UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
777 Sonoma Avenue, Room 325
Santa Rosa, California 95404-4731

June 23, 2014

Mr. Bruce Wolfe, Executive Officer
California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street
Oakland, CA 94612

Dear Mr. Wolfe:

NOAA's National Marine Fisheries Service (NMFS) thanks you for the opportunity to comment on the tentative general waste discharge requirements (WDR) for discharges of water from drinking water supply distribution, transmission and groundwater systems. NMFS is the lead Federal agency responsible for the stewardship of the Nation's living marine resources through science based conservation and management, and the promotion of healthy ecosystems. As a steward, NMFS conserves, protects, and manages living resources in a way that ensures their continuation as functioning components of marine ecosystems, affords economic opportunities, and enhances the quality of life for the American public. Much of our work involves conserving, protecting, and recovering species listed as threatened or endangered pursuant to the Federal Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.).

NMFS reviewed the WDR for potential effects on essential fish habitat (EFH) designated under the Magnuson-Stevens Fishery Conservation and Management Act (MSA). For the purposes of the MSA, EFH means "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity", and includes the associated physical, chemical, and biological properties that are used by fish (50 CFR 600.10), and "adverse effect" means any impact which reduces either the quality or quantity of EFH (50 CFR 600.910(a)). In many ways, the implementation of these statutes is similar to San Francisco Bay Regional Water Quality Control Board's (Water Board) efforts to protect designated beneficial uses under the Clean Water Act related to marine and anadromous species (COLD), threatened and endangered species (RARE) and the habitats (MAR, EST, FRSH, MIGR, SPWN) they utilize.

In general, NMFS is supportive of the tentative WDR because it takes the important step of applying the Environmental Protection Agency's (EPA) acute water quality criterion for chlorine as the hourly average effluent limitation for total residual chlorine. This interprets the Water Board's narrative toxicity standard and assigns permittees a level to which they must treat

covered discharges for compliance. The acute criteria for chlorine is 0.019 milligrams per liter (mg/L or parts per million).

Chlorine is highly toxic to aquatic life and is commonly used as a disinfectant in municipal drinking water systems. Chlorine does not easily pass through the gill membranes of fish. Rather it destroys the cells of the gills by oxidation. This reduces their ability to draw oxygen from the water and may result in mortality. In the event that the exposure does not kill the individual, it may harm them by impairing their ability to maintain behaviors which require significant oxygen replenishment in the blood system such as swimming at high speeds for feeding or predator avoidance or swimming against currents.

Chlorine is toxic to aquatic life at levels maintained in municipal systems as required residuals and salmonids are among the most sensitive species to chlorine. EPA's ambient water quality criteria for chlorine document (EPA 1985) contains numerous test results for salmonids used in the development of the water quality standards. The lethal concentrations to 50% of the test organisms (LC50) are presented for coho salmon and rainbow trout (which is commonly used as a surrogate species for steelhead trout) in freshwater as well as for brook, cutthroat and lake trout. Please note that concentrations lower than the LC50 may still be lethal or harmful to organisms, but typically to a somewhat lower percentage of the test population, and that 50% mortality is obviously an unacceptable level of impact.

Eleven tests are presented for juvenile coho salmon with the resulting LC50s ranging from 0.057 to 0.082 mg/L. One test is presented for coho fry with a LC50 of 0.069 mg/L. There are also two coho LC50s without a noted lifestage and these are presumably for adult fish. The resultant LC50s are 0.102 and 0.123 mg/L. Results are similar for the rainbow trout tests with one sac fry lifestage test resulting in a LC50 of 0.052 mg/L, four fry lifestage tests resulting in LC50s ranging from 0.040 to 0.084 mg/L and one juvenile lifestage test resulting in an LC50 of 0.069 mg/L. Only one adult test result is given with an LC50 of 0.110 mg/L. This data point was interpolated from a figure in a 1958 study. However, it is in the range of those found quantitatively for coho salmon.

For your information, the one lake trout study was on juvenile fish and resulted in a LC50 of 0.060 mg/L. Twenty-seven brook trout data points are presented covering lifestages from sac-fry to juveniles. The LC50s range from 0.060 to 0.179 mg/L resulting in a mean acute value of 0.117 mg/L for brook trout. Five juvenile cutthroat trout tests resulted in LC50s ranging from 0.075 to 0.095 mg/L.

The EPA report (EPA 1985) also notes that numerous toxicity tests have been conducted using shorter exposure times, but the results of these tests were not presented in the criteria document because they do not meet the standard water quality criteria protocols. However another reference text (Alabaster and Lloyd 1982) does summarize some short term tests.

Grande (1966 in Alabaster and Lloyd 1982) found that Atlantic salmon exposed to 0.100 mg/L chlorine in soft water had a mean survival period of 1.2 days, but at 0.130 mg/L it was reduced

to 8 hours and at 0.300 mg/L it was only 3 hours. Scheuring and Stetter (1950-1951 in Alabaster and Lloyd 1982) reported that "trout" died in 16 to 24 hours at a chlorine concentration of 0.100 mg/L. Taylor and James (1928 in Alabaster and Lloyd 1982) found that rainbow trout fingerlings and yearlings died in 2 hours at chlorine concentrations of 0.300 mg/L and in 4-5 hours at concentrations of 0.250 mg/L. Brooks an Seegert (1977 in EPA 1985) and Latimer *et. al* (1975 in EPA 1985) also noted that the effects of short exposures will probably be underestimated if the observation period is not extended to take into account delayed effects.

Additional in situ and field tests using caged sockeye salmon, pink salmon and rainbow trout are discussed in a 1993 Canadian government Priority Substances List Assessment Report on chlorinated wastewater effluents (Environment Canada 1993). Servizi and Martens (1974 in Environment Canada 1993) found 100% mortality of caged sockeye salmon fingerlings at five stations between 9 and 92 meters downstream of a municipal waste treatment facility. The total residual chlorine at the 92 meter site was 0.070 mg/L. Twenty percent mortality occurred at another station 185 meters downstream where the total chlorine residual was 0.020 mg/L. The causative agent for the mortality was likely chlorine because undiluted effluent from the facility which was dechlorinated to a level below the detection limit of 0.020 mg/L did not cause mortality to the juvenile salmon.

The Ontario Ministry of the Environment conducted similar in situ studies downstream from several municipal waste treatment facilities using caged rainbow trout. Chemical configuration of the three different receiving waters indicated that total residual chlorine levels above approximately 0.040 mg/L were associated with 100% mortality during acute exposures. When one location began using ultraviolet light for disinfection rather than chlorination, the observed mortality of rainbow trout dropped from 100% to less than 6% at the 53 meter station.

While the designation of a numeric effluent limitation should clearly notify permittees of the requirements, this fact should be called out more strongly in the draft WDR especially since the Water Board is proposing to relax the minimum level (ML) required for field monitoring from MLs established in previous permits (0.05 or 0.08 mg/L to 0.130 mg/L in the proposed WDR). The proposed ML is above most of the LC50s reported in the literature reviewed in the previous paragraphs. NMFS suggests adding clarifications throughout the WDR as appropriate, but especially in the footnote of Table 2 – Effluent Limitation, that dechlorination systems must be planned and sized to rapidly reduce total chlorine residual levels below the effluent limitation.

The Water Board should consider retaining a ML from a previously approved permit, specifically the 0.05 mg/L ML. The draft WDR discusses that the ML is proposed to be relaxed due to an draft EPA guidance document that is two decades old (EPA 1994) and an appendix in a permit manual from the state of Missouri (Missouri DNR 2004). These documents propose using a standard deviation of 3.18 multiplied by the method detection level established for the particular instrument (which already includes a 3.14 standard deviation multiplier in the method detection level calculation) in order to minimize the chances of obtaining a false positive test result. However, in the case of an exceedingly toxic contaminant such as chlorine that may impact ESA listed species and the RARE designated beneficial use, the focus should be

on preventing false negative test results. If a sample above the ML is detected with a field instrument, immediate resampling could be required by the Water Board to confirm or provide evidence of a false positive result. Additional observations (*e.g.* from biological monitors at the receiving water, notes regarding detectable odors of chlorine in the discharge, *etc.*) could also be required in these cases.

The permit manual from Missouri (Missouri DNR 2004) also notes that the single instrument tested (a Hach colorimeter, presumably state of art for the time) produced very accurate monitoring results down to approximately 0.025 mg/L total residual chlorine. A standard deviation of 3.14 was applied to determine the method detection limit for this instrument resulting in a calculated MDL of 0.04 mg/L which is three times lower than the proposed ML in the draft WDR. The document (Missouri DNR 2004) noted that the state of Kansas elected to use the 0.04 mg/L value as their enforceable limit, presumably to be more protective of their aquatic resources. Using a lower ML would also encourage permittees to utilize more accurate instrumentation and could be influential in convincing manufacturers to rate and guarantee the accuracy of their meters at the lower end of their detection levels.

NMFS also recommends requiring more frequent evaluations of BMPs by dischargers covered under the proposed WDR. For prolonged discharges (*i.e.* more than a few hours, especially those which are planned) at least an hourly check to ensure adequate BMP operation and maintenance is reasonable. The proposed effluent limitation and EPA criteria are only supposed to be violated for one hour or less. Therefore additional BMP evaluation is needed to ensure the discharge is protective and to rapidly detect any upsets in the treatment system.

Permittees are required in several clauses in the draft WDR to contact the California Office of Emergency Services in the event of a discharge resulting in adverse water quality impacts. These sections also mention that NMFS may need to be contacted. Where appropriate, please instruct permittees to contact the Santa Rosa Area Office at (707) 575-6050 with the appropriate information. The draft WDR should also note that the permittees may be authorized by and required by NMFS or another contacted agency to gather fish mortalities under standard chain of custody procedures. These will be collected by NMFS or the California Department of Fish and Wildlife, as appropriate.

NMFS supports the Water Board's proposed copper management provisions in the draft WDR as well as the requirement to begin monitoring at the moment of initial discharge for planned discharges. In the event of an unplanned discharge event, a grab sample should be taken if possible in order to document the concentration of chlorine or other contaminants being released into receiving waters. Otherwise, the planned residual level of chlorine for the system will have to be presumed to have been released to the environment.

When monitoring at the initial moment of discharge shows the release is in compliance with WDR requirements, NMFS suggests that monitoring be required every 15 minutes for a period of 4 hours for all chlorinated discharges. This will show that the treatment system and BMPs are in place, working as planned, and stable. This could be followed by a minimum requirement

of hourly monitoring to show that the one hour effluent limitation is not being violated and to detect any upset in the treatment system. Assuming that field instrumentation is being used for this monitoring, the requirement is reasonable to protect designated beneficial uses. Thank you for the opportunity to provide comments on the tentative general WDR for discharges of water from drinking water supply distribution, transmission and groundwater systems. NMFS appreciates that the Water Board is proposing to adopt a numeric criteria for chlorine which is expected to lead to improved protection for receiving waters and ESA species they may contain. NMFS looks forward to receiving responses to our recommendations for improving the protectiveness of the draft WDR. Please contact Joe Dillon at (707) 575-6093 or Joseph.J.Dillon@noaa.gov if you have any questions concerning this letter.

Sincerely,

Joyce Ambrosius

Joyce Ambrosius
Acting North Central Coast Office Supervisor
North-Central Coast Office

Cc: David Smith, US EPA Region IX, San Francisco, CA
Susan Glendening, SF Bay Regional Water Board, Oakland, CA
Copy to ARN File # 151416WCR2014SR00144

References:

Alabaster, J. S. and R. Lloyd, 1982. Water Quality Criteria for Freshwater Fish, Second Addition. Published by Buterworth Scientific by arrangement with the Food and Agriculture Organization of the United Nations. ISBN 0-408-10849-5. 361 pages.

Environment Canada 1993. Canadian Environmental Protection Act Priority Substances List Assessment Report, Chlorinated Wastewater Effluents, Government of Canada, Environment Canada, Health Canada. 40 pages. Available at: http://www.hc-sc.gc.ca/ewh-semt/pubs/contaminants/psl1-lsp1/chlorinated_wastewater_effluents_eaux_chlorees/index-eng.php#syn

Environmental Protection Agency 1994. National Guidance for the Permitting Monitoring and Enforcement of Water Quality-based Effluent Limitations Set below Analytical Detection/Quantitation Levels [Draft]. March 1994. 116 pages. Available at: http://yosemite.epa.gov/water/owrccatalog.nsf/7322259e90d060c885256f0a0055db68/5af468b67a5ca82d85256b060072415b!OpenDocument

Environmental Protection Agency 1986. Quality Criteria for Water (Gold Book) 1986. United States Environmental Protection Agency, Office of Water, Regulations and Standards, Washington DC 20460. EPA 440/5-86-001. May 1, 1986. 477 pages. Available at: http://water.epa.gov/scitech/swguidance/standards/criteria/aqlife/upload/2009_01_13_criteria_goldbook.pdf

Environmental Protection Agency 1985. Ambient Water Quality Criteria for Chlorine – 1984. United States Environmental Protection Agency, Office of Water, Regulations and Standards, Criteria and Standards Division, Washington DC 20460. EPA 440/5-84-030. January 1985. 65 pages. Available at: http://water.epa.gov/scitech/swguidance/standards/upload/2001_10_12_criteria_ambientwqc_chlorine1984.pdf

Missouri Department of Natural Resources 2004. Permit Manual, Appendix T: Total Chlorine Residual. 2 pages. Available at: http://www.dnr.mo.gov/env/wpp/permits/manual/T_0.pdf