



IRVINE RANCH WATER DISTRICT

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Dena McCann
Division of Water Quality
State Water Resources Control Board
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Sacramento, CA 95814
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Subject: Chlorine and Chlorine Produced Oxidants CEQA Scoping Comments

Dear Ms. McCann:

Thank you for the opportunity to comment on the proposed Total Chlorine Residual and Chlorine-Produced Oxidants Policy being proposed by the State Water Resources Control Board. The Irvine Ranch Water District (IRWD) has been distributing recycled water directly to customers since 1968 and over that time has developed a wealth of experience on the efficacies of using chlorine and maintaining chlorine residuals in a large recycled water system. The purpose of these comments is to provide considerations to be evaluated in the development of the Functional Equivalent Document (FED) for the proposed statewide chlorine residual regulation.

Background

IRWD currently delivers recycled water to the City of Irvine and parts of the cities of Newport Beach, Foothill Ranch, Lake Forest, and unincorporated Orange County. IRWD has two treatment plants which discharge into distribution systems for the immediate use of recycled water or storage of water for future return into the distribution system. The water leaving the treatment plants is chlorinated to meet Title 22 requirements and a chlorine residual is maintained to ensure the biological stability of the water. Water not immediately needed for irrigation or other uses is first stored in closed reservoirs. Water in excess of short term needs is stored in large open storage reservoirs, some of which are listed as waters of the state. IRWD dechlorinates water delivered to the reservoirs listed as waters of the state.

Benefits of Chlorine

The FED should include an evaluation of the benefits of using chlorine in operating and maintaining recycled water distribution systems especially those systems that utilize open reservoirs which satisfy seasonal and drought induced irrigation demands. Chlorine is a broad spectrum biocide which kills pathogenic organisms and persists for a short period to ensure that

pathogens do not reoccur. It is these characteristics that make chlorine the preferred method to disinfect and stabilize water that is delivered for human consumption and non-consumptive uses such as irrigation and industrial use.

Chlorine provides a substantial benefit for water distribution systems because of its ability to stabilize the water and slime layers that are present in all water distribution systems. In general, recycled water systems contain more nutrients and organic carbon and are more biologically active than domestic water systems. To provide a customer acceptable water, the recycled water needs to be stable with respect to water quality and biological quality. Chlorine provides that stability. In IRWD's experience, there is no evidence that chlorine residuals in the mg/l range have any effect on the use of recycled water for agricultural or urban irrigation or the industrial use of recycled water. On the contrary, there is evidence that chlorine will inhibit the development of diseases in the germination of turf grass seed.

IRWD discharges to surface water reservoirs and does not discharge into streams and, as a result, it will not comment on discharges into flowing waters. However, based on discharges into surface water reservoirs chlorine in the mg/l range does not appear to cause any impairment. IRWD has been discharging to surface waters since 1968 and until the late 1990s was not required to dechlorinate before discharging into its reservoirs. During this period there was no evidence that chlorine residuals in the mg/l range caused any impairment to phytoplankton, zooplankton, or fish biology in the reservoirs. One reservoir has a substantial bass and catfish habitat and contains all the small feeder fish and invertebrates that are necessary to provide a viable and sustainable fish habitat. The chlorine in the recycled water discharged into the reservoir has not been associated with any decline in the quality of the fish habitat.

Mixing Zones

The proposed regulation does not allow for mixing zones and IRWD believes that this provision was inadequately evaluated. The FED should quantitatively show that disallowance of mixing zones at the levels of chlorine proposed will improve the quality of a water body. Chlorine is not a conservative pollutant. Water containing a chlorine that is discharged into a water body that has a chlorine demand, as most surface waters do, will lose the chlorine to satisfy the chlorine demand. In addition, chlorine is reduced by exposure to sunlight which further increases the chlorine decay rate. The final result is that the chlorine will be reduced to levels more rapidly than chlorine reduction based on dilution alone, minimizing any effect in the water body.

Chlorine Removal Practices

The FED should provide a comprehensive discussion of chlorine removal practices. The proposed regulation states correctly that chlorine can be easily and effectively removed from water, to which IRWD is in full agreement. The issue for IRWD is the process and instrumentation required to effectively remove chlorine to the levels proposed in the policy are difficult to achieve. With surface water reservoirs at the end of the distribution system the dechlorination equipment sees widely varying concentrations of chlorine and flows which need

to be dechlorinated. To remove chlorine first the amount of chlorine needs to be determined and correlated to the flow. Then a dechlorinating agent needs to be added and mixed. The chemical addition process is quite stable when the concentration of chlorine and the flow remain essentially constant. However in the terminal storage reservoir application at IRWD, both the chlorine residual and flow can vary by at least an order of magnitude in the period of several minutes. Dechlorination equipment is not capable responding to such rapid changes in chlorine residual or flow. As a result dechlorination will tend to over dechlorinate or under dechlorinate in the term of minutes, even though a longer term dechlorination average will result in a complete removal of chlorine. The proposed regulation requires continuous monitoring at a one minute interval. This interval will show frequent excursions above the proposed limit because of the inability of the dechlorination measurement and dosing process to respond completely in the one minute time interval being proposed.

The IRWD does not agree with the statement that adoption of the proposed policy will minimize the current violations of chlorine residual. It is more likely that the number of violations will increase significantly. Chlorine is still needed at its current levels for disinfection and water quality stabilization. Because the proposed limit is much lower and the dechlorination process is unable to respond adequately to fluctuating chlorine levels and flows, significantly higher violations should be expected.

Environmental Quality Enhancement

The FED should provide an evaluation of the success and failures in meeting the proposed chlorine levels. In addition, the FED should clearly show that reducing chlorine to the levels proposed will improve environmental quality, not merely state that if removing chlorine to the existing levels is good, then reducing the chlorine levels to the proposed limits is better. We know that the proposed policy is based on USEPA studies published in 1984 and that the state has not implemented the more stringent limits. IRWD is also aware that chlorine in varying amounts has been discharged into waters of the state since chlorine disinfection became a common practice almost a century ago. The greatest improvements in the quality of waters of the state are the result of removing biologically available organic matter and toxic compounds which persist in the environment. This improvement of water quality has occurred without such stringent regulation on chlorine discharges into waters of the state. IRWD recognizes that there has been some stringent control of chlorine in specific discharges and that such control has resulted in localized improvement in beneficial use, however, IRWD has not seen the broad improvement in beneficial use that should be expected from the stringent regulation of chlorine. To validate the need for stringent chlorine levels, the State should quantify the broad benefits of the stringent control of chlorine discharges. It appears that the proposed chlorine regulation is based on laboratory studies rather than studies carried out in the environment. It is important to rely on environmental studies, because laboratory studies are not sophisticated enough to mimic all of the variabilities that are present in the natural environment. IRWD experiences are based on the natural environment.

Local Environmental Considerations

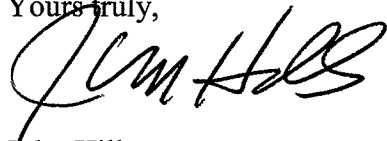
The FED should provide an evaluation of the over riding environmental advantage to establishing a statewide chlorine standard, rather than allowing development of regional chlorine standards. We know that water quality ranges from snow melt in the Lahotan Region to ephemeral brackish pools in the desert regions to salt water along the coast and that the environmental effects of chlorine will be different in each region. Because chlorine decays quite rapidly with respect to water movement, it is unlikely that chlorine in water will migrate into other areas with different water quality characteristics. As described above, chlorine decay is a function of chlorine demand in the receiving water and physical parameters such as sunlight relegating the effects of chlorine to rather small portions of the watershed or water body. Such effects are best regulated through the basin planning process, rather than establishing statewide standards then require development of site specific objectives for individual discharges.

Summary

In summary, the proposed regulation will probably not result in a degradation in the environment, but at the same time, will probably not enhance the natural environment. Years of discharging chlorine into surface water reservoirs has shown no discernable effect, therefore reducing the chlorine to essentially zero is unlikely to have any discernable effect. IRWD requests that the FED provide sufficient evaluations which validate the need for a more stringent regulation of chlorine.

If you would like additional information, please call me at 949-453-5850 or e-mail me at hills@irwd.com.

Yours truly,

A handwritten signature in black ink, appearing to read "John Hills", written over the typed name.

John Hills
Director of Water Quality