

# Welcome To The Price Creek Water Plant Tour



**Price Creek Water Plant**

Lake City's municipal water supply has always come from our own wells. The City's water system has been continually improved since the first well was drilled in 1885. As part of a major system upgrade, the new water plant went into continuous operation in September 2007.

Four wells drilled 750 feet (on average) into the Floridan aquifer provide the raw (untreated) water to this 9 million gallon per day capacity treatment plant.



**Raw Water Well Pump**

The 4 supply wells are consolidated into a concentrated well field located east of the city where ground water is available in an adequate amount to meet demand. The quality of the well water entering the plant is generally good. However, some treatment is required to ensure that the water delivered to your home or business is both safe to drink and esthetically pleasing.



**Ozone Generator**

Ozone is prepared on site and it is very unstable. The gas preparation unit is used to produce dry air. The generator is a pair of electrodes separated by a gas space, and oxygen containing air passes through the empty space as a high voltage alternating current is applied. An electrical discharge occurs across the gas space and ozone is formed when a portion of the oxygen is ionized and becomes associated with non-ionized oxygen molecules.



**Contact Basin**

The contact basin is a mixing chamber for the ozone rich material and the process water. The objective is to dissolve enough ozone in the water to achieve disinfection at the lowest possible cost. Ozone is a toxic gas, and it is a hazard to plants and animals. When ozone breaks down in the atmosphere as a result of photochemical reactions the resulting atmospheric pollutants can be harmful. Ozone is less of a hazard than gaseous chlorine. Ozone may be used for several purposes in treating drinking water.



**Deox Blowers**

The Deox blowers are used to lift any residual ozone gas to the upper surface of the contact basin so it may be routed to the destruct units.

The blowers are also used to increase dissolved oxygen into the treated water for stabilization.



**Destruct Units**

The destruct units remove any excess ozone gas left over from the treatment process and convert the remaining gas back to oxygen before being piped back into the atmosphere.



**Chemical Injection**

After exiting the contact basin the water is then injected with three chemicals such as liquid chlorine, liquid ammonia, and sodium hydroxide. The blue fluoride line pictured is for future use.



**Analyzers & Controllers**

All pumping, treatment, and distribution aspects of the plant operation are computer controlled. These automated systems monitor pressure, chemical injections, and flow throughout the plant and service area, making adjustments as necessary. In emergency situations, plant operations personnel can assume manual control.



**High Service Pumps**

To make sure all customers receive sufficient water at the right pressure, the distribution system delivers consistent pressure throughout the service area. This plant uses six high service pumps to step up the pressure to the distribution system to meet demands.



### **Water Distribution maintains over 1500 fire hydrants.**

Occasionally hydrants are "flowed" (Illustrated in the picture) by Distribution personnel or the Fire Department.

Have you ever been driving in Lake City and noticed a City worker standing by a fire hydrant with water gushing out of it? Have you ever wondered why they're "wasting" so much water? There are good reasons for the use of this water. The workers you see flushing fire hydrants work for the Lake City Water Department, and they are trained in sound and proven water system maintenance practices. Flushing fire hydrants are one of the most important maintenance practices that can be performed on a water distribution system.

When a worker fully opens a fire hydrant for the flushing process, the following are checked and recorded:

- Visible and audible leaks;
- Proper operation of valve;
- Flushing out corrosion & rust;
- Water pressure;
- Color of the water;
- PH test of water in main - identifies a potential problem with waterline;
- Chlorine level before and after flushing - identifies organic contamination in line;
- Flow of water measured in gallons per minute.

If ignored, corrosion and rust can cause problems such as: severe rusty water, reduced water pressure, lower chlorine levels. Replacing water that has been standing in the system with fresh water is especially important in dead end main areas and low flow areas in the system. Flushing one fire hydrant may cost between \$30 - \$50, which includes wages, water cost and equipment. The cost of flushing fire hydrants is money well-invested. So, the next time you see a City worker flushing a hydrant, you can rest assured that they are working hard to protect the safety of the public, improve water quality and

properly maintain the water distribution system.

Flow testing of fire hydrant is done in cooperation with Lake City Fire Department to identify the amount of water a certain fire hydrant can deliver during an emergency situation. This service is done on a continuing basis so that problems can be identified and then eliminated. All hydrants will be color coded so that Fire Department personnel can identify what gallons per minute an individual fire hydrant can deliver.

## **Customer Concerns**

**Here is a list of common Water Concerns and some Possible Resolutions.**

### **Taste - Odor - Chlorine**

The most probable cause is low chlorine residual due to age of the water which can lead to rotten egg, medicinal, or a fishy smell. Even a perceived high chlorine smell can actually be low chlorine residual rather than high due to the breakpoint in the disinfections process. Other causes of odor are dead-end lines, old plumbing, hot water heaters, or kitchen sink odors.

### **Resolution**

Frequently these concerns can be corrected if the customer will run water for a few minutes (Using the kitchen or bathroom faucet). If this does not correct the concern, City Employees can flush the water main outside the customer's residence and then the customer can flush inside again.

### **Milky Water**

The most probable cause of milky water is air in the water lines. This may be caused by water main repair, low pressure, temperature changes, or over-heating of water in the hot water heater.

### **Resolution**

This concern can be resolved by either the customer flushing their water lines (faucets) and /or the city flushing the water main. Check the setting of the hot water heater thermostat and measure the water temperature. Normal setting should be below 150 degrees Fahrenheit. Ensure that the pressure/temperature relief valve on the hot water heater is functioning properly.

### **Sediment - Discoloration - Rust**

Usually caused by small particles from existing plumbing or hot water heaters, dislodged due to rapid changes in pressure or flow.

### **Resolution**

Symptoms can be resolved by flushing water lines (faucets) and flushing hot water heaters. There is a possibility that old water lines and /or the water heater may need to be replaced. If symptoms persist, collect a sample of the sediment for analysis to determine the origin.

### **Black algae - fungus in plumbing fixtures**

This concern is due to leaking kitchen or bathroom fixtures which leave standing water or moist surfaces. When this happens the chlorine dissipates from the water and algae growth results from spores in the air.

### **Resolution**

The algae can be eliminated with common household bleach in a spray bottle. Toilets with algae "rings" can be treated the same way or a toilet bowl cleaner containing chlorine is effective in removing the algae. When using the spray bottle, particular attention should be taken to get the chlorine bleach solution up into the faucet/aerator and into the flush opening under the commode lid to insure a good kill of the algae/fungus.

## **Water softeners**

Water softeners can sometimes cause more concerns than they cure. If not properly installed and maintained, water softeners can cause taste, odor, sediment, or other problems. There are a variety of softeners that can eliminate chlorine and minerals from the water while adding sodium to an already stable drinking water. Destabilization of the water can cause increased corrosion in the plumbing system.

## **Resolution**

If a water softener has been installed, test the water quality before and after the unit to make sure that it is operating correctly. Ensure that the unit is serviced and maintained regularly.

## **Other Water Quality Questions and Answers.**

Why is the water pressure low?

Your water pressure may be low due to the flushing of fire hydrants, which lowers the water pressure in the area that is being tested.

Why is my water discolored?

Due to the fire hydrant flushing, customers could experience a temporary discoloration of water, which is due to the unsettling of rust in the water main.

What should I do about the discolored water?

Run the cold water for about five minutes - this should clear up the water.

Is the water safe to drink?

Yes. If the water were to be unsafe for any reason to drink, a boil alert would be issued immediately.

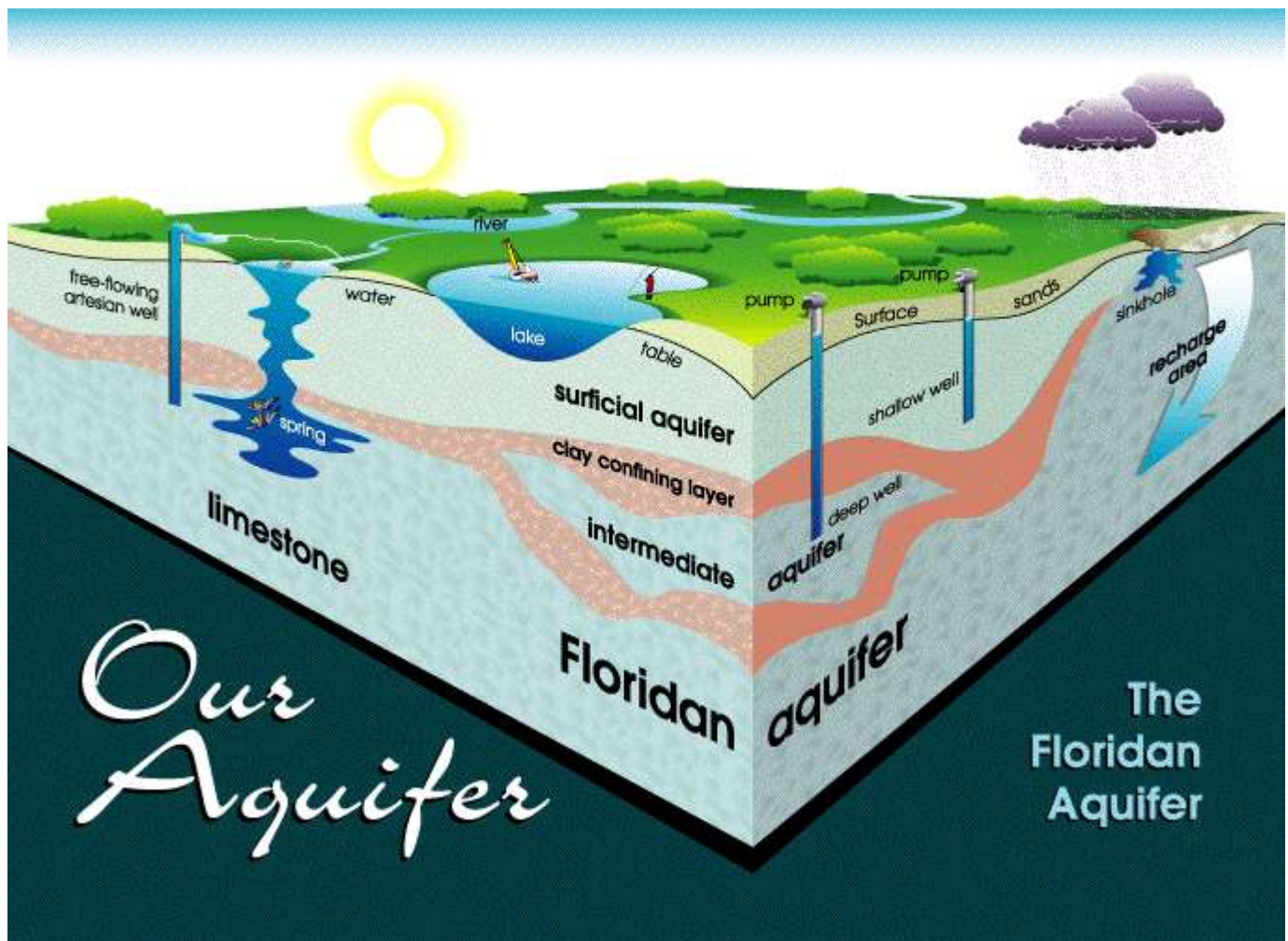
If you would like further information about this topic, please feel free to contact the water department (386) 466-3350.

## Ground Water Basics/Facts

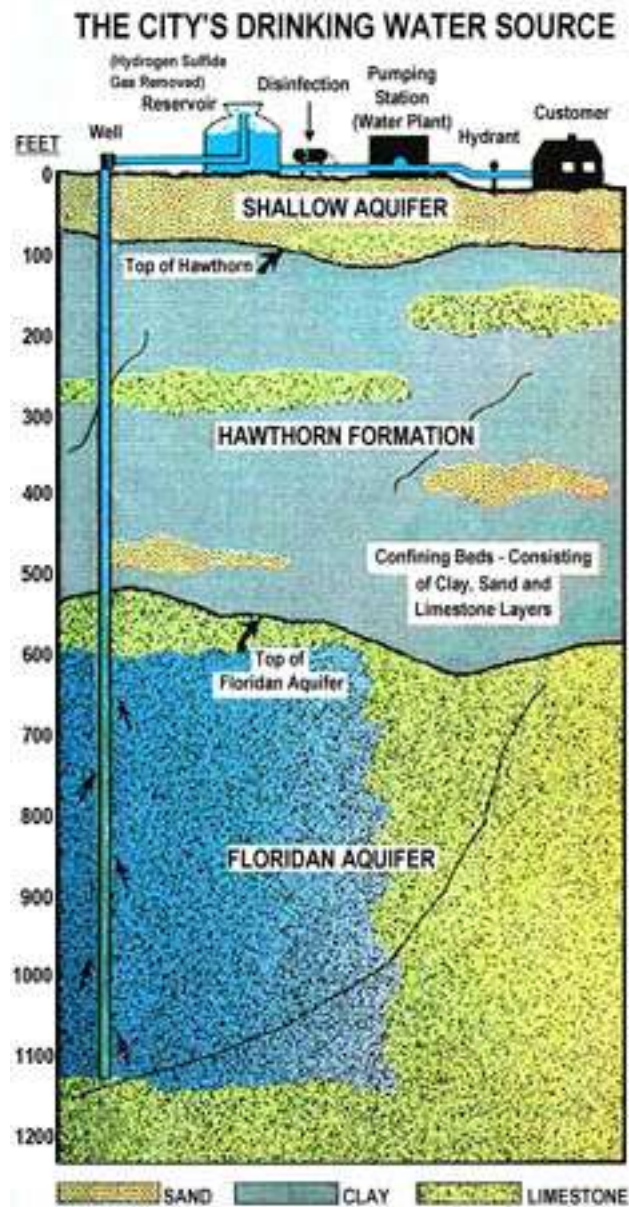
Water is one of our most precious natural resources. Practically, every living creature on Earth is sustained by water. Water occurs on Earth as oceans, rivers, lakes, glaciers and clouds. Water also occurs under ground as ground water in saturated soil and bedrock units known as aquifers. It has been estimated that the Earth contains nearly 326 million trillion gallons of water. However, only 2.8% of the world's total water supply is available to humans as fresh water. Of the freshwater which is available, 98% of it occurs in the form of ground water.

### *The Floridan Aquifer System*

Northeastern Florida depends upon ground water as its primary source of fresh potable water. The Floridan Aquifer is the primary source of water for the major public drinking water supply wells throughout the City. The Floridan Aquifer system is one of the most productive aquifers in the world. The aquifer underlies parts of Alabama, Georgia, South Carolina and all of Florida, encompassing an area of approximately 100,000 square miles. The Floridan aquifer is a thick sequence of carbonate rocks (limestone and dolomite) which typically occurs at a depth of 250 feet or greater below the ground surface in Lake City.



In the 1880's Lake City was one of the first municipalities to use the Floridan Aquifer as a public water supply source. According to the U.S. Geologic Survey, an estimated 3 billion gallons of water per day are withdrawn from the Floridan Aquifer for public, residential, industrial and agricultural uses. In 2006, Lake City withdrew over 3.5 million gallons of water per day from the Floridan Aquifer.

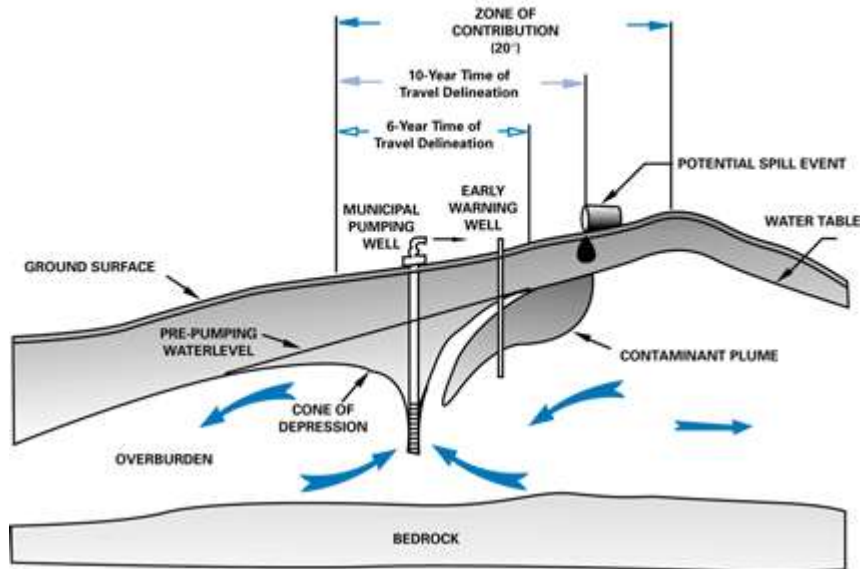


#### *Ground Water Contamination*

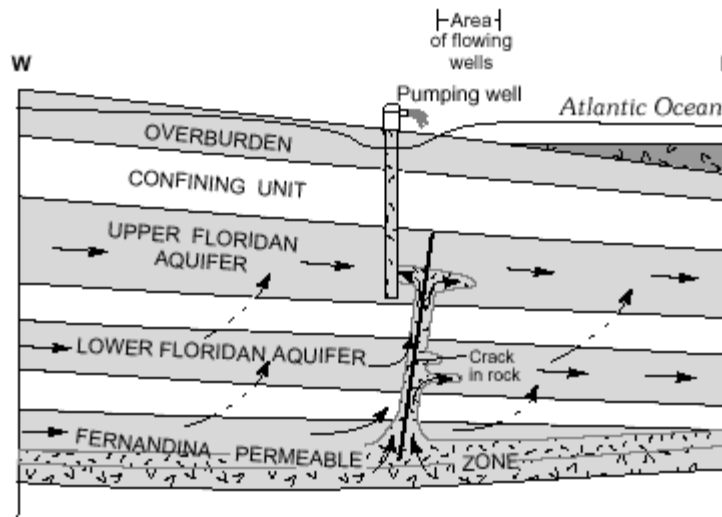
The improper management of hazardous substances has contributed directly to localized and regional ground water contamination throughout the world. It only takes a small amount of contamination to impact an aquifer and raise health concerns.

As water percolates downward into the ground, pollution, present at or below the ground surface may become dissolved. Once dissolved, the contamination may easily seep into the aquifer. Ground water moves from areas where the water table is high to where the water table is low. When water is being pumped from a well, the water table in the immediate vicinity of the well is lowered, thereby increasing ground water flow in the direction of the well. The resulting Zone of Contribution represents the area within the aquifer, which contributes recharge to the well. As such, contamination which enters the Zone of Contribution will eventually move towards and pumping well.

# CROSS SECTION








Current trends in development within northeast Florida have increased the demand placed on the Floridan aquifer system. In order to meet the needs of the public, increasing amounts of water are being withdrawn from the aquifer. The U.S. Geologic Survey has estimated that water levels within the Floridan Aquifer system in Columbia County have gradually declined at the rate of 0.3 to 0.75-feet per year due to the increased demand. Lower water levels in the Floridan Aquifer increase the risk of contamination by surface and subsurface pollution. Additionally, the lower water levels increase the potential for saltwater intrusion into the Floridan Aquifer.



NOT TO SCALE

## EXPLANATION

- |   |  |
|---|--|
|  Freshwater      |  Potentiometric surface                 |
|  Transition zone |  General direction of ground-water flow |
|  Saltwater       |  |

### Conceptualization of Saltwater Intrusion (modified from Krause & Randolph 1989)

When an aquifer or well becomes contaminated it poses a threat to human health and the environment. Additionally, ground water contamination can jeopardize the economic welfare of a community. Cleaning up an aquifer or providing alternative sources of drinking water are expensive and difficult propositions often exceeding \$100 million per incident.

## *Miscellaneous Ground Water Facts*

The following miscellaneous water facts were taken from *National Driller* magazine:

1. Water is the only substance on earth found naturally in three forms – solid, liquid and gas.
2. The average residence in the United States uses 107,000-gallons of water per year.
3. It takes 1,500-gallons of water to process one barrel of beer.
4. It takes 62,600 gallons of water to produce 1 ton of steel.
5. It takes approximately 1,851 gallons of water to refine one barrel of crude oil.
6. The average individual today used approximately 70 to 125 gallons of water per day.
7. Automatic dishwashers used between 9 to 12 gallons of water per load.
8. Assuming a person consumes 2.5 quarts of water per day from all sources (food, water, etc); during an average lifetime they will consume more than 16,000-gallons of water.
9. The United States uses approximately 100-billion gallons of water for irrigation each day.