

4. Water Distribution

Overview

This chapter covers issues related to the water distribution system. Water distribution is the City's main water resource function, as treated water purchased from San Francisco does not require further water treatment. The first section of this Chapter describes the distribution system. Subsequent sections cover the Capital Improvement Plan, water quality monitoring, flushing, leak detection, and chloramines.

The Department of Health Services conducted a thorough inspection of the City's water facilities in 1999, renewing its water supply permit and concluding that the distribution system is well maintained and that the storage and pumping stations are in excellent condition.¹⁴ Water quality meets primary and secondary drinking water standards.

4.1 Water Distribution System Description

The City water system serves the City of Redwood City and portions outside the corporate limits, including Cañada College and the Emerald Lake Hills area. The City's service area presently covers approximately 10.3 square miles. Service is provided to areas between Highways 280 and 101, Whipple Avenue and Marsh Road in the area east of Highway 101, and in the Redwood Shores development. The City's service area greatly differs in elevation, from about mean sea level along Seaport Boulevard to over 800 feet in the Emerald Lake Hills area.

The City obtains water via 13 active connections with the San Francisco transmission system. It also has 10 emergency interties with California Water Service Company, Belmont County Water District, and the City of Menlo Park. The system has 208 miles of distribution mains, 12 storage reservoirs, 10 pump stations, 1812 fire hydrants, and 26 pressure reducing valves ranging from two to six inches in diameter.

The distribution mains consist mostly of ductile iron, approximately five percent of older, two-inch galvanized iron, six-inch polyvinyl chloride (PVC) pipe, and some asbestos-cement pipe. Asbestos-cement pipe was installed over a period of several decades, from about 1960 to about 1988. Typically, asbestos-cement pipe was installed in areas where the soil was determined to be too corrosive for the preferred material, cast iron pipe. The City has an on-going main replacement program in which undersized mains are replaced with C-900 PVC pipe.

The total storage capacity of the 12 storage facilities is 21.24 million gallons. The storage tanks and reservoirs are cleaned and inspected once every five years. Recoating, repairs,

¹⁴ *Engineering Report*, California Department of Health Services, Revised Permit for the City of Redwood City, April 1999.

and structural work are performed as needed. Several tanks have recently been recoated on the interior and exterior, and seismically retrofitted. All storage tanks have cathodic protection to prevent corrosion. The storage facilities are in excellent condition and are properly secured against unauthorized entry. Most recently, one steel tank was constructed to replace two redwood tanks of the same total capacity at Easter Cross.

The City has 10 pump stations located throughout the system. Four stations have permanent standby generators. The City also has four portable generators for emergency use. Most pump stations are housed. The City plans to eventually build housing around the remaining pump stations to protect them from weathering and vandalism.

The City can meet maximum day demand as long as the SFPUC pipelines are in service. In the event of a loss of the SFPUC supply, the City would be able to supply all but four of the 17 pressure zones in the system for an extended period. Those four pressure zones are not currently connected to other pressure zones and do not have storage facilities. In order to provide water to those four zones when the SFPUC supply is not available, the City has connected the four zones to storage tanks that normally supply the Main City pressure zone. The City connected Altamont, Fernside North, and Fernside South pressure zones to Carson Reservoir for emergency use only, and constructed a permanent connection from Cordilleras pressure zone to the Sequoia Tanks. In addition, the City may add storage facilities to serve remote services areas, such as Seaport and Friendly Acres areas, susceptible to low service pressures during prolonged interruptions.

4.2 Leak Detection

The City's unaccounted-for water rate is about 4%. This is an excellent rate and is significantly below most other water agencies. The City monitors its unaccounted-for rate continually and repairs system leaks immediately when found. The City purchased an electronic leak detector unit and its crews have participated in AWWA sponsored Leak Detection training, surveying at least 15 miles of main and service lines per year on an on-going basis.

4.3 Water Quality Monitoring

Monitoring of the imported Hetch Hetchy supply is conducted by the SFPUC. The SFPUC treats the Hetch Hetchy supply by lime addition at Rock River for corrosion control and chlorination at Tesla Portal for disinfection, but does not filter prior to delivery. Bay Area reservoir waters receive complete treatment of filtration and disinfection at either the Sunol or the Harry Tracy filtration plants. Filtered water from these treatment plants may be co-mingled with unfiltered Hetch Hetchy water in bay area transmission pipelines. The SFPUC and the agencies that serve water from the SFPUC Hetch Hetchy supply previously applied for and were granted filtration avoidance for that supply under the Federal regulations. The Department adopted revisions to the Surface Water Treatment Regulations ("SWTR"), Chapter 17, Title 22, California Code of

Regulations that include criteria and requirements for avoiding filtration for public water systems that serve water from a surface water supply. With the adoption of the revisions, which became effective July 8, 1998, those public water systems serving water from the Hetch Hetchy supply must demonstrate to the Department of Health Services that the supply meets the state's criteria for filtration avoidance. In accordance with Citation Order Number 02-051 issued to the City of Redwood City on April 2, 1997, within 120 days of the effective date of the amendments to the state SWTR, the City applied to the Department for certification that the Hetch Hetchy supply it distributes will be in compliance with the state criteria for filtration avoidance.

The City routinely monitors water quality within the distribution system. The water quality meets primary and secondary drinking water standards. The City has had no recent bacteriological problems. While the City should be able to meet the recently adopted 80 µg/L total trihalomethanes ("TTHM") standard of the Enhanced Surface Water Treatment Regulation, the City in association with the SFPUC should work to reduce TTHM levels. The lead action level was exceeded in consumer tap samples taken in 1992 and 1993. The City is continuing lead and copper tap sampling, water quality parameter monitoring, and public education as required by the Lead and Copper Rule. The City has not exceeded the Action Level for lead and copper since the testing program in 1993. Should the City exceed the lead action level after the implementation of regional treatment, the City will have to install optimal corrosion control treatment on its own.

- ❑ Bacteriological Quality. The City has an approved bacteriological sample plan, dated August 2000, that makes use of a series of dedicated sampling stations located at key points within the distribution system. City personnel routinely collect 23 samples per week for bacteriological analysis. The 23 samples are selected from 28 sites designated for even weeks and 28 sites designated for odd weeks.
- ❑ Disinfection Residual. The City collects samples for free chlorine residual monitoring at the same time and same location as the bacteriological monitoring as required by the state Surface Water Treatment Regulation.
- ❑ General Physical. The City collects 24 samples per month for color, odor, turbidity, pH, and temperature measurements.
- ❑ Trihalomethanes. As required, the City collects four samples from the distribution system per quarter for trihalomethane monitoring. Analysis is performed at the SFPUC certified laboratory in Millbrae.
- ❑ Asbestos. Due to the presence of asbestos-cement pipe, the system is vulnerable to asbestos contamination from leaching. The City submitted sample test results to the DOHS demonstrating compliance with state requirements and was granted permission to reduce the testing cycle to once every nine years.
- ❑ Lead and Copper. Under the state Lead and Copper Regulation, the City of Redwood City is a large-size water system. This designation requires the City to perform corrosion control treatment steps. Since the City obtains all of the drinking water from the SFPUC and provides no further treatment, the City is piggybacking onto the

SFPUC's corrosion control studies. The City conducted two six-month rounds of initial sampling at consumer taps for lead and copper. The lead action level was exceeded in both rounds. The reports are dated December 1992 and May 1993. The City provides public education materials within the annual water quality report that is distributed to its customers. The City has performed some water quality parameter monitoring in the past. The City has an approved sampling plan for lead, copper, and water quality parameter monitoring on file with the Department of Health Services dated November 3, 1998. During two six-month rounds, ending July 31, 1999, the City conducted monitoring in conjunction with the SFPUC and the other public water systems that serve water from the SFPUC supply. The City is required to conduct two six-month rounds of lead and copper monitoring at consumer taps, two six-month rounds of water quality parameter monitoring at taps in the distribution system, and bi-weekly water quality parameter monitoring at points of entry to the distribution system. The water quality samples are to be analyzed for pH and Langelier Index. The SFPUC use the data generated to determine optimal corrosion control treatment appropriate for the SFPUC transmission system. Should any suburban agency continue to exceed the lead action level after the implementation of regional treatment, the individual agency will have to install optimal corrosion control treatment on its own.

4.4 Flushing and Cross Connections

The City has a proactive program to flush the distribution pipelines to remove deposits, encrustations, sediments, and other materials. This prevents water quality problems related to taste, odor, and turbidity, among others. The program includes the flushing of dead ends and using unidirectional flushing to optimize results. The City maintains a database recording the schedule and length of time for each flushing. City personnel use maps from the "block book" and valve cards to locate valves and perform proper valve exercising. During times of water shortage, the City may suspend flushing activities to conserve scarce water resources.

The City also has a cross connection control program contracted out to the San Mateo County Environmental Health Department. They use trained certified Staff to test 100% of the backflow prevention devices annually.

4.5 Capital Improvement Program

One of the City's guiding principles regarding water service is to repair/replace/upgrade the water distribution infrastructure on a 50-year cycle to ensure the system's long-term integrity. The City Council appropriates \$2 million a year via its Capital Improvement Program to accomplish this objective as illustrated in Table 4.1.

**Table 4.1
Capital Improvement Program
System Replacement Cost Allocations**

Project Description	Estimated Annual Cost Allocation
Distribution system replacement	\$1,755,000
Water system facility replacement	\$75,000
Water pumps and controls replacement	\$50,000
Cathodic protection program	\$100,000
GIS/CAD system development / maintenance	\$20,000
Total	\$2,000,000

Source: Capital Improvement Projects – Five Year Program, Water Fund