

These symptoms, however, are not just associated with disease-causing organisms in drinking water, but also may be caused by a number of factors other than your drinking water. The Ministry of Health and the W&SC have adopted the WHO guidelines for treating drinking water in order to reduce the risk of these adverse health effects. Treatment such as filtering and disinfecting the water removes or destroys microbiological contaminants. Drinking water which is treated to meet WHO requirements is associated with little to none of these risk and should be considered safe.

## 2. Total Coliform Bacteria

The World Health Organization (WHO) has determined that the presence of total coliforms is a possible health concern. Total Coliforms are common in the environment and are generally not harmful themselves. The presence of these bacteria in drinking water, however, generally is a result of a problem with water treatment or the pipes which distribute the water, and indicates that the water may be contaminated with organisms that can cause disease. Disease symptoms may include diarrhea, cramps, nausea, and possibly jaundice, and any associated headaches and fatigue. These symptoms, however, are not just associated with disease-causing organisms in drinking water, but also may be caused by a number of factors other than your drinking water. The W&SC have adopted the WHO drinking water standard for total coliforms to reduce the risk of these adverse health effects. *Under this standard, no more than 5.0 percent of the samples collected during a month can contain these bacteria, except that systems collecting fewer than 40 samples/month that have one total coliform-positive sample per month are not violating the standard.* Drinking-water meeting this standard is usually not associated with a health risk from this disease-causing bacteria and should be considered safe.

## 3. Faecal Coliforms/E. Coli

The WHO has determined that the presence of faecal coliforms generally not harmful themselves, but their presence in drinking water is serious because they are usually associated with sewage or animal wastes. The presence of these bacteria in drinking water generally is a result of a problem with water treatment, or the pipes that distribute the water, and indicates that the water may be contaminated with organisms that can cause disease. Disease symptoms may include diarrhea, cramps, nausea, and possibly jaundice, and any associated headaches and fatigue. These symptoms, however, are not just associated with disease-causing organisms in drinking water, but also may be caused by a number of factors other than your drinking water. The W&SC have adopted the WHO drinking water standard for faecal coliforms to reduce the risk of these adverse health effects. *Under this standard, all drinking water samples must be free of these bacteria.* Drinking-water which meets this standard is associated with little or none of this risk and should be considered safe.

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# Water Safety Guide



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## INTRODUCTION

The Bahamas particularly in the urbanized areas of New Providence and Grand Bahama enjoy a safe and good supply of drinking water. Nevertheless, many of us who once gave little or no thought to the water that comes from our taps are increasingly asking the question: "Is my water safe to drink?" While tap water meets World Health Organization (WHO) standards generally is safe to drink, threats to drinking water quality and quantity are increasing. From short-term disease outbreaks linked to contaminated drinking water (eg. Hepatitis A outbreaks of 1997 & 1998) to restrictions on water use during droughts (eg. early 1999), we can no longer take our drinking water for granted.

People are asking many questions. **How safe is my drinking water? Where does my drinking water come from, and how does it get to my home? My water may be safe now, but what about the future? What can I do to help protect my drinking water?**

### How Safe Is My Drinking Water?

The Water & Sewerage Corporation (W&SC) delivers high quality drinking water to thousands of Bahamians and tourists every day. Of the many water systems in the country, only about 8.5% reported a violation of one or more drinking health standards in 1998.

Nationwide, the W&SC continues to spend millions of dollars to build drinking water supply, treatment and distribution systems and additional millions to operate and maintain them. In the future, additional monies will have to be made available to upgrade water systems and implement local source water protection activities (new water resources management laws).

In addition, there is a network of government agencies who also ensure that public water supplies are safe. Nonetheless, problems with local drinking water can, and do, occur.

### Allowance of Contaminants in Drinking Water?

All sources of drinking water contain some naturally occurring contaminants. Because water is the universal solvent, many materials are easily dissolved upon contact. At low levels, these contaminants generally are not harmful in our drinking water. Removing all contaminants would be extremely expensive and in nearly all cases would not provide greater protection of health. A few of the naturally occurring substances may actually improve the taste of drinking water and may have nutritional values at low levels.

### What Problems Can Occur?

As development in our modern society increases, there are growing numbers of threats that could contaminate drinking water. Suburban sprawl has encroached upon once-pristine water catchment areas, bringing with it all of the by-products of our modern life style. Actual events of serious drinking water contamination occur infrequently, and typically not at levels posing near-term health concern (eg. Encroachment near Perpalls and Blue Hills wellfields, Oil/gas spills at Nassau International Airport and Bahamas Electricity Corporation, Blue Hills Compound). Nonetheless, with the threats of such events increasing, we cannot take drinking water safety for granted. Greater vigilance by you the customer, the supplier (W&SC), and the government is vital to ensure that such events do not occur in our water supply.

### Microbiological and Chemical Contaminants Can Enter Water Supplies.

These materials can be the result of human activity or can be found in nature. For instance, chemicals can migrate from disposal sites and contaminate sources of drinking water. Animal wastes and pesticides may be infiltrated into the groundwater sources after heavy rainfall. Human wastes from septic facilities are also discharged into the groundwater, which may or may not be used for drinking water. Coliform bacteria from human and animal wastes may be found in drinking

## What Do I Need To Know To Protect My Private Drinking Water Supply?

Over 15,000 households rely on their own private drinking water supplies. Most of these supplies are drawn from ground water through wells, but some households also use water from rainwater catchments. These households must take special precautions to ensure the protection and maintenance of their drinking water supplies.

### How Can I Test The Quality Of My Private Drinking Water Supply?

Private water supplies should be tested at least annually for nitrate and coliform bacteria to detect contamination problems early. They should be tested more frequently and for more potential contaminants, such as petroleum products, herbicides, pesticides, etc. if a problem is suspected.

### How Can I Protect My Private Water Supply?

You can protect your water supply by carefully managing activities near the water source. For households using a domestic well, this includes keeping contaminants away from sinkholes and the well itself. Hazardous chemicals also should be kept out of septic systems.

### Protecting Your Ground Water Supply

- Periodically inspect exposed parts of the well for problems such as:
  - cracked, corroded, or damaged well casing
  - broken or missing well cap
  - settling and cracking of surface seals.
- Slope the area around the well to drain surface runoff away from the well.
- Install a well cap or sanitary seal to prevent unauthorized use of, or entry into, the well.
- Disinfect drinking water wells often with bleach or hypochlorite granules, according to the manufacturers directions.
- Have the well tested once a year for coliform bacteria, nitrates, and other constituents of concern.
- Keep accurate records of any well maintenance, such as disinfection or sludge/silt removal, that may require the use of chemicals in the well.
- Hire a certified well driller for any new well construction, modification, or abandonment and closure.
- Avoid mixing or using pesticides, fertilizers, herbicides, degreasers, fuels, and other pollutants near the well.
- Do not dispose of wastes in dry wells or in abandoned wells.
- Do not cut off the well casing below the land surface.
- Pump and inspect septic systems as often as recommended by your local health or building inspection department.
- Never dispose of hazardous materials in a septic system.

### Health Effects of Microbiological Contaminants

#### 1. Water Treatment Technique Microbiological Contaminants

The World Health Organization(WHO) has determined that the presence of microbiological contaminants is a health concern at certain levels of exposure. If water is inadequately treated, microbiological contaminants in that water may cause disease. Disease symptoms may include diarrhea, cramps, nausea, and possibly jaundice, and any associated headaches and fatigue.

obtaining new drinking water supplies.

The W&SC is required to notify you if there is a problem with your drinking water. In addition, if you suspect a problem, you can hire a laboratory to analyze your drinking water.

### Are Alternative Water Supplies Available? What About Bottled Water?

Yes, alternative sources of water are available. Bottled water is sold in supermarkets and convenience stores, service stations, Depots etc. Some companies lease or sell water dispensers or bubblers and regularly deliver large bottles of water to homes and businesses. Bottled water is very expensive compared to water from a public water system. Bottled water quality varies among brands, because of variations in the source water used, costs, and company practices.

The Ministry Of Agriculture and DEHS regulates bottled water used for drinking. The source water is generally the same as W&SC and therefore, product water must be periodically sampled and analyzed for compliance with quality standards for microbiological and other contaminants.

### Can I Do Anything In My House To Improve The Safety Of My Drinking Water?

You can choose to install a home water treatment device to add a factor of safety, or to address concerns about the taste of your water.

Point-of-use (POU) systems treat water at a single tap. Point-of-entry (POE) systems treat water used throughout a house. POU systems can be installed in various places in the home, including on the counter top, at the faucet itself, or under the sink. POE systems are installed where the water line enters the house.

POU and POE devices are based on various contaminant removal technologies. Filtration, ion exchange, reverse osmosis, and distillation are some of the treatment methods used. All types of units are generally available from retailers (Guanite Pools, Kellys, John S. George), or by mail order. Price can range well into the hundreds of dollars. Depending on the method and location of installation, plumbing changes can also add to costs.

Home filtration units use activated carbon filters, which adsorb organic contaminants and constituents that cause taste and odor problems. Depending on their design, some units can remove chlorination by-products, some cleaning solvents, and pesticides. To maintain the effectiveness of these units, the carbon canisters must be replaced periodically. Activated carbon filters are not efficient in removing metals such as lead and copper.

Because ion exchange units can be used to remove minerals from your water, particularly calcium and magnesium, they are sold for water softening. Reverse osmosis treatment units generally remove a more diverse list of contaminants than other systems. They can remove nitrates, sodium, other dissolved inorganic, and organic compounds.

Distillation units boil water and condense the resulting steam to create distilled water.

You may choose to boil your water to remove microbial contaminants. Keep in mind that boiling reduces the volume of water by about 20 percent, thus concentrating other contaminants not affected by the temperature of boiling water, such as nitrates and pesticides.

### Maintaining Treatment Devices

All POU and POE treatment units need maintenance to operate effectively. If they are not maintained properly, contaminants may accumulate in the units and actually make your water worse. The W&SC does not test or certify these treatment units.

water if the water is not properly treated or disinfected. These bacteria are used as indicators that other harmful organisms may be in the water.

The potential for health problems from drinking water is illustrated by the localized outbreaks of water-borne diseases, which may be linked to contamination by bacteria or viruses, probably from human or animal waste. In 1997 and 1998, for example, there were the Hepatitis A outbreaks. Though this problem was associated with the private well water supply. To my knowledge, there have been no major outbreaks of water-borne diseases associated with the public water supply in the urbanized areas.

### Where Can I Get More Information About My Water?

Information on water quality in your area is available from several sources, including the public and environment health departments and the water supplier (W&SC). It is hope that in the future, information on water quality can be printed on your water bill at least annually. The Water Quality Unit (WQU), the section of the W&SC responsible for drinking water quality, can provide extensive information on your water supply and its quality.

### Who Makes Sure That My Drinking Water Supply Is Safe?

Local governments, W&SC public water systems, and health agencies work together towards the goal of ensuring that all public water supplies are safe. For households on private wells, it is generally up to the homeowner to maintain the quality of the drinking water.

Local governments have a direct interest in protecting the quality of their drinking water source, be it ground water or deep surface water (brackish or saltwater used for Reverse Osmosis source). They may be responsible for overseeing land uses that can affect the quality of untreated source water. The W&SC have a responsibility to maintain sound treatment works and water distribution networks. We are responsible for ensuring that the water we supply does not contain contaminants at levels higher than WHO guidelines allows. It is hoped that in the not-to-distant future, minimum drinking water quality standards can be set nationally for all water suppliers.

When the W&SC (the WQU in particular) announces that the standard for a particular contaminant has been exceeded, that may or may not by itself be a cause for alarm, but it can be a cause for action. It is a safety precaution required by the law to alert the public to deficiencies in drinking water quality.

### Boil Water Notices

When microorganisms such as those that indicate fecal contamination are found in drinking water, a "boil water notice" should be issued. Boiling water kills the organisms that can cause disease. Therefore, the notices serve as a precaution for the public.

### Where Does My Drinking Water Come From?

Drinking water comes from ground water sources. Ground water is pumped from wells (boreholes) or dugged trenches that are drilled or cut into aquifers. Aquifers are geologic formations that contain water. The quantity of water in an aquifer and the water produced by a well or



trench depends on the nature of the rock, sand, or soil in the aquifer where the well withdraws water. Most of the W&SC drinking water wells are shallow (50 feet or less).



## What is a Public Water System?

The Public Water System is defined as one that serves piped water to at least 25 persons or 15 service connections for at least 60 days per year. Homeowner associations, investor-owned water companies, local governments, and others may own such systems. Water, that does not come from a public water supply, and which serves one or only a few homes, is called a private supply.

Community water systems are public systems that serve people year-round in their homes. The Department of Environmental Health Services (DEHS) also regulates other kinds of public water systems--such as those at schools, factories, campgrounds, hotels or restaurants--that have their own water supply.

## How Does Water Get To My Faucet?

In a typical community water supply system, water is transported under pressure through a distribution network of buried pipes. Smaller pipes, called house service lines, are attached to the main water lines to bring water from the distribution network to your house. In many community water supply systems, water pressure is provided by pumping water up into storage tanks that store water at higher elevations than the houses they serve. The force of gravity then "pushes" the water into your home when you open your tap. (Eg. Water Tower at Ft. Fincastle, Blue Hills Waterworks). Houses on a private supply usually get their water from a private well. A pump brings the water out of the ground and into a small tank within the home, where the water is stored under pressure.

## How Does W&SC Treat My Water To Make It Safe?

The W&SC use the treatment processes of sedimentation and disinfection. No other form of treatment is carried out. Disinfection is by chlorination. The water is disinfected before it enters the distribution system to ensure that dangerous microbes are killed. Chlorine has been used since the beginning of the modern water supply (1927) and has been very effective. Residual concentrations are maintained to guard against bacteriological contamination in the water distribution system.

## How Much Drinking Water Do We Use In Our Homes?

On average, our society uses over 50 gallons of water per person per day. Traditionally, water use rates are described in units of gallons per capita per day (gpcd), gallons used by one person in a day.

Of the "drinking water" supplied by public water systems, only a small portion is actually used for drinking. As residential water consumers, we use most water for other purposes, such as toilet flushing, bathing, cooking, cleaning, and lawn watering.

## What Information Can I Expect To Receive?

The W&SC will promptly tell you if the water has become contaminated by something that can cause immediate illness. If such a violation occurs, the W&SC will announce it through the media and provide information about:

- The potential adverse effects on human health,
- The steps that the system is taking to correct the violation, and
- The need to use alternative water supplies (such as boiled water or bottled water) until the problem is corrected.

The W&SC will also inform customers about violations of less immediate concern in an Annual

Report or during Public Relations Campaigns such as Water Week, World Day for Water, or Inter-American Water Day. We are seeking legislation to put more efforts on protection of source water.

## How Often Is My Water Supply Tested?

The Laboratory of Water Quality Unit has established pollutant-specific minimum testing schedules for public water systems. To find out how frequently your drinking water is tested, please contact the W&SC Lab. If a problem is detected, there are immediate retesting requirements that go into effect and strict instructions for how the system informs the public about the problem. Until the system can reliably demonstrate that it is free of problems, the retesting is continued.

## How Can I Help To Protect My Drinking Water Supply?

Drinking water protection is a shared responsibility, involving water suppliers, local and central governments, business, and individuals. We all have an important role to play, and as private citizens we have many opportunities. Environmental protection activities such as wellfield or catchment protection projects must be high on the community's agenda. Clean and healthy wellfields are vital to safe drinking water.

## Future: New Act

Water catchment area protection is a process for protecting individual communities' underground sources of drinking water. These programs focus on areas thousands of square feet to a few square miles immediately surrounding a community water supply wellfield.

Communities are being encouraged to undertake source water protection programs. Source water protection should be a critical part of all community water programs. This will help to reduce the cost of treatment of source waters.

The general components of a source water protection program include:

- Delineation: Identifying the area of land that water passes through to reach the drinking water intake.
- Contaminant source inventory: Mapping the locations of potential sources of drinking water contamination.
- Source water protection area management: Using regulatory controls, such as zoning or health ordinances, or non-regulatory controls, such as technical assistance to businesses and public education, to keep contaminants out of drinking water supplies.
- Contingency planning: Plan special actions in case a sudden event (for instance, a flood or spill) occurs that threatens the drinking water supply.

## How Can I Get Involved To Protect Water Supplies?

Source water protection works by involving all members of the community. Citizens can voice their support for controlling how land is used near the wellfields.

Citizens can also educate their neighbors about the danger that household chemicals pose to drinking water supplies. Citizens can sponsor household hazardous waste disposal days to promote proper handling of waste paints and thinners, pesticides, used oil, and other hazardous materials.

## What Can I Do If There Is A Problem With My Drinking Water?

Local incidents, such as spills and treatment problems, can lead to short-term needs for alternative water supplies or in-home water treatment. In isolated cases, individuals have needed to rely on alternative supplies for the long term because of their individual health needs or problems with