

**DRINKING WATER
QUALITY ISSUES FOR
DELTA SOURCE WATERS**

ISSUE PAPER

**Prepared by: City and County of San Francisco
Public Utilities Commission
(Hetch Hetchy Water and Power)**

PUBLIC UTILITIES COMMISSION
CITY AND COUNTY OF SAN FRANCISCO
FRANK JORDAN, MAYOR
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MUNICIPAL RAILWAY
WATER DEPARTMENT
HETCH HETCHY
WATER AND POWER

April 13, 1993

Mr. Steven Yaeger
Deputy Executive Director
Bay Delta Oversight Council
P.O. Box 942830
Sacramento, CA 94236-0001

Dear Mr. Yaeger,

I am writing in response to your letter of March 24, 1993 inviting San Francisco's perspective on Delta water impacts on water treatment in our system.

Our limited, but recent, experience has sensitized us to the direct and indirect system-wide impacts of relatively small amounts of Delta water in San Francisco's system. Our current experience matches the documented problems East Bay MUD faced following the 1978 drought. We are watching the regulatory horizon cautiously because there appear to be antagonistic regulations that will require more expensive treatment of Delta waters. Our system was never designed for Delta waters and its use may even force extensive water treatment changes to water supplies unrelated to the Delta.

San Francisco's Water System: Historically, water supplies for San Francisco have come from the Hetch Hetchy Reservoir and local reservoirs located in Alameda and San Mateo counties. Hetch Hetchy, in normal years, supplies eighty to eighty-five of the water for our service area of 2.3 million people which includes the city of San Francisco and thirty suburban water agencies. All local waters are filtered, Hetch Hetchy water is not. The San Francisco Water Department has just finished upgrading one filter plant, is reviewing the need to upgrade the other plant

and is seeking State and Federal filtration avoidance for the Hetch Hetchy supply.

System Operations: The delivery and distribution of water in the San Francisco System is a longitudinal process. Water originating in the Sierra Nevada travels through the Hetch Hetchy Aqueduct one hundred and forty miles by gravity to San Francisco. The water is corrosion controlled and chlorinated. The Alameda water supplies are filtered at the Sunol Filter plant and added to the Hetch Hetchy flows to meet peaking demands along the suburban transmission mains. Some of this mixed supply is released into Crystal Spring Reservoir in San Mateo County as seasonal storage. Water from the Crystal Springs Reservoir is pumped to a filter plant at San Andreas Reservoir where it is filtered and distributed to the higher zones of northern San Mateo and San Francisco counties.

Existing Water Quality: The water quality of the Hetch Hetchy water supply is exceptional in nearly all respects. This high quality mountain water meets the Environmental Protection Agency filtration avoidance criteria under the Surface Water Treatment Rule. The San Francisco Water Department is currently seeking the filtration avoidance status from the EPA and the California Department of Health Services. Final determination is expected in early 1995. The Alameda reservoirs are of lower quality in that they are subject to high turbidities due to the large amounts of sediments in runoff. These reservoirs are also subject to periodic episodes of algae growths which cause taste and odor as well as high disinfection by-product (DBPs) levels. The San Mateo reservoirs have good water quality owing to the fact that over time they taken on the characteristics of the imported Hetch Hetchy water and not the local runoff.

Influence of Delta Water: During the prolonged drought the City transferred supplemental water supplies through connections to the South

Bay Aqueduct into the San Antonio Reservoir in Alameda county. The Water Department also took in SBA water in the drought of 1978 but since THM monitoring was not initiated until 1979 effects on DBP's were not documented. In 1990 through 1991 the department received 57,000 acre feet of SBA water at San Antonio Reservoir. The Delta water had an immediate impact on the water quality at the Sunol Plant and the Hetch Hetchy Aqueduct. Trihalomethanes, especially brominated THMs, increased in the Sunol effluent and when mixed with Hetch Hetchy water raised the system wide DBP levels to the violation range. The Water Department had contracted to purchase 82 TAF but cut off deliveries at 57 TAF in order to prevent a THM violation.

The Sunol Filter Plant was constructed in 1966 and uses complete treatment with free chlorine as the disinfectant. The plant was not set up to optimize DBP precursors or use chloramination as a disinfectant. Use of chloramines is contra-indicated because the plant would not comply with CT requirements of the SWTR. An equally significant contra-indication is the mixing of chloraminated water with the free chlorinated Hetch Hetchy water.

To control the raw water Total Organic Carbon levels the reservoir was treated with copper sulfate to prevent algal blooms. The treatment plant operators used a non-chlorine oxidant, potassium permanganate, and powdered activated carbon (PAC) to control DBPs. These efforts had little effect on lowering the effluent DBPs. In the end the Water Department General Manager recommended a halt to the deliveries and a delay in the use of the Delta water until the water could be blended with Hetch Hetchy water to comply with THM regulations.

The impacts were not limited to the Alameda reservoirs. Seasonal supplies stored in Crystal Springs and treated at San Andreas Filter Plant have shown increases in brominated THM species. This suggests that the bromide ion concentration in these reservoirs is reaching a significant

level. It is clear that prolonged use of Delta water would eventually raise the DBP levels in the San Mateo supplies to unacceptable levels. Ozone has been recently installed at San Andreas. The impact of the Delta water on Crystal Springs will have to be evaluated after the ozone treatment process is optimized.

Future Water Treatment: The San Francisco Water Department has a multi-year study to evaluate and upgrade treatment processes for all of its water supplies. Sunol will begin a pilot plant evaluation testing in September 1993, after the pilot plant work is finished on the Hetchy supply. The use of Delta water in the past few years and the possibility of future use has dictated a new study protocol to evaluate the treatability of Delta waters and its mixtures.

The department has also been following the Disinfection By-product Regulation Negotiation process (Reg/Neg) in an attempt to project the future treatment issues for Sunol and any other plants that directly or indirectly receive Delta Water in the future. As the Reg/Neg process nears its conclusion there are some difficult issues facing the water industry. The raising of microbiological standards in the Enhanced Surface Water Treatment Rule (ESWTR), the lowering of DBP levels to 80 & 60 $\mu\text{g/l}$ for THM and HAA and the use of a TOC MCL to establish the Best Available Technology (BAT) will put all Delta water users in a difficult position vis a vis water treatment. The projected low level standards for DBPs of ozonation, bromate in particular, may dim the potential use of ozone at the Sunol. This seems contradictory in light of the likely that an ESWTR would raise the required virus and parasite removals from unprotected waters like the Delta. If the Sunol Plant is upgraded to meet the ESWTR requirements and the projected DBPs it is likely to require the use of chloramines as the final disinfectant. If so the Hetch Hetchy and San Andreas systems will have to follow suit to prevent the problems of mixing free and chloraminated waters in the distribution system. The

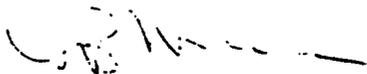
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system-wide use of chloramination will cost tens of millions of dollars at a minimum and much more if Hetch Hetchy treatment is effected.

As to the future use of Delta water supplies our treatment people are concerned because of the tightening rules on microbiological contaminants and DBPs. Our limited, but intense, exposure to a relatively small amount of Delta water has convinced us that our whole system water quality would be effected by the Delta water. The use of Delta water on a sustained basis is likely to put San Francisco on a treadmill of trying to find the acceptable treatment that protects our customers from disease and does not produce cancer causing by-products. The microbiological standards will rise and the DBP levels will lower without doubt. Can treatment technology keep up with the standards? Our feeling is that it would take extraordinary change in our system to accommodate Delta water in our system. We are concerned that it would directly or indirectly lower the quality of the water we have spent decades protecting.

Let me know if I can supply you with any more information on San Francisco's experience with Delta water.

Sincerely,



Anson Moran
Acting General Manager