

WATER SUPPLY AND TREATMENT

Water Supply

Generally, one of the most important principles in developing a public water supply is to utilize the highest quality raw water available. This raw water source also must be available in sufficient quantity to meet the water demands of the service area during times of unusual stress, such as extended droughts, extra heavy run-off or extended peak demands. The supply must be reliable and should have sufficient dependable reserve to meet the projected needs of the community into the foreseeable future.

Groundwater, when it is available in sufficient quantity, is often the preferred source over a surface water as the raw water supply. Groundwater is normally free of any bacteriological contamination. Also, it is usually turbid-free, cool and uniform in chemical character, but it is often more highly mineralized than surface waters.

As water moves through the fractured limestone underlying Sandusky County, it dissolves and carries in solution minerals contained in the bedrock.

The primary groundwater source is a carbonate aquifer which is composed of limestone and dolomite. The aquifer provides adequate supplies for farm, domestic, and small village needs beneath 40 to 85 feet of glacial drift. Wells developed in the limestone have yields that require multiple wells to meet municipal needs. The groundwater is highly mineralized and softening is recommended.

The Ohio Department of Natural Resources has developed a Groundwater Resource Map which predicts yield and water quality data for each County.

This map of Sandusky County Groundwater Resources presents geographically the areas having well yields in three ranges: 500 to 1,000 gpm, 100 to 500 gpm, and up to 100 gpm. The eastern half of the county appears to have yields between 500 up to 1000 gpm and the western half (west of Fremont) is up to 100 gpm.

Groundwater treatment normally involves removal of iron, manganese, hardness, and total dissolved solids by means of aeration, iron filtration, softening, and disinfection.

Surface water as a raw water supply is more vulnerable to contamination and will require different treatment than a groundwater system. Due to the direct runoff over both saturated or impermeable surfaces, surface waters may contain debris, sediment, waterborne pathogens, suspended and dissolved substances. At a minimum, clarification and filtration followed by disinfection will be required to meet established drinking water standards for finished water quality. Surface water supplies normally are more productive and lower in dissolved minerals than groundwater systems. Sources of surface water includes lakes, reservoirs, rivers, and streams.

All surface water supplies in Sandusky County will require the construction of a dam and pumping facilities on a river or stream along with the construction of a reservoir. Adequate storage volume to provide a sufficient supply during drought conditions and poor water quality in the river or stream is required.

Conventional treatment for a surface water supply will require chemical addition, coagulation, flocculation, sedimentation, filtration, and disinfection. Water softening is optional, but if the raw water supply is high in minerals associated with hardness, softening then needs to be considered. Innovative treatment technology will require pilot testing.

Treatment

Generally, there are two types of potable water treatment plants, those treating groundwater and those treating surface water. Surface plants are primarily concerned with making the water bacteriologically safe and palatable for use. Groundwater treatment plants, on the other hand, are normally concerned with altering objectionable aesthetic or chemical qualities, such as removing hardness or iron. Surface water, on the other hand, cannot meet the Drinking Water Standards without some form of treatment -- usually coagulation, disinfection and filtration. This treatment often includes providing facilities for controlling taste and odor to make the water palatable as well as safe to drink. Chemical and bacteriological quality of surface waters is often variable. This ever changing quality requires constant treatment, supervision and operational control. To achieve the

goal of producing potable water, several individual steps are undertaken. Each step performs a specific function which is referred to as unit processes.

Several factors must be considered in the selection of services for water supply systems. The first step is to determine the present areas of need to insure these areas receive adequate water supply systems as soon as possible. The second and most difficult step is the determination of future areas of need or growth concentrations. The determination of future areas of need or growth concentrations depends on several factors, including, present growth trends, availability of other utilities, topography, soils, zoning, land use planning, and transportation facilities. It is especially important to consider these factors because water supply lines are usually the first utility to be installed, and for economic reasons, they tend to have a leading effect on growth. In other words, when public water supply becomes available, development will usually follow.

The Ohio Revised Code requires all water supply systems within the State of Ohio to be approved by the Ohio EPA and Department of Health. Water supplies for private residences are the only exception to this rule; as they are regulated and approved by the local codes, ordinances, subdivision regulations, and reviewing authorities. Prior to the development or construction of any public water supply system, the design plans must be approved by Ohio EPA. At the present time, primary drinking water quality standards are established by the EPA in order to govern the quality of all public water supply systems.

Table 21 lists general requirements for groundwater and surface water treatment systems.

TABLE 21 GENERAL TREATMENT REQUIREMENTS	
Groundwater	Surface Water
Well Field Development	Dam
Aeration	Raw Water Pumping
Oxidizing	Raw Water Reservoir
Contact Basin	Low Service Pumping
Iron Filtration	Chemical Storage and Feed

TABLE 21 GENERAL TREATMENT REQUIREMENTS	
Filtration Backwash	Clarification
Softening - Ion Exchange Membrane	Softening
Chlorination Disinfection	Recarbonation
Corrosion Control	Filtration
Clearwell Finished Water Storage	Disinfection
High Service Pumping	Fluoridation
Auxiliary Power	Corrosion Control
	Clearwell Finished Water Storage
	High Service Pumping
	Auxiliary Power

Certified Operators Required

Public water treatment systems shall designate one or more operators of record to oversee the technical operation of the public system. Each operator of record shall have a valid certification of a Class equal to or greater than the classification of the public water system.

1. Distribution system.

A. The director shall classify as a class I water distribution system:

- 1) The distribution system of each public water system if the system serves a population of less than twenty-five thousand per day and is not part of a class A public water system as defined in paragraph (B)(3) of this rule; and
- 2) Each public water system that consists solely of a distribution system if the system serves a population of less than twenty-five thousand per day and is not part of a class A public water system as defined in paragraph (B)(3) of this rule.

B. For distribution systems that are not classified as a class I water distribution system under paragraph (B)(2)(a) of this rule and are not part of a class A public water system as defined in paragraph (B)(3) of this rule, the director shall classify the

distribution system of each public water system and each public water system that consists solely of a distribution system as a class II water distribution system.

2. A public water system shall be classified as a class A public water system when the public water system meets all of the following criteria:

- A. Is a community or nontransient noncommunity public water system that serves a population of no more than two hundred fifty, or a transient noncommunity public water system that serves a population greater than two hundred fifty;
- B. Uses only purchased water or a ground water source;
- C. Does not provide precipitative softening or treat for a chemical contaminant to meet a maximum contaminant level as defined in rule 3745-81-01 of the Administrative Code; and
- D. Has no serious public health or environmental hazard associated with the operation of the public water system.

3. Unless classified as a Class A public water system according to paragraph (B)(3) of this rule, public water systems shall be classified according to the criteria in the following table:

No.	System Characteristics	Design Flow *	Classification
1	Surface water treatment, excluding slow sand filtration	More than 5.0 MGD	Class IV
		5.0 MGD or less	Class III
2	Slow sand filtration surface water treatment	All	Class II
3	Ground water treatment to remove any chemical contaminant with a maximum contaminant level (arsenic, nitrate, etc.) - or- precipitative softening ground water treatment	More than 5.0 MGD	Class III

No.	System Characteristics	Design Flow *	Classification
		0.5 to 5.0 MGD	Class II
		Less than 0.5 MGD	Class I
4	Ground water treatment for any contaminant with a secondary maximum contaminant level ^a or that only involves adding a disinfectant, but in either case excluding precipitative softening ground water treatment	More than 5.0 MGD	Class III
		2.5 to 5.0 MGD	Class II
		Less than 2.5 MGD	Class I
5	Public water systems meeting the criteria of paragraphs (B)(3)(a) to (B)(3)(c) but not paragraph (B)(3)(d) of this rule	not applicable	Class I
<p>* MGD = Million gallons per day ^a "Secondary maximum contaminant level" is as defined in rule 3745-82-01 of the Administrative Code.</p>			

Staffing

An operator of record shall, at a minimum, be physically present at the public water system and fulfill the time requirements in the following table and perform technical operation as assigned by the owner of a public water system or their designee.

System Classification	Staffing requirement
Class A without treatment	At least 30 minutes per week
Class A with treatment	2 days per week for a minimum of 1 hour per week
Class I	3 days per week for a minimum of 1.5 hours per week
Class II	5 days per week for a minimum of 20 hours per week
Class III and IV	5 days per week for a minimum of 40 hours per week