

# DISINFECTION

## THE MOST VITAL PROCESS OF WATER TREATMENT FOR PRIVATE WATER SYSTEMS

### *Providing Bacteriologically Safe Water Through Hypochlorination*

With additional benefits in many systems of improved taste and odor, and the reduction of staining properties, color, and deterioration of equipment.

#### FOR:

FARMS	SCHOOLS
HOMES	CHURCHES
RESTAURANTS	CAFES
TRUCK STOPS	CABINS
FILLING STATIONS	CAMPS
LODGES	MOTELS

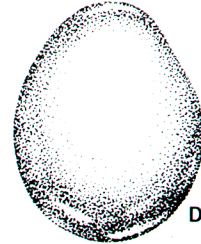
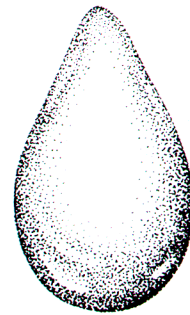
*and any private  
drinking water source!*

#### EVEN THOUGH:

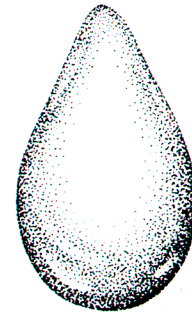
- *It is clear, colorless and tastes good.*
- *It is filtered.*
- *A water softener is used.*
- *It hasn't hurt anyone yet.*
- *Tests have shown it to be safe.*

**WATER IS A UNIVERSAL SOLVENT  
AND CAN CONTAIN ORGANIC OR  
INORGANIC POLLUTANTS AND  
MICRO-ORGANISMS.**

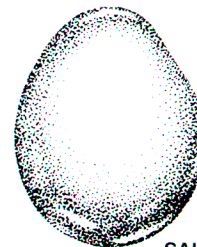
***PLEASE . . . PLAY IT SAFE  
AND DISINFECT YOUR WATER!***



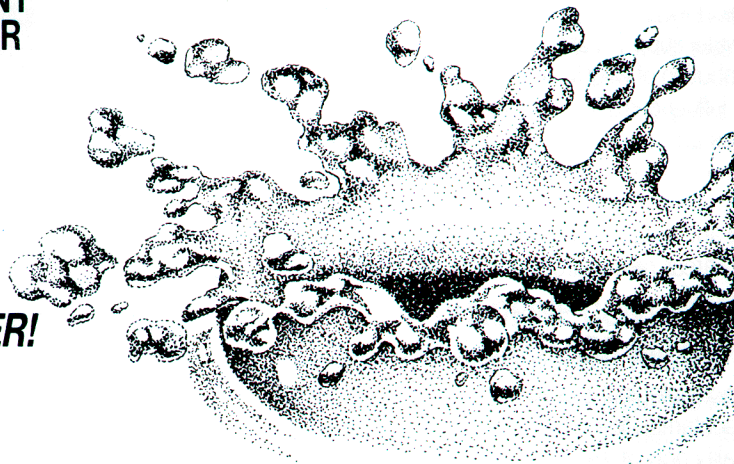
SHIGELLA  
DYSENTERIAE



VIBRIO COMMA  
(CHOLERA)



SALMONELLA  
TYPHOSA



An ISO 9002 System-Certified Company

**PULSAFEEDER**

A Unit of IDEX Corporation



# DISINFECTION-

Even clear, colorless water with no visually apparent suspended matter may contain numerous pathogens (disease-producing microorganisms) such as various bacteria, amoebas, protozoans, etc. In most instances the presence of such microorganisms is undetectable to taste, or smell.

Though filters and water softeners may considerably improve water quality, and may catch some microorganisms, they should not be relied upon to produce bacteriologically safe water. Dangerous microorganisms will be carried through the filter media or softening unit.

Raw water from deep ground sources is less likely to contain microorganisms than water obtained from sources closer to the surface. Microorganisms which are numerous in waters at or near the earth's surface may be reduced by soil filtration, depletion of available oxygen and underground detention for long periods. However, these natural processes of purification are not consistent or reliable. All ground water was at one time surface water, and when water flows through underground fissures or channels, through porous limestone or coarse granular strata, it may retain contamination over long distances and for extended periods of time. Surface water seepage into deep wells is a common source of contamination. Biological growth is possible within the distribution system, especially within those systems containing equipment which is occasionally open to the atmosphere.

Though a water source has proven safe in the past, the biological quality of the water supply may be subject to constant variations due to natural and man-made influences. These variations may be in the vicinity of the water supply or at considerable distances. Rainfall, snow thaw, distribution of wildlife, and normal land erosion are examples of natural influences affecting water supply. A few of the man-made influences are: conversion of unused land to used, or conversion of land from one use to another; the presence of domestic livestock, or septic tanks or sewage systems; the use of streams or rivers for sewage and industrial wastes; excavations as mines, quarries, etc. In many areas new sources of contamination are constantly being introduced.

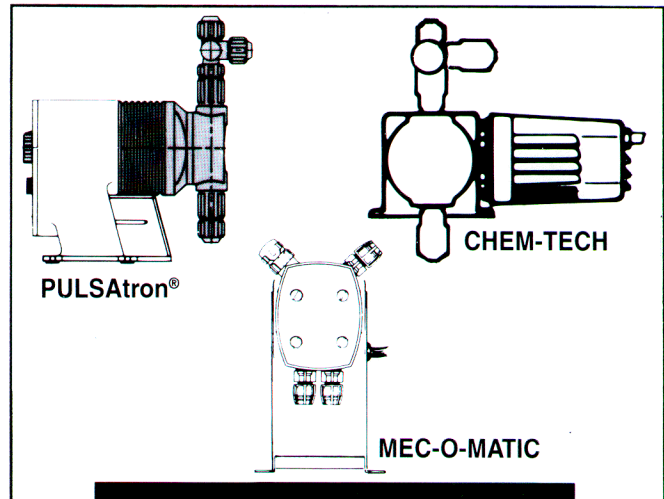
Though tests are extremely useful in determining the general quality of water, "bacteriological examinations indicate the presence or absence of contamination in the collected sample only, and are indicative of quality only at the time of the collection."

For the private water system the method for disinfection combining the greatest effectiveness, economy, and convenience is . . .

## HYPOCHLORINATION

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Hypochlorination is simply the addition of relatively small amounts of a chlorine compound in solution (HYPOCHLORITE) to the water supply. This is accomplished with a small chemical solution feed pump or injector called a HYPOCHLORINATOR.



*These are some of the many hypochlorinators manufactured by Pulsafeeder. There is a right size model for any application, from the smallest domestic to the larger institutional systems. A typical installation is illustrated on the back page.*

Chlorine, the active ingredient in the hypochlorite, destroys microorganisms such as bacteria, amoebas, protozoans, etc. including those which cause disease — the pathogens. Though chlorine is an effective killer of microorganisms, it is harmless to humans or domestic animals in the amount required for water disinfection.

## THE CHEMICALS USED

Two chemicals are widely used, being inexpensive and easily obtainable, and both containing sufficient chlorine to provide very effective disinfection.

SODIUM HYPOCHLORITE (common liquid laundry bleach) is available at most grocery stores and markets, from chemical supply and swimming pool supply companies. It may be fed, as purchased, or diluted with water, depending on the strength of the solution required.

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CALCIUM HYPOCHLORITE is available in a powdered or granular form which must be mixed with water and allowed to settle out before use, but can be purchased in large quantities and stored for considerable time in its dry form. It is available from chemical supply, farm and garden supply, and swimming pool supply firms.

## BONUS BENEFITS OF HYPOCHLORINATION

Besides the destruction of pathogenic microorganisms, hypochlorination offers these additional water treatment benefits:

### ELIMINATION OR REDUCTION OF OBJECTIONABLE TASTES AND ODORS CAUSED BY

**ALGAE & BACTERIA** Chlorine destroys algae and bacteria, completely eliminating this source of offensive taste and odor.

**HYDROGEN SULFIDE** This gas gives water (commonly called sulfur water) a rotten egg smell, and is eliminated or reduced by chlorine's oxidizing property.

**IRON & MANGANESE** These minerals in solution may give water an objectionable metallic taste. They are precipitated out of solution by chlorine's oxidizing property.

**ORGANIC MATTER** Slime, decaying vegetation, leaves, grass, and sewage may impart offensive taste and odor to some waters. Oxidation by chlorine eliminates this offensiveness.

### ELIMINATION OR REDUCTION OF COLOR & STAINING PROPERTY OF WATER CAUSED BY

**IRON** (rust colored), **MANGANESE** (brown to black), **HYDROGEN SULFIDE** (black), **ALGAE** (several colors, dependent on the particular algae), **IRON BACTERIA** (rust colored), **ORGANIC MATTER** (variable).

### ELIMINATION OR REDUCTION OF DETERIORATION OF PIPES, TANKS & FIXTURES CAUSED BY

**IRON BACTERIA** which cause a pitting of iron surfaces on which they live.

**HYDROGEN SULFIDE** which is highly corrosive to common metals.

**THE AMOUNT OF HYPOCHLORITE REQUIRED FOR SAFE WATER** is rarely more than A FEW OUNCES FOR SEVERAL HUNDRED GALLONS OF WATER. The specific amount required is dependent on the organic and mineral content, with which chlorine reacts, in the water to be treated. This organic and mineral content uses up a certain amount of the chlorine introduced with the hypochlorite solution. The amount of chlorine required to react with this content is called the **CHLORINE DEMAND** of the water. Too little hypochlorite will not meet the chlorine demand, reacting with part of the impurities only, leaving the rest intact in the water system. When the amount of chlorine introduced with the hypochlorite solution is in excess of the chlorine demand, the excess is called the **CHLORINE RESIDUAL**. Too great a residual will result in unsatisfactory taste and odor of chlorine in the water. A commonly recommended practice is to feed an amount of hypochlorite to give a residual of ".2 PPM (Parts Per Million) free available chlorine" after 20 minutes contact time. This amount is easily measured with a **CHLORINE RESIDUAL TEST KIT**. These test kits are inexpensive, simple to use and available from your local pump supplier and swimming pool supply firms. The kit will permit you to make periodic checks to assure proper treatment throughout seasonal and other variations in the water supply. The small amount of residual recommended should not be offensive to the taste, it deters recontamination, and it is a good assurance of adequate disinfection.

The chlorine demand will usually be greater the first day or so after the installation of a hypochlorinator, as chlorine will be acting on accumulated impurities on the walls of the water system. After this initial demand, it will usually be possible to reduce the amount of hypochlorite fed to give the desired residual.

The amount of hypochlorite fed into the water system is controlled by means of the output adjustment on the hypochlorinator and/or by varying the strength of the hypochlorite solution.

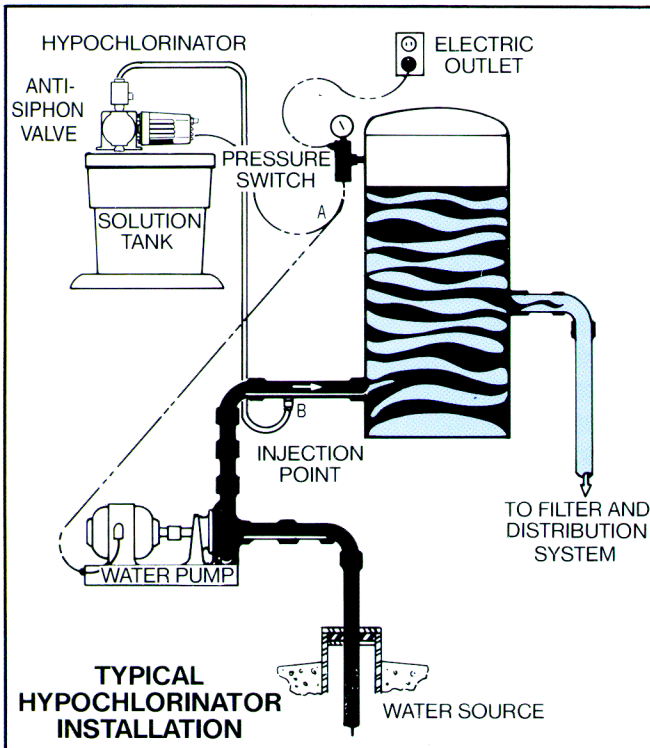
## CHLORINE CONTACT TIME REQUIRED FOR SAFE WATER

**CHLORINE CONTACT TIME**, here, refers to the time required for water to pass from one point of hypochlorite injection to the first outlet for usage. Chlorine requires a period of time for its action, dependent upon the content and temperature of the water treated, and the amount of hypochlorite fed above the chlorine demand. A minimum of **TWENTY MINUTES** contact time is recommended for treatment in private water systems with .2 PPM free chlorine residual.

In some water systems at times of maximum usage the short distance between the point of hypochlorite injection and the first outlet do not allow a twenty minute chlorine contact time. A common solution to this problem is called . . .

## SUPERCHLORINATION — DECHLORINATION

With this method of disinfection, the amount of hypochlorite fed into the water is considerably greater than the chlorine demand (Superchlorination). This increased amount acts on the impurities in the water with greater speed, requiring less contact time. The chlorine residual, however, is generally too strong for satisfactory taste, so is removed with an activated carbon filter (Dechlorination) leaving the water free from chlorine taste, but adequately disinfected. Several brands of activated carbon filters are commercially available for this purpose, and offer other filtration benefits.



- A. The hypochlorinator may be wired in at any point between the pressure switch and the water pump.  
 B. Injection point located on the pressure side of the water pump prevents potential damage to pump by concentrated chlorine or precipitants.

Hypochlorination should not be considered a substitute for good sanitary practices in well construction and operation, or surface water development. Normal sanitary precautions should be taken to provide a good source of water, then — THE WAY TO INSURE BIOLOGICALLY SAFE WATER IS CONSTANT DISINFECTION, PULSAFEEDER HYPOCHLORINATORS OFFER THE MEANS TO THIS MOST VITAL PROCESS.

When selecting equipment for a private water system it is to your advantage to specify a PULSAFEEDER POSITIVE DISPLACEMENT HYPOCHLORINATOR. Several hundred electrically operated hypochlorinator models are manufactured by PULSAFEEDER, offering a range of feed rates and cost permitting the most economical and efficient selection for any private water system, from the smallest domestic application to the larger institutional systems.

All PULSAFEEDER models offer positive displacement feed with a mechanically linked diaphragm or a plunger-cylinder mechanism, the most reliable feed methods available. They are easy to install and are supplied complete with instructions and all necessary tubing and fittings. Simple but sturdy construction of quality, corrosion resistant materials; and functional engineering design permit low cost with dependable operation and long life.

PULSAFEEDER hypochlorinators are in wide use on public water systems and sewage treatment plants, having established a sound reputation with those who are responsible for public health. They are used with equal facility for coagulant feed, pH control, and many other water treatment chemicals. They are also used on food and industrial processing systems, where accuracy of feed rate and dependability are critical.

## FURTHER INFORMATION

State and local health departments usually offer information and aids for the development of private water sources and should be consulted for regulations pertaining to such development.

We hope this bulletin may have answered some of the questions concerning disinfection in private water systems. Our PULSAFEEDER hypochlorinators are in wide use on public water systems and sewage treatment plants. Please contact your local water treatment professional for further details.



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