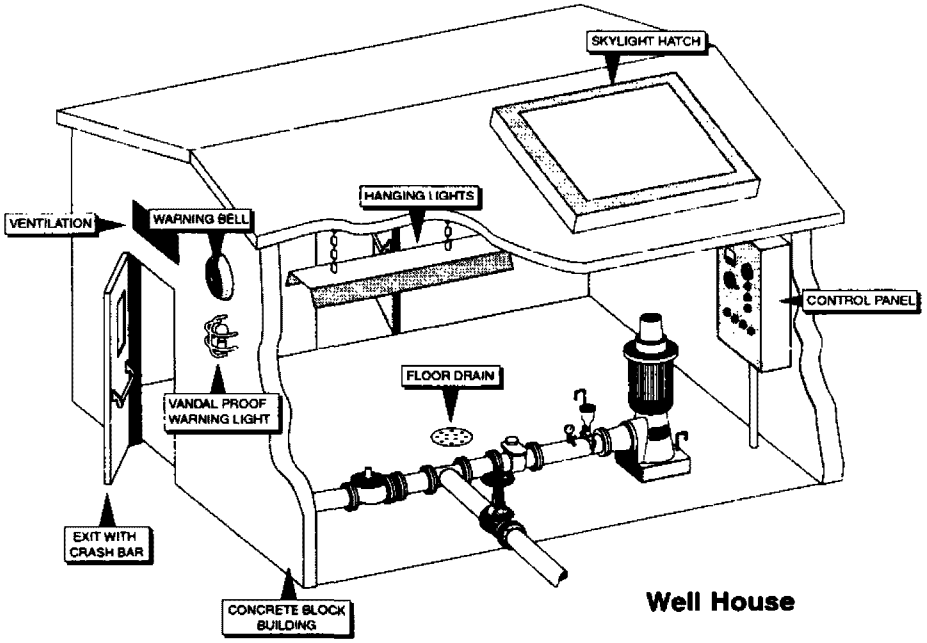



**Example of a Spring Collection System**

# 3. Pumps and Pumping Facilities

## Sanitary Deficiencies - Pumping Station and Well House

1. Is security adequate?
2. Are the building and equipment protected from flooding?
3. What is the structural condition of the building?
4. Are heating, ventilation, and lighting adequate?
5. Can equipment be accessed and removed from the building for maintenance?
6. Is the building orderly and clean?
7. Is the pumping station also used for storage?
8. Is safety equipment adequate?




**Well House**

## Sanitary Deficiencies - Pumping Equipment and Appurtenances

### Pumps and Motors

1. What are the number (including reserves), location, and type of pumps?

2. Is the actual capacity of the pumping facility adequate to meet the demand?

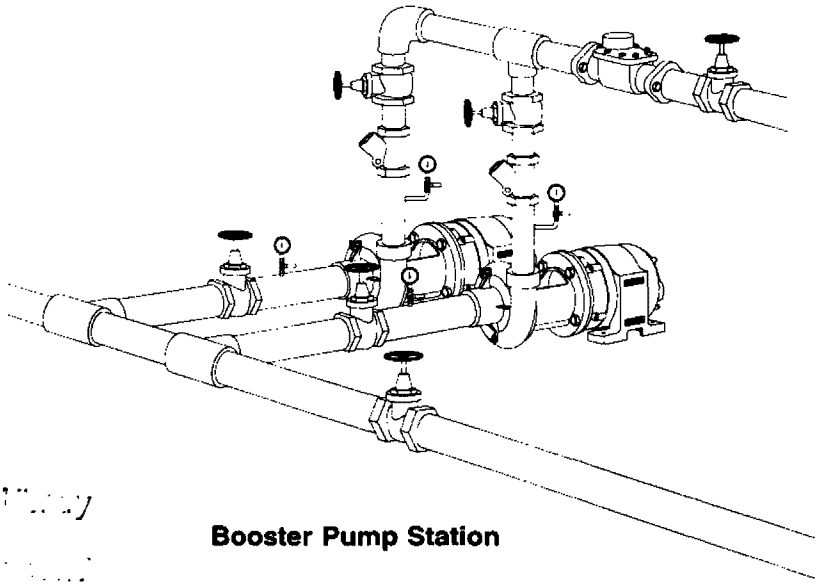
3. When and how are pump capacities determined?

4. What is the condition of the equipment?

   - All units operable?
   - Excessive noise, vibration, heat, or odors?
   - Leaking water?
   - Dirt and grime?
   - Leaking lubricant?

5. Are the correct types of lubricant used?

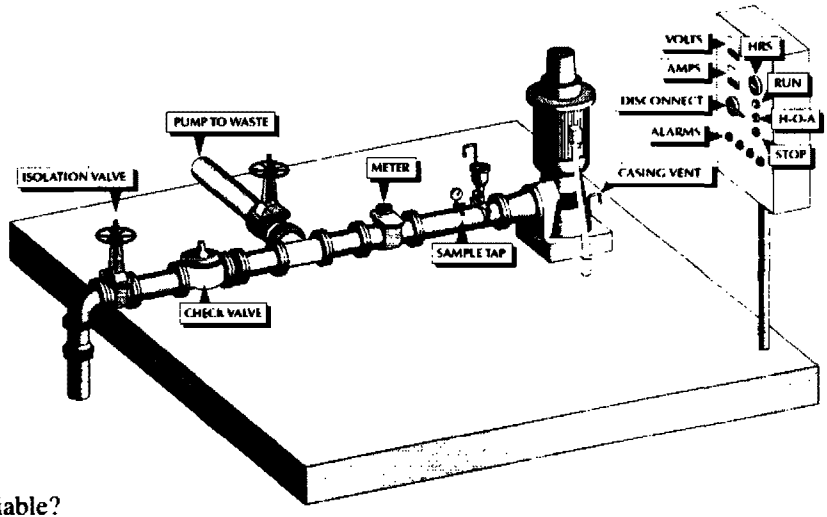
6. Are the frequency and amount of lubrication adequate?



**Booster Pump Station**

## Appurtenances

1. Are the pumping systems equipped with:
   - Check valves?
   - Isolation valves?
   - Pressure gauges?
   - Flow meeter?
   - Blow-off line?
   - Air/vacuum relief valve?
2. Are there any cross connections present?




**Lineshaft Turbine Pumping Station**

## Controls

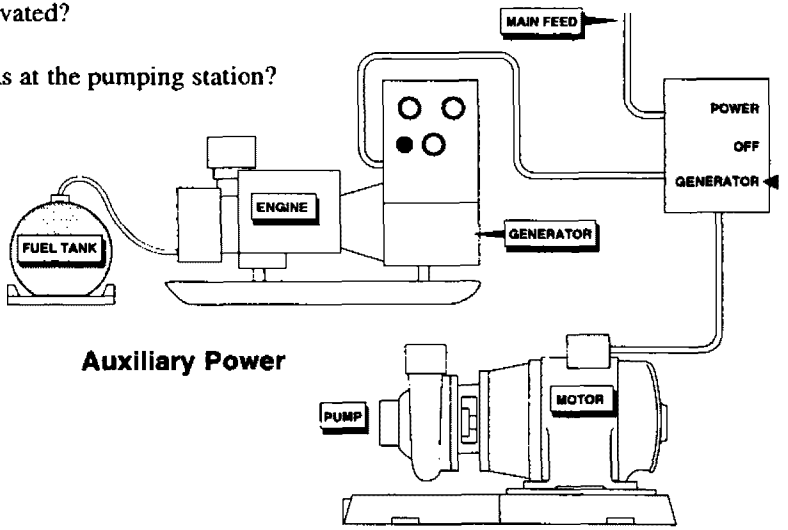
1. Is the motor control system adequately designed and reliable?
2. Is the pump system equipped with an adequate failure alarm system?
3. Does the auxiliary equipment have fail-safe devices?
4. Are controls equipped with elapsed time meters?
5. Are controls adequately protected?
6. Are control systems adequately maintained?

### Safety

1. Do rotating and electrical equipment have protective guards?

## Sanitary Deficiencies - Auxiliary Power

1. Is auxiliary power needed and, if so, is it provided?
2. What type of auxiliary power is provided, and how is it activated?
3. Does the auxiliary power unit supply ALL electrical systems at the pumping station?
4. Where is the fuel tank located?
5. Is the auxiliary power unit exercised and tested regularly and properly?
6. Is the auxiliary power unit secure and maintained in good condition?
7. Are there any cross-connections between the auxiliary power system and potable water?




**Auxiliary Power**

## Sanitary Deficiencies - Operation and Maintenance

1. Are the number and skill level of the staff adequate for operating and maintaining the pumping facilities?
2. Are adequate operational records maintained for pumping facilities?
3. Are written standard operating procedures available and followed?
4. Is there an established and documented preventive maintenance program?

# 4. Storage Facilities

## Sanitary Deficiencies - Gravity Storage

1. Is the storage system designed for direct pumping or floating on the distribution system?
2. Is the storage capacity adequate?
3. Is the storage over-designed?
4. Is the pumping capacity adequate?
5. Is the elevation of the tank sufficient to maintain distribution pressure throughout the system?
6. Is there a need for separate pressure zones?
7. Does the operator understand the controls that regulate tank water levels?
8. Are there adequate minimum rise and fall distances?
9. Are control systems reliable and properly protected?
10. Is the water level indicator accurate?
11. Is there a maintenance program?

## Direct Contamination Concerns

1. Is all treated water storage covered?

2. Are overflow pipes:

   - Terminated 12 to 24 inches above a splash pad?
   - Screened?

3. Are air vents:

   - Turned down or covered to protect the tank's contents from rain?
   - Terminated a minimum of three pipe diameters above the surface of the storage tank roof?
   - Screened?

4. Are the cathodic protection access plates watertight?

5. Is the top access hatch designed correctly and does it close tight?

6. Are access hatches locked?

7. Is there a roof penetration for a water level indicator cable?

8. Are there other roof penetrations?

9. Are there sewer lines within 50 feet of an in-ground storage tank?

10. Are there cracks in the walls or cover of the in-ground concrete storage tanks?

11. Is there protection from flooding?

12. Can the tank be isolated from the system?

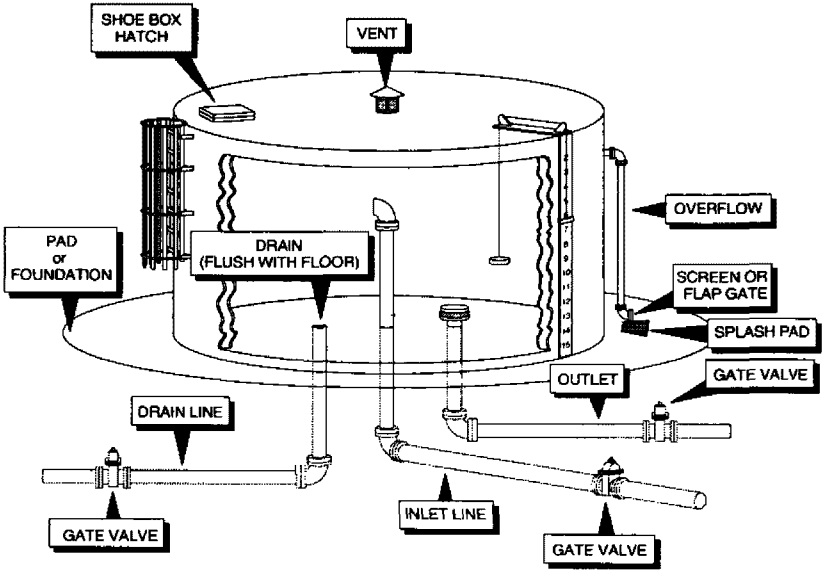
13. Is the site protected against vandalism?

14. Are the interior surface coatings approved?

15. Are volatile organic chemicals (VOCs) sampled after painting?

16. Is the tank protected against icing?

17. Are there indications that the tank may not be structurally sound?




**Reservoir**

18. Is the tank protected against corrosion?

19. What is the frequency of general inspection and cleaning?

20. How and how often are the storage tank's structure and coating inspected?

21. Are storage tanks disinfected following interior maintenance?

22. Are there procedures to sustain the water supply when the storage tank is out of service for maintenance?

23. Are emergency procedures established?

24. Are safety precautions followed?

25. If the tank is wooden, is it operated in a manner to minimize an increase in bacterial count?

## Sanitary Deficiencies - Hydropneumatic Storage Tanks

1. Is tank capacity adequate?

2. Does low pressure "pump-on" level maintain adequate distribution system pressure?

3. Are instruments and controls adequate and operational? Are they used and maintained?

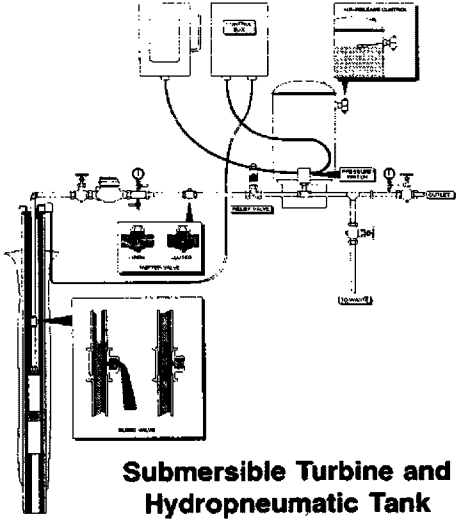
4. What are the cycle rate and air-to-water ratio?

5. Are the tank and controls properly protected?

6. Are emergency procedures established?

7. Are there back-up systems?

8. Are the interior and exterior surfaces in good condition?



**Submersible Turbine and Hydropneumatic Tank**

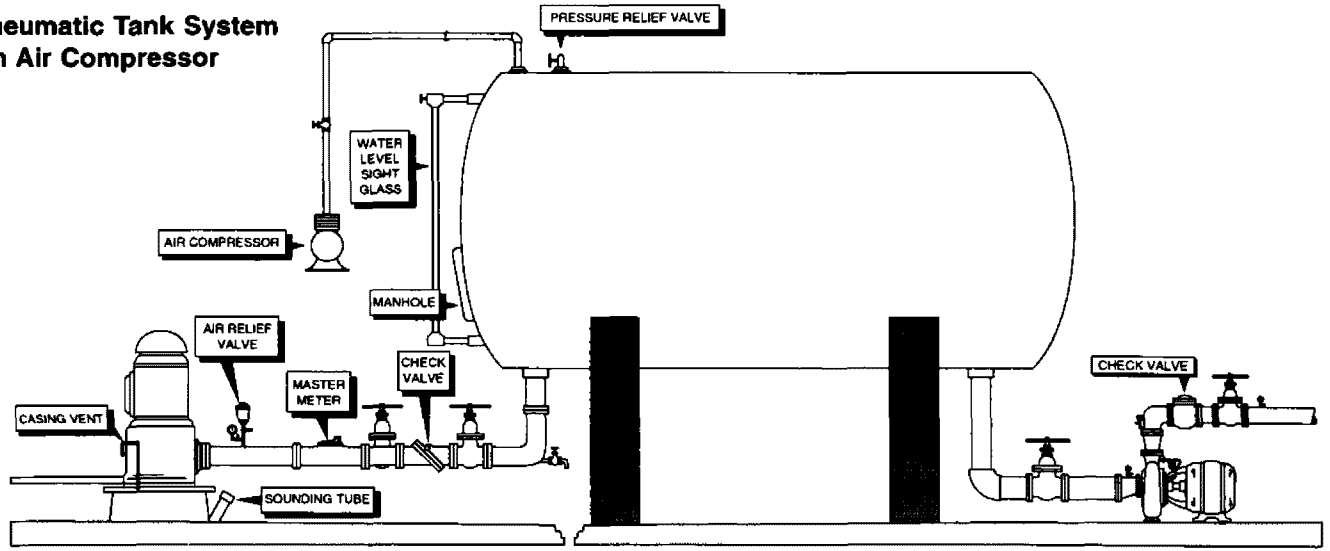
9. Are tank supports adequate and structurally sound?

10. Is the recharge air free of pollutants such as oil from an air compressor?

11. What is the physical condition of the outside hatch?

12. Are the pump and source capable of meeting the system's maximum momentary demand?

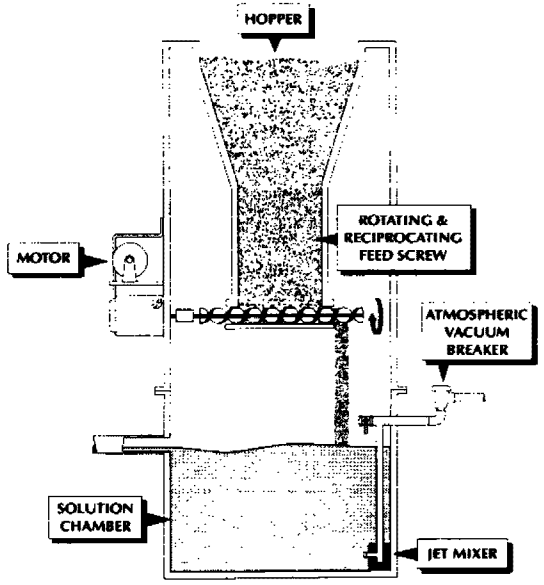
**Hydropneumatic Tank System with Air Compressor**



# 5. Ground Water Treatment

## Sanitary Deficiencies - Chemical Feed Systems

1. What chemicals are used?
2. what is the amount of chemicals used?
3. Where is each chemical applied?
4. Does the system have adequate monitoring and testing procedures?
5. What is the condition of the chemical feed equipment?
6. Is the chemical feed equipment calibrated?
7. Are instrumentation and controls for the process adequate, operational, and used?
8. Is chemical storage adequate and safe?
9. Do daily operating records reflect chemical dosages and total quantities used?
10. Is the chemical feed system tied to flow (i.e., flow paced)?
11. Is there an operating 4-in-1 valve or equivalent on each feed pump?




**Volumetric Dry Feeder**

12. Is there a hazardous chemicals protection and communication program in place?

13. Is there appropriate safety equipment (e.g., cartridge respirator for calcium hypochlorite) and personal protective equipment (PPE) (e.g., goggles and gloves) available and in use? Have operators been trained to use the safety equipment?

14. Is the building as clean and dry as possible?

## Sanitary Deficiencies - Dosages and Residuals

1. Can the operator answer basic questions about the disinfection process, including what is done, and when and why it is done?

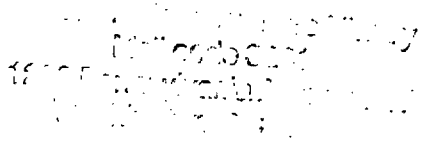
2. Have there been any interruptions in disinfection? If so, why?

3. Is a proper residual entering the distribution system at all times?

4. What disinfectant residual is maintained?

5. Is the contact time between the point of disinfection and the first customer adequate?

6. Are the temperature and pH of the water at the point of chlorine application measured and recorded daily?

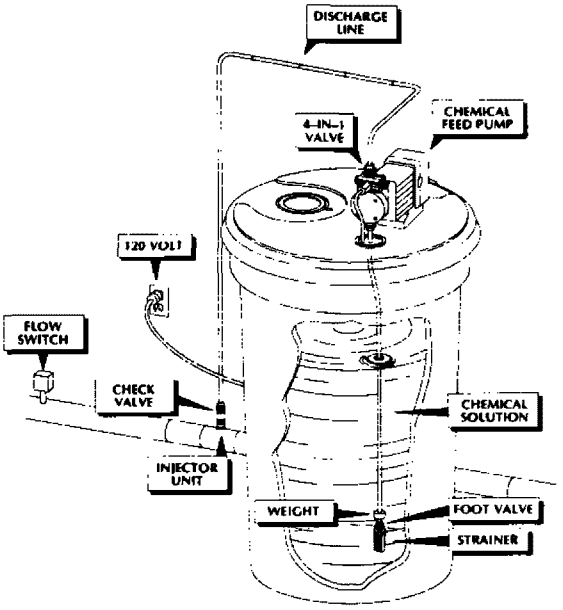


## Sanitary Deficiencies - Hypochlorination Systems

1. What kind of hypochlorite is used (e.g., calcium, sodium, or others)?
2. Is the solution tank covered to minimize corrosive vapors?
3. Is there adequate spill containment?
4. Are safe practices followed during chemical handling and mixing?

## Sanitary Deficiencies - Gas Chlorination Systems

1. How are leaks detected? At what detection concentration are automatic detectors set and have they been tested recently?
2. Is the sensor tube for the automatic detector near the floor level? Is the tube screened?
3. Is the chlorination equipment properly contained?




**Liquid Feed Pump (Hypochlorinator)**

4. Is the chlorination room vented at floor level with an adequate make-up air supply coming from the ceiling across the room? Is the vent switch located outside by the door? Does the system store chlorine gas in quantities sufficient to be covered by the Uniform Fire Code?
5. Does the door in the chlorination room open out and have a panic bar and a window?

6. Are there any cross-connections in the chlorine feed make-up or injection points?

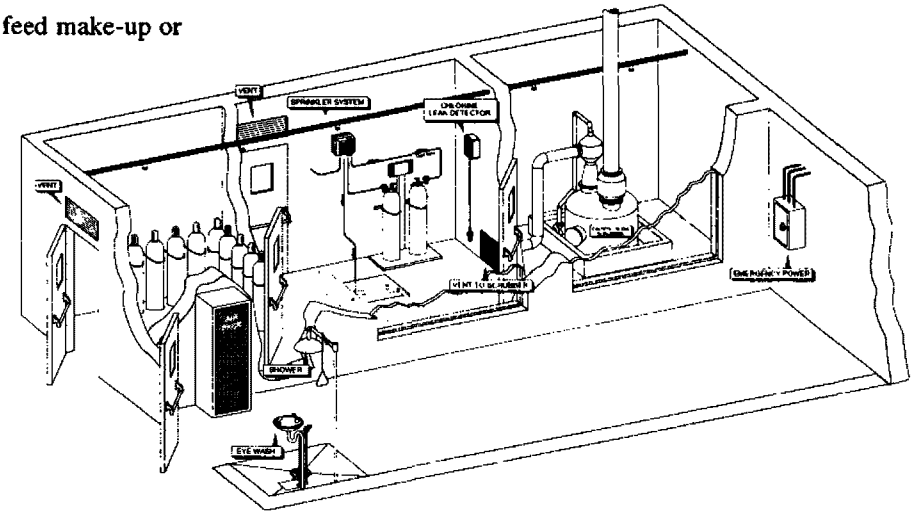
7. Is there an alarm tied to interruptions in the chlorine feed?

8. Does the system use automation, pace with flow, chlorine residual analyzer, or other system to adjust feed rates? Does it work?

9. Is there more than one cylinder, and are they equipped with a manifold and an automatic switch-over to avoid running out of chlorine?

10. Are the cylinders on a working scale?

11. Are the tanks in use a quarter turn open with a wrench in place for quick turnoff?




**Chlorine Gas Treatment Room**

12. Are all cylinders properly marked and restrained to prevent falling?

13. Does the facility transport gas chlorine cylinders? If so, are the requirements of 49 CFR parts 171 and 172 followed?

14. Is the proper concentration of ammonia available to test for leaks?

15. Are there adequate leak containment provisions?

16. Are safe practices followed during cylinder changes and maintenance?

17. How many individuals are present when the chlorine cylinders are changed?

18. What type of respiratory protection is used?

19. Is there an emergency plan, and when was it last practiced?

20. What is the operating condition of the chlorinator?

21. Is redundant equipment available, and are there adequate spare parts?

22. Are the appropriate lighting, guards, and railings in place? Are there other safety concerns, such as electrical hazards?

## Sanitary Deficiencies - Corrosion Control

1. What are the results of current lead and copper sampling?

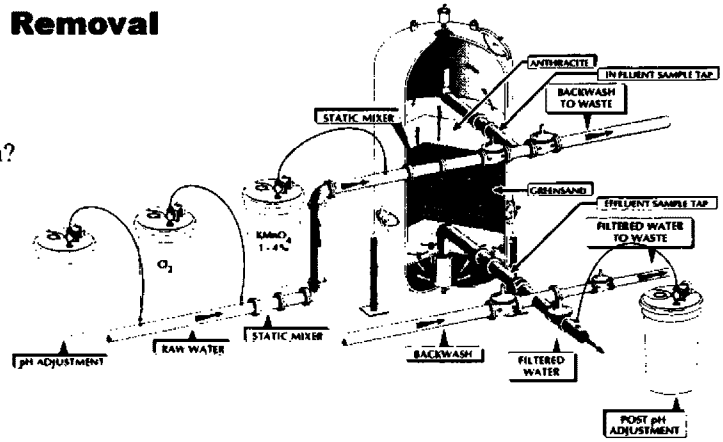
2. What are the characteristics of the water entering and leaving the treatment plant?

3. What sampling is conducted in the distribution system as part of the corrosion control program?

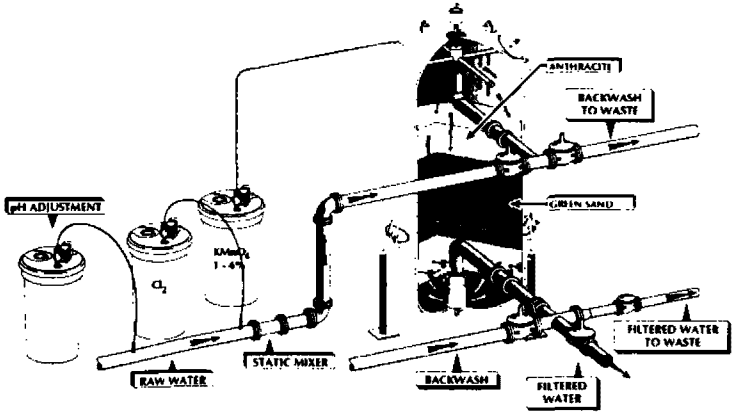
4. Is the test equipment to monitor the data appropriate and in good working order?

## Sanitary Deficiencies - Iron and Manganese Removal

1. What treatment process is used?
2. Is the process performing adequately, based on visual observation?
3. What chemicals are used and in what amounts?
4. Where are the chemicals applied?



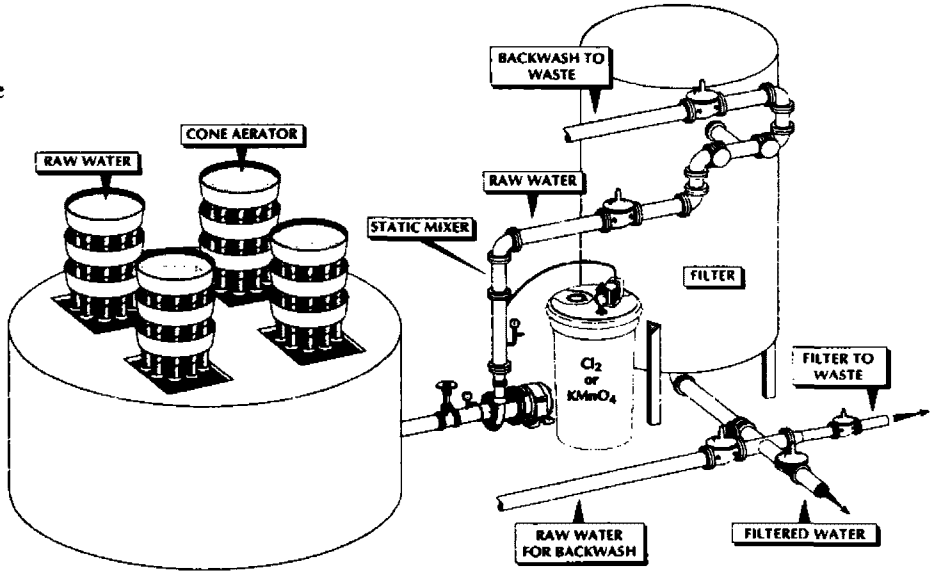

**Manganese Greensand Filtration - CR Process**




**Manganese Greensand Filtration - IR Process**

## Sanitary Deficiencies - Aeration

1. What type of aeration system is used?
2. What parameters are monitored to evaluate the performance of the process?
3. What types of contaminants are in the vicinity that could be pulled into the air supply?
4. What types of operational problems has the facility experienced that could contribute to poor performance of the aeration device?
5. After treatment in the aerator, is the effluent disinfected adequately before it is introduced into the water distribution system?
6. What is the condition of the aerator, both inside and out?




**Aeration – Filtration**

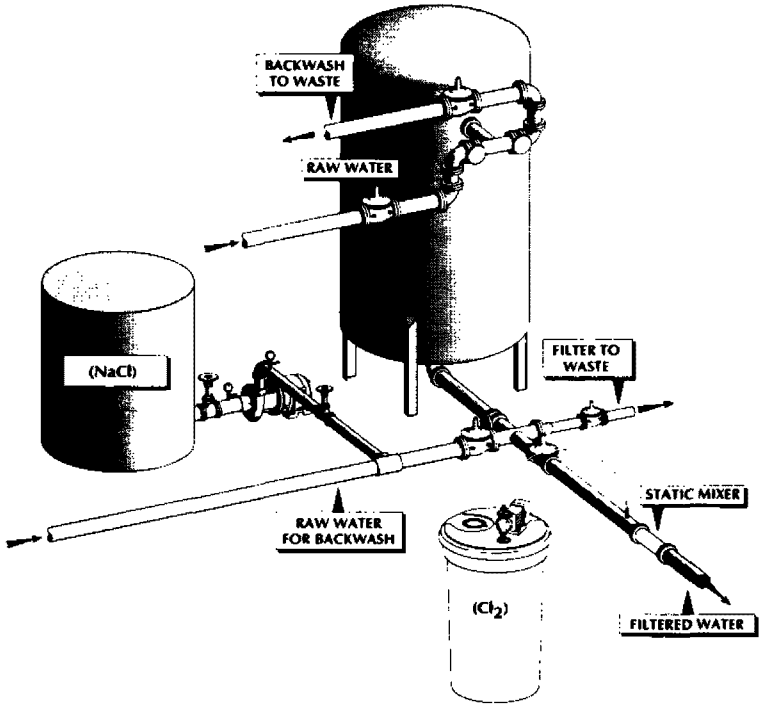
## Sanitary Deficiencies - Softening

### Lime Soda Process

1. What are the treatment goals?
2. Is the facility performing adequate process control testing?
3. Is the facility tracking the chemicals used?

### Ion Exchange

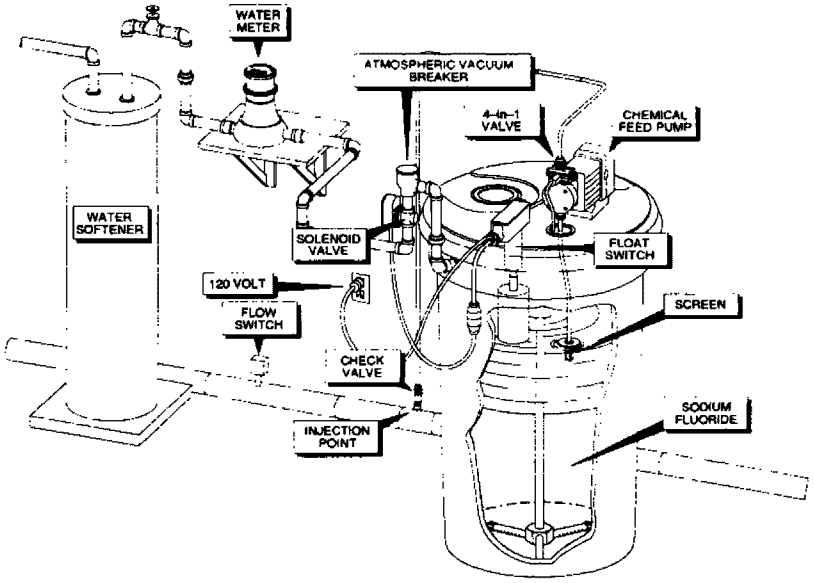
1. What are the treatment goals?
2. What is the condition of the equipment?
3. What is the operators' knowledge of the softening process?




**Ion Exchange Water Softener**

## Sanitary Deficiencies - Fluoridation

1. Can the operator answer basic questions about the fluoridation process, including what is done, when, and why?
2. Is there a proper concentration of fluoride in the distribution system at all times?
3. Are fluoride concentrations tested in the system daily?
4. Does the fluoride concentration vary from day to day?
5. Is the testing performed correctly?
6. When was the testing instrument last calibrated?
7. Is there a water meter on the inlet line when using a saturator?
8. How often is the saturator tank cleaned/
9. What is the level of fluoride crystals in the tank?
10. What method is used to dispose of old fluoride crystals?

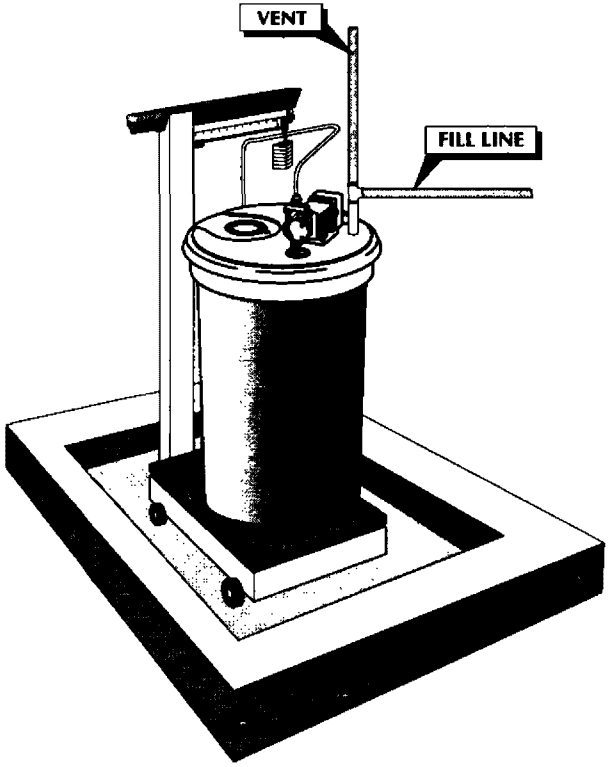



**Fluoride Saturator**

11. Is there a scale for weighing the solution tank for a liquid acid system?

12. How often are the scales calibrated?

13. Is the electrical system wired with a fail-safe?



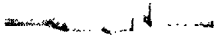

**Fluoride Acid Feed System**

# 6. Distribution Systems

## Sanitary Deficiencies - Distribution Systems

### Piping Materials

1. Does the system contain any thin-wall polyvinyl chloride (PVC) pipe?
2. Does the system contain any gray cast-iron pipe?
3. Does the system contain any wood pipe?
4. Is high-density polyethylene (HDPE) pipe used for main lines or service connections?
5. Does the system contain any steel pipe that is more than 35 years old?
6. Does the system contain any solvent-weld PVC pipe larger than 2 inches in diameter?
7. Are there any lead goosenecks still in place and being used for service connections? If yes, how many? Are there plans to remove them? If yes, by what date?



PVC Pipe

Gray Cast Iron Pipe

Wood Pipe

HDPE Pipe

Steel Pipe

## Material Standard

1. What standards are used to select materials?
2. Are all materials used in the system manufactured according to American Water Works Association (AWWA) standards?
3. Are all materials American National Standards Institute/National Sanitation Foundation certified?
4. Is there a set of construction standards used by the utility?
5. Does the system have its own construction standards, or has it adopted some from another agency?
6. Do the construction standards meet state requirements?
7. Are in-house staff and contractors required to use the same standards?
8. Are standards actually followed?

## Water Quality

1. Is there any point in the system where pressure drops below 20 psi during peak demand or fire response?
2. If the valves are in a vault, can the operator observe pressures without entering the vault? If the valves are in a confined space, does the operator have and use gas monitoring equipment and follow a confined space entry procedure?
3. If there is a vault, is there a sign identifying it as a confined space?

4. If there are pressure zones controlled by automatic pressure reducing valves (PRVs), do the PRVs work properly?

5. If there are PRVs, can the operator describe how they work and what they do?

6. How would the utility be notified if a PRV fails?

7. Is the system designed with dead-end lines?

8. Are there several low places in the piping system?

9. Do reservoirs turn over at least once every 14 days?

10. If there is a hydraulic model, has it been compared to actual conditions? When was it last updated? Does it show any low-pressure conditions?

11. Are backflow prevention devices installed and tested at each commercial site where backflow could cause a reduction in water quality?

12. Does the discharge piping on all air valves extend a proper distance above ground and flood level?

13. Are distribution system problem areas identified on a system map?

## Maps, Drawings, and Planning

1. Are as-build drawings available?
2. How often are maps updated?
3. Do maps and as-builts contain the proper information?
4. Is there a master plan showing proposed construction and replacement lines?

## Distribution System Monitoring

1. Are chlorine residuals tested in the system as required?
2. Is the residual at least 0.2 mg/L prior to the first customer?
3. Is a trace of residual maintained at coliform sampling points?
4. Is there an adequate number of residual sampling sites, and do the sites provide a representative sample of system conditions?
5. Is the correct reagent used for testing free residual?
6. Are operators waiting the correct length of time before reading the residual?
7. When was the testing instrument last calibrated?

8. Is system pressure monitored at high and low elevations? Is this information recorded/

9. Are customers' water quality complaints recorded?

10. What is the percentage of unaccounted-for water?

**System Operation and Maintenance**

1. What is the frequency of main breaks?

2. Are the breaks primarily in one area? What type of pipe is involved?

3. Is there a line flushing program? Is a systematic unidirectional process used? Are records maintained of frequency, location, and amount of time required?

4. Is there a valve inspection and exercising program and are records maintained?

5. Is there a fire hydrant flushing program separate from the line flushing program?

6. Does the utility have a backhoe? If not, how long would it take a contractor or rental company to provide one if needed? Can this equipment be obtained late at night?
7. How often are pressure readings taken in the distribution system? Are they representative of the system?

8. Are adequate repair materials on hand?

9. Are there written procedures for isolating portions of the system and repairing mains?

10. Does the utility maintain an updated list of critical customers?

11. Does the utility have a corrosion control program?

### Safety Considerations

1. Does the utility use proper safety procedures for handling line disinfection materials?

2. Is there a trained, competent person on the staff?

3. Does the competent person evaluate soil and work site hazards at each excavation?

4. Are excavation hazard evaluations documented?

5. Does the utility have and use cave-in protection equipment?

6. Does the utility have and does it use proper traffic control equipment?

7. Have all field workers been trained in the use of traffic control equipment?

8. Do all employees who operate industrial trucks have a Commercial Drivers License?

### Disinfection Procedures

1. What disinfection procedure is used for new lines?
2. Does this procedure meet the AWWA C-651 Standard?
3. What disinfection procedure is used during repairs of broken lines?

### Design and Operational Constraints on Water Quality

1. Are water lines looped, or are there dead ends?
2. Are there any bottlenecks in the piping system (a small diameter pipe connected on both ends to large diameter pipe)?
3. Are blow-offs connected to sanitary storm sewers, or do they exit below flood level in ditches and streams?

### Design and Operational Constraints on Reliability

1. Is the system interconnected with any other water systems?
2. Does the system have adequate valves?

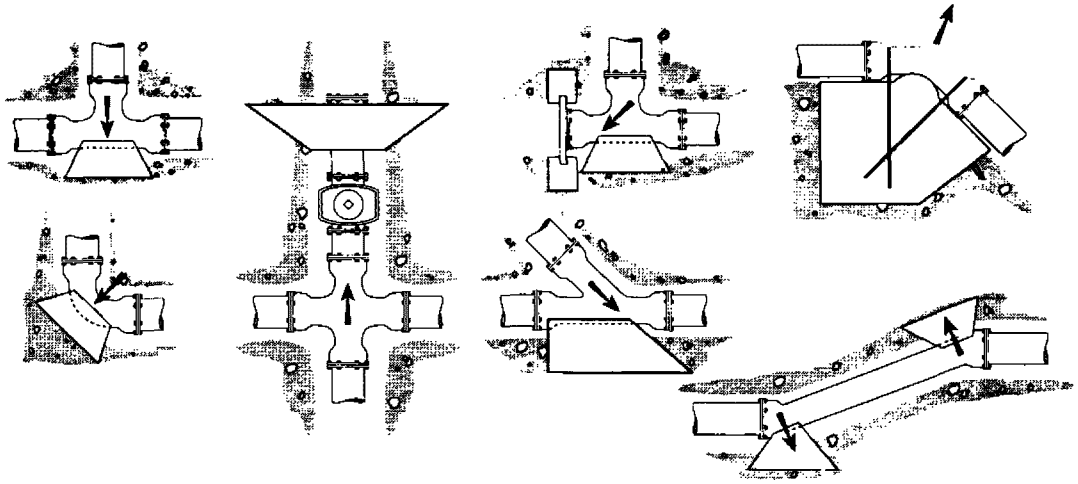
## Construction Considerations

1. Are concrete thrust blocks or restraining fittings used at all elbows, tees, and dead ends?

2. Are proper bedding and backfill procedures used with new or repaired pipes?

3. Are pressure or leak tests performed on all new pipe construction?

4. Are cast-iron and steel pipe protected from external corrosion?

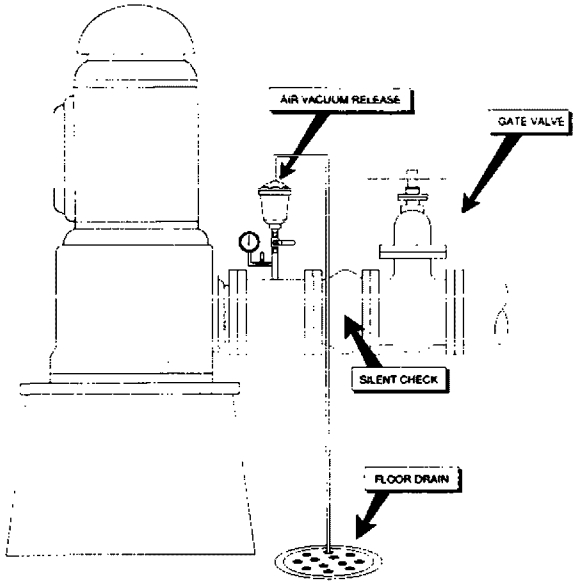


**Thrust Blocks**

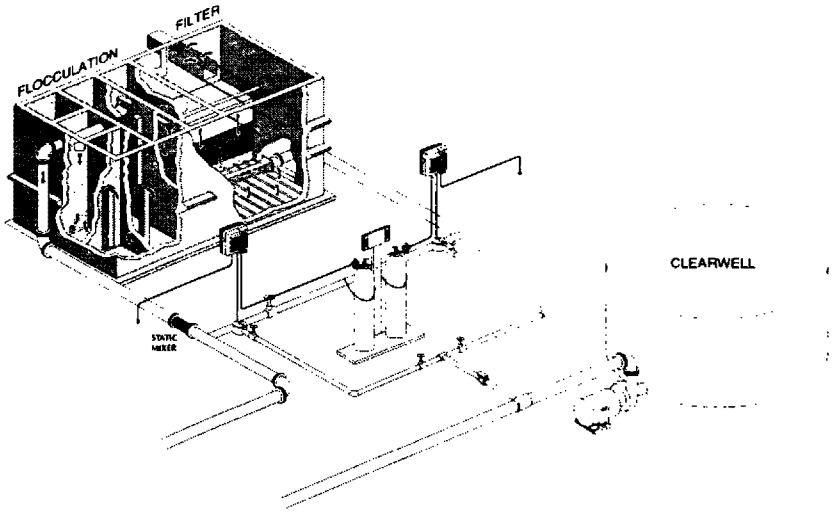
# 7. Cross-Connections

## Sanitary Deficiencies - Cross-Connections

1. Does the water system have a written cross-connection control program?
2. Is the program active and effective in controlling cross-connections?
3. Are there cross-connections at the water treatment plant?
4. Does the system test backflow preventers at treatment plants and other facilities it owns?
5. Are there cross-connections in pumping stations?
6. Are there cross-connections in the distribution system that the water system owns or controls?
7. Does the water system have a program to control the use of fire hydrants?

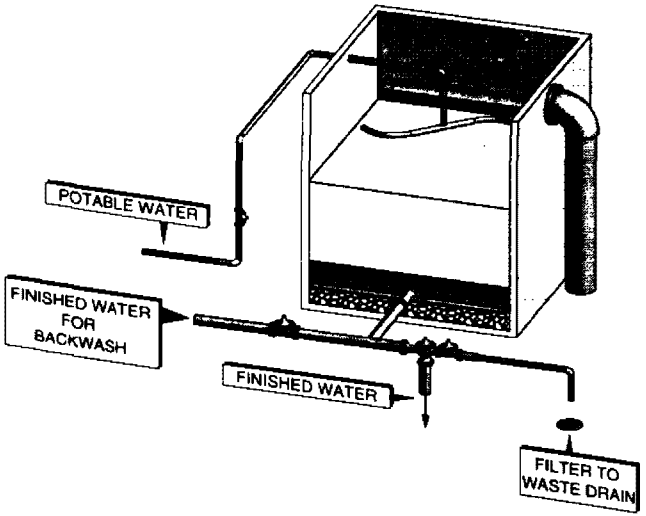



**Air Relieve Valve Incorrectly Piped Directly to Floor Drain**




**Chlorine Split Feed**

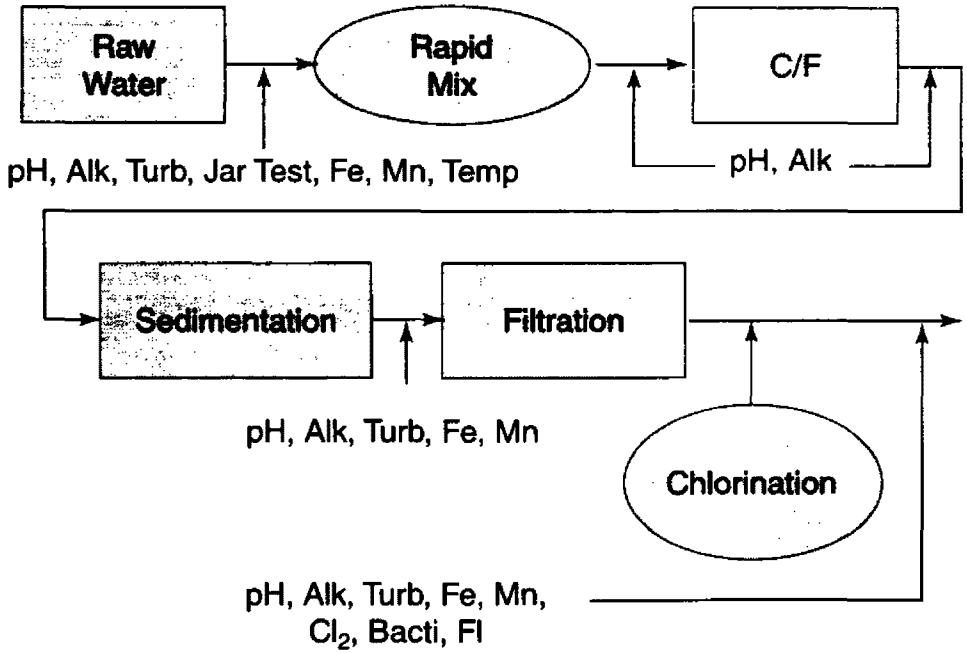
**Surface Wash Filter with Submerged Outlet**



# 8. Monitoring and Laboratory Testing

## Sanitary Risks - Monitoring and Laboratory Testing

1. Is adequate monitoring in place?
2. Is the operator following proper procedures?
3. Are testing facilities and equipment adequate?
4. Are records of the monitoring program adequately maintained?
5. Does the operator chart the results?
6. Are treatment adjustments based on laboratory results?
7. Are certified laboratories used when required?



# 9. Utility Management

## Organization

### Administration

1. Who owns the public water system?

2. Is there a formal organizational chart?

3. Does the operating staff have authority to make required operation, maintenance, or administrative decisions affecting the performance and reliability of the plant or system?

4. Are administrators familiar with Safe Drinking Water Act requirements and system needs?

5. Is there a formal and adequate planning process?

### Information Management

1. Does the utility manage its information?

2. Does the utility track and identify typical operating parameters such as:

   - Unaccounted-for water?
   - Cost per unit of production of water?

3. Does the utility track finances, operational data, and maintenance practices on a computer?

### Internal and External Communications

1. Is there effective communication between key management staff, operations staff, and the state primacy agency?

2. What is the level of cooperation between the system and other agencies and organizations?

3. What is the level of cooperation between the system and the local fire department?

4. Is there a customer complaint system and an ongoing public information program?

5. Does the system have an adequate source of capital for operations, maintenance, and capital projects? Is the system eligible for, and has the system received, state or federal funding?

6. Is the staff active in industry and professional organizations?

### Planning

1. Is an emergency or contingency plan available and workable?

2. Are written, workable plans available for the areas listed below?

   - Source protection
   - Sampling and monitoring
   - Emergency or contingency

- Hazard communication plan (if required)
- Cross-connection control
- Repair, replacement, and future expansion (capital improvement)
- Distribution system flushing program

## Personnel

### Staffing

1. Are there sufficient personnel?

2. Is the staff qualified?

3. Are personnel adequately trained?

### Safety Program

1. Have the operators been adequately trained in safety procedures and equipment?

2. Has the utility complied with Occupational Safety and Health Administration requirements?

3. Does the utility have a good safety record?

## Operations

### Operating Procedures

1. Is there an overall operations and maintenance manual for the facility?
2. Has a program of standard operating procedures been implemented at the facility?

### Facilities and Equipment

1. Is there sufficient storage for spare parts, equipment, vehicles, traffic control devices, and supplies?
2. Are the facilities and equipment of the system adequate?
3. Are there adequate facilities for system personnel?

## Finance

1. Are the financing and budget satisfactory? What is the estimated income? What are the estimated expenses?
2. Are funds focused in the correct direction?
3. Are there sufficient funds for staff training?
4. Are projected revenues consistent with projected growth?

5. Does the system have formal accounting systems and written procedures for financial records?

6. Does the system have budget and expenditure control procedures?

7. What are the utility's debt service expenses?

8. Does the system have a water conservation policy or program?

Office of Water
(4606)
EPA 816-R-03-023
December 2003