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Plant Operation

Water Treatment: Surface Water

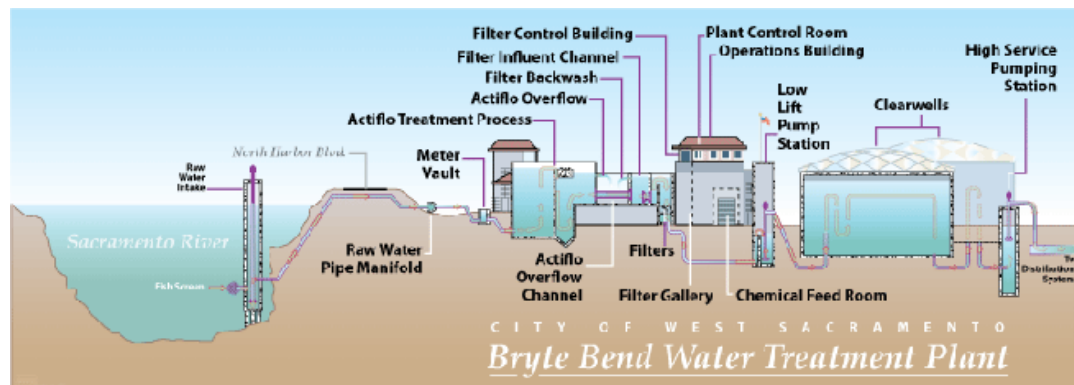
The City of West Sacramento's main water source is the Sacramento River. Our intake structure is located at Bryte Bend, upstream of the confluence of the Sacramento and American rivers. Water withdrawn from the Sacramento River is treated at the City's Bryte Bend Water Treatment, which is operated 24 hours a day by state certified Water Treatment plant Operators.

Untreated surface water is subject to runoff and other sources of contamination. Possible contaminants in untreated surface water include the following:

- Microbial contaminants, such as viruses, bacteria and protozoa resulting from the presence of livestock and wildlife, as well as human activity, agriculture and septic systems.
- Inorganic contaminants, such as salts and metals, which can occur naturally or as a result of urban runoff, mining or farming.
- Organic contaminants, such as pesticides, herbicides and hydrocarbons resulting from agriculture, urban runoff, residential and industrial uses.
- Radioactive contaminants, either naturally occurring or as result of petroleum production or mining activity.

In accordance with the City's Water Master Plan and in order to keep pace with West Sacramento's continuing growth, the Bryte Bend Water Treatment plant (BBWTP) has undergone an expansion from 24 MGD to 60 MGD. Construction started in July 2002 and was completed in late 2004. Water treatment at the BBWTP was converted to the ACTIFLO MICROSAND BALLASTED CLARIFICATION PROCESS.

Below is a graphic rendering of the Bryte Bend Water Treatment Plant, followed by a brief description of each location.



RAW WATER INTAKE – Raw water pumps draw water through tee-type wedge wire fish screens, lifting it through a valve vault that manifolds the raw water pumps into a common header.

RAW WATER PIPE MANIFOLD – Raw water is pumped from the raw water intake through two forty-two inch pipes. Chlorine is added at the manifold and water is conveyed to the Actiflo treatment trains at a maximum rate of 60 million gallons per day or 41,666 gallons per minute.

METER VAULT – The raw water flow for both treatment trains is measured and controlled in this vault. The main chemical of the treatment process, Aluminum Sulfate, is added and intensely mixed. Each flow meter can measure accurately up to 30 million gallons per day of 20,833 gallons per minute.

ACTIFLO TREATMENT PROCESS – This is the primary plant process to remove solids and clarify the water for filtration. This is a new process and West Sacramento is the largest Actiflo treatment plant in California. The Actiflo High Rate Sedimentation process uses silica sand and polymers to settle the large particles in 1/10th of the time it takes conventional processes. This decreased the initial construction costs and utilized less land than conventional processes.

RECLAIM WATE BASINS – One unique aspect of expanding an existing plant is the reuse of existing

structures. The reclaim basins were the original 1987 treatment trains. The flow through the basins was reversed and they became basins for gathering all waste streams. Waste streams from throughout the plant are collected in these two basins for treatment. The clear water is pumped back to the raw water piping while the sludge is pumped from the bottom to the City's wastewater plant for further treatment.

FILTERS – Eight dual media filters remove fine particles and most remaining contaminants. Each filter contains 42 inches of Granular Activated Carbon and 9 inches of sand. After approximately 72 hours of operation the filters are backwashed and returned to service.

ACTIFLO OVERFLOW – When the process is started, the initial effluent water quality is not suitable for filtration. The overflow is directed into the reclaim basins for return to the raw water manifold. After approximately 30 to 60 minutes, the operator directs the flow on to the filters.

FILTER CONTROL BUILDING – This building houses the electrical components to control filter operation and backwash. There are four consoles that monitor two filters and includes all the manual controls to operate the filters if the control system fails.

PLANT CONTROL ROOM – The operators control all plant processes as well as the remote water distribution tanks and pump stations from this room through a supervisory control system. Over 2,000 points are continuously monitored and alarmed to increase the efficiency and safety of the City's water supply.

OPERATIONS BUILDING – The new operations building includes the administrative offices, lunch room, operator quarters, locker rooms, restrooms and plant control room. The plant is staffed twenty-four hours per day, year round.

CHEMICAL FEED ROOM – The treatment process uses various chemical to accomplish the goal of providing safe, potable water. Chemicals are piped into the tank farm outside and pumped to various feed points in the process. The rate of pumping is set by operators and controlled by the supervisory control system.

FILTER GALLERY – Once the water is filtered, piping carries the water to the clearwells for disinfection. This piping also allows for backwashing and ripening of a freshly washed filter. Devices measuring the clarity of each filter effluent are sent via the supervisory control system to the operators in the plant control room.

LOW LIFT PUMP STATION – The low lift pump station connects the combined filter effluent piping to the clearwells. The station is used to overcome the difference in elevation between the water surface level in the clearwell compared to that of the filter effluent piping.

CLEARWELLS – Treated water is stored in two pre-stressed concrete clearwells that each holds four million gallons. The clearwells provide contact time for disinfection and allow the plant to meet peak water demands, fire flows and provide filter backwash water.

HIGH SERVICE PUMPING STATION - There are eleven high service booster pumps that pump water into the distribution system. Surges created from starting and stopping of these pumps are dampened by a hydro-pneumatic tank. The pressure is boosted to 60 PSI leaving the plant to try and maintain 55 PSI throughout the City.

BACKUP GENERATOR – There are three 16-cylinder diesel generators located throughout the plant which operate the plant in the event of a power failure

The city of West Sacramento does not add fluoride to its water. Naturally occurring fluoride at 0.1 milligrams per liter (mg/L) was detected in our source water, and this concentration was carried over into our finished water. These results are well below the 1.4 mg/L primary maximum contaminant level for fluoride.

We are frequently asked for the hardness of West Sacramento water in grains per gallon. One grain/gallon is equal to 17.1 mg/L of hardness. The Water Quality Association uses the following classifications for water hardness:

Classification	mg/L	Grains / Gallon
Soft	0 - 17.1	0 - 1
Slightly hard	17.1 - 60	1 - 3.5
Moderately hard	60 - 120	3.5 - 7.0
Hard	120 - 180	7.0 - 10.5
Very Hard	180 & Over	10.5 & above

In 2004 the maximum level of hardness detected in West Sacramento water 61 mg/L or 3.5 grains/gallon, placing our water at the upper end of the slightly hard classification. There is maximum contaminant level for hardness.

Water Treatment: Ground Water

Filtration of ground water takes place naturally as water moves through porous layers of soil. This process, called percolation, removes most suspended material from ground water. Ground water pumped from West Sacramento's wells is filtered and then chlorinated before being pumped into the water distribution system. The City did not utilize ground water in 2004.