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6/21/06 BdMtg Item ___
Chlorine Policy
Deadline: June 5, 2006

TO: Ms. Dena McCann
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Division of Water Quality
State Water Resources Control Board

FROM: John H. Robertus
Executive Officer
SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD

DATE: June 5, 2006

SUBJECT: Comments on Draft Statewide Chorine and CPO Policy

Thank you for the opportunity to comment on the draft Total Residual Chlorine and Chlorine-Produced Oxidants Policy. The following are comments from the San Diego Regional Water Board Staff:

1. Water Quality Objectives

   The USEPA recommends that water quality criteria (called water quality objectives in California) for the protection of aquatic organisms be stated as Criteria Chronic Concentration (CCC) and Criteria Maximum Concentration (CMC). The USEPA states that CCCs and CMCs should consist of a magnitude, duration (averaging period), and allowable frequency of exceedance of the criteria [see USEPA's *Technical Support Document for Water Quality Based Toxics Control* (TSD), page 36-38]. The duration of CCCs and CMCs are given as a 4-day average and as a 1-hour average, respectively, while the exceedance frequency for both CCC and CMC are stated as once every three years.

   Chronic and acute toxicity responses are biologically different responses requiring different criteria. Consequently, the CCC is established as a receiving water concentration that protects against chronic toxicity responses while the CMC is a receiving water concentration that protects against acute toxicity responses. The USEPA's *Ambient Water Quality Criteria for Chlorine -1984*, recommends a CCC and a CMC for chlorine, each consisting of a magnitude, duration and exceedance frequency. When calculating effluent limitations, permitting authorities must calculate effluent limitations based on the CCC or CMC, whichever is determined to be more protective.

The water quality objectives (WQOs) of the draft policy are stated as 4-day and 1-hour averages without a statement of frequency of exceedance and without regard to acute or chronic toxicity effects. Consequently, while the proposed WQOs of the draft policy are numerically equal to the USEPA national chlorine criteria recommendations contained in *Ambient Water Quality Criteria for Chlorine –1984*, the draft policy misinterprets CMCs and CCCs. The proposed WQOs do not have the same effect as CCCs and CMCs, and may not be sufficiently protective of receiving waters. The proposed chlorine WQOs are also not expressed in the same manner as other WQOs in the California Toxics Rule, which are also given as CCC and CMC. The draft policy should contain WQOs stated as CCCs and CMCs rather than 4-day and 1-hour average concentrations.

The Draft Substitute Environmental Document for the draft policy suggests that the US EPA's recommended chlorine criteria is being recommended for adoption; however, this suggestion is inaccurate since not all aspects of the recommended criteria are included in the draft policy. No explanation has been provided why the proposed WQOs deviate from the USEPA recommended criteria and why they are not stated as CCCs and CMCs.

2. Calculation of Effluent Limitations

The effluent limitation calculation procedure of the draft chlorine policy consists of merely assigning the proposed 4-day and 1-hour average WQOs as effluent limitations without regard to effluent variability and effluent sampling frequency. The proposed calculation procedure is contrary to procedures in the USEPA's TSD and the State Water Board's *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (SIP) for developing appropriate effluent limitations from CCCs and CMCs.

The TSD and SIP procedures both utilize the concept of long-term averages based on either the CCC or CMC. For a discharge without dilution in the receiving water and with typical effluent variability, the long-term average concentration in the effluent would necessarily have to be lower than either the proposed 4-day or 1-hour average concentrations in order to meet the CCC or CMC (whichever is more protective) in the receiving water. The more frequently an effluent is monitored, the closer the average effluent concentration can be expected to be to the long-term average. US EPA's *Ambient Water Quality Criteria for Chlorine –1984* does not provide any information that would suggest that the recommended CCC and CMC for chlorine should be treated differently than water quality criteria for any other toxic pollutant with regards to effluent limitation calculation. Based on our assessment, because the draft policy's proposed calculation procedures differ from the TSD and SIP and because the proposed WQOs are not expressed as CCCs and CMCs, the

draft policy could result in allowing higher chlorine concentrations in receiving waters than the acceptable concentrations recommended by USEPA to protect against toxic effects.

Dechlorination procedures and systems at existing permitted facilities may not be able to remove chlorine and chlorine-produced oxidants in the effluent to the levels required if effluent limitations were calculated based on CCCs and CMCs and according to the TSD and SIP. However, current treatment capabilities should not be the only factor considered in determining what WQOs are necessary to maintain beneficial uses and should not be a primary reason for deciding which calculation procedures are adopted by the State Water Board.

Also, because current analytical methods may not be able to detect chlorine and chlorine-produced oxidants (CPO) at the level of the WQOs and the effluent limitations, and therefore actual compliance cannot be ascertained, the draft policy should require a pollution prevention program, as is currently required in the SIP.

3. Definition of Chlorine-Produced Oxidants

The draft policy defines chlorine-produced oxidants (CPO) as "the sum of oxidative products [HOBr, OBr-, and bromamines] in salt water". This definition is not entirely accurate. The *Ambient Water Quality Criteria for Chlorine –1984* states that the terms "total residual chlorine" and "chlorine-produced oxidants" are both intended to refer to the sum of free and combined chlorine (Cl2, HOCl, OCl-, and chloramines) and the bromine species as measured by the methods for "total residual chlorine." While chlorine will react with bromide ions found in saltwater to form HOBr, OBr-, and bromamines, the reaction depends on pH, salinity, and amount of available amino-nitrogen compounds (see Sugam and Helz, 1977) such that it should not be assumed that CPOs are all only in the form of bromine species. It is likely that in lower salinity portions of bays and estuaries, CPOs would be in the form of both chlorine and bromine species. In the least, the draft policy's CPO definition should state that CPO is to be measured for receiving waters using analytical methods for total residual chlorine.

Because freshwater effluents, prior to chlorination and prior to discharge into saline receiving waters, would likely not contain significant bromine species if the effluent did not initially contain sufficient bromide ions, the draft policy should also explicitly state that effluent limitations for discharges to saline receiving waters are to be expressed as total chlorine residual.

4. Expression of Effluent Limitations

   The rationale for the use of 4-day and 1-hour average effluent limitations instead of monthly, weekly and daily averages should be supported with scientific information so that the policy, when adopted, is less subject to legal challenges when used as a basis for permitting by the Regional Boards, especially with regards to POTWs. The *Ambient Water Quality Criteria for Chlorine -1984* cites many toxicity studies that indicate LC50 toxicity to aquatic systems from chlorine that are observed within several hours to several days, and these were the bases for the US EPA's recommended chlorine CCCs and CMCs. The statement in the draft policy that "chlorine residual can be acutely toxic within minutes of exposure to fish and other aquatic life" should be supported with information about what is meant by "acutely toxic" and what chlorine concentrations are toxic within minutes. It would be in the best interest of the environment, dischargers, the State Water Board, and the Regional Boards to implement legally sound policies.

5. Non-Detect Measurements

   The draft policy states that measurements that are non-detect (ND) shall be considered zero. Substitution with zero could tend to bias low the calculated average and therefore give an apparent lower average chlorine concentration than what is actually discharged to the environment. The proposal should instead recommend improved statistical approaches for handling non-detects and other censored data, such as nonparametric methods, similar to the procedures in the SIP and Ocean Plan, or parametric "maximum likelihood" methods.

6. Calculations of Rolling or Discrete Averages

   If 4-day and 1-hour average effluent limitations are retained in the draft permit, please explain why the draft policy provides discretion in calculating these averages as either rolling or discrete averages. For consistency between regional boards and between permits issued by a regional board, the draft policy should select either rolling or discrete averages, but should not allow both.

If you have any question regarding the above, please contact Mr. Victor Vasquez at (858) 636-3155, or via e-mail at vvasquez@waterboards.ca.gov.

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