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Total Residual Chlorine and
Chlorine-Produced Oxidants Policy of California

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DIVISION OF WATER QUALITY
STATE WATER RESOURCES CONTROL BOARD
CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

Table of Contents

<i>Introduction</i>	3
<i>Policy Applicability</i>	3
<i>PART I</i>	
<i>Objectives</i>	4
<i>PART II</i>	
<i>Determining the Need for Water Quality-Based Effluent Limits</i>	4
<i>Calculation</i>	4
<i>Compliance Schedules</i>	4
<i>Monitoring and Reporting Requirements</i>	5
<i>Detection Level</i>	5
<i>Site-Specific Objectives</i>	6
<i>Acronyms</i>	7
<i>Definition of Terms</i>	8

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TOTAL RESIDUAL CHLORINE AND CHLORINE-PRODUCED OXIDANTS POLICY OF CALIFORNIA

Introduction-

Chlorine is toxic to aquatic life in both *freshwater* and *saltwater*. Thus, every discharger that uses chlorine has the potential to cause *acute toxicity*. Although a chlorination-*dechlorination* process can be used and maintained, the chlorination-*dechlorination* process can be incomplete, leaving *total residual chlorine* (TRC) in freshwater, or *chlorine-produced oxidants* (CPO) in saltwater. Consequently, TRC and CPO in wastewater discharges must be regulated.

The approach for addressing TRC and CPO varies between regions, and violations of these different approaches have become unclear. A statewide chlorine policy for TRC and CPO is needed to promote consistency and improve clarity for dischargers and Waterboard permit writers.

This Policy establishes:

1. TRC and CPO objectives that apply to all *inland surface waters* and *enclosed bays* and *estuaries* throughout the State to protect aquatic life beneficial uses;
2. Consistent procedures that apply to non-storm water *National Pollutant Discharge Elimination System* (NPDES) permits to regulate TRC and CPO discharges; and
3. A basis for equitable enforcement of violations of TRC or CPO effluent limitations in non-storm water NPDES permits.

Policy Applicability -

This Policy establishes, in Part I, TRC and CPO objectives that apply to all inland surface waters and enclosed bays and estuaries in California. The objectives protect the aquatic life beneficial uses of these waters, including uses for warm freshwater habitat, cold freshwater habitat, inland saline water habitat, estuarine habitat, rare, threatened, or endangered species, migration of aquatic organisms, and spawning, reproduction and/or early development. Part II of this Policy establishes implementation procedures for the objectives. Part II applies only to non-storm water NPDES permits. The Policy supersedes any and all numeric TRC or CPO objectives and implementation provisions for TRC or CPO in regional water quality control plans (Basin Plans) for the same waters.

PART I

Objectives-

The following objectives apply to all inland surface waters and enclosed bays and estuaries to protect freshwater and saltwater aquatic life:

	1-hr average (mg/L)	4-day average (mg/L)
TRC (freshwater)	0.019	0.011
CPO (saltwater)	0.013	0.0075

PART II

Determining the Need for Water Quality-Based Effluent Limits-

Any discharger that uses chlorine in its processes will receive an effluent limit.

Calculation-

Effluent limitations shall be expressed as the objectives above, *1-hour average* and *4-day average*. Although, NPDES regulations, according to 40 Code of Federal Regulations (CFR) section 122.45(d), require that all permit limits be expressed as both average monthly and maximum daily limits for non-Publicly Owned Treatment Works (POTWs) and average weekly and average monthly limits for POTWs, unless impracticable. Because chlorine residual can be acutely toxic within minutes of exposure to fish and other aquatic life, weekly and monthly limits are not protective of aquatic life and are, therefore, impracticable.

Compliance Schedules-

Where an *existing* discharger demonstrates that it is *infeasible* to promptly comply with a new or more restrictive effluent limit or other provision of this Policy, the discharger may request a compliance schedule from the permitting authority. A compliance schedule can be requested from existing dischargers, for example, to investigate the feasibility of acquiring new equipment, hire or train staff, or reconfigure treatment processes to help achieve compliance with this Policy.

A schedule of compliance shall require actions to be undertaken for the purpose of achieving compliance with this Policy. These actions shall demonstrate reasonable progress toward attaining TRC and/or CPO effluent limitations or other provisions of this Policy.

The discharger must provide justification for the allowance of a compliance schedule, which shall include the following:

1. Documentation of efforts to control chlorine residual;
2. Documentation that facility upgrades are underway, if applicable;
3. Documentation of an overall plan to gain compliance; and
4. A demonstration that the proposed schedule is as short as practicable.

Compliance schedules shall not exceed two years from the date that the permit is issued, reissued, or modified to include the new or more stringent effluent limits or other policy requirements. The compliance schedule shall include interim TRC or CPO limitations that apply during the compliance period. Compliance schedules shall not be allowed in permits for *new dischargers*.

Monitoring and Reporting Requirements -

Continuous monitoring shall be required in all facilities. Continuous monitoring is defined as one or more data points, every minute. The Regional Water Board may, however, except facilities on a case-by-case basis from the continuous monitoring requirement where the discharger demonstrates and the Regional Water Board determines that continuous monitoring is inappropriate. For example, facilities with very small, intermittent flows lasting for minutes can appropriately be excepted.

When continuous monitoring systems are off-line for calibration and maintenance, a back-up system must be in place to show compliance. These systems can include, but are not limited to, monitoring for dechlorination residual, redundant analyzer, *Whole Effluent Toxicity* (WET), or grab samples (according to 40 CFR 136.3 Table 1B) using U.S. Environmental Protection Agency approved methods. Grab samples must adequately characterize the discharge. This means at least one sample in 30-minute intervals, both at the end of pipe and in the receiving water until the continuous monitoring system is back on-line.

Effluent limitations must be met at the end-of-pipe, with no zone of initial dilution. Any excursion over the 1-hour average or 4-day average is a violation. Both non-detects (ND) and negative values shall be considered zero.

Detection Level -

On-line devices must have a manufacturer's stated detection limit, scale range, or sensitivity of 1 part per billion (0.001 parts per million). During calibration processes, the discharger shall limit the calibration solution to no more than 500 parts per billion (0.500 parts per million) and verify the solution concentration by Method 4500-Cl E as found in - Standard Methods for the Examination of Water and Wastewater, whose stated detection limit is 10 parts per billion (0.010 parts per million). All off-line measurements of chlorine residual shall be by the above analytical method.

Site-Specific Objectives (SSOs) -

The Regional Water Boards may consider adopting SSOs for TRC or CPO in appropriate cases. Specific variables can affect the speed of chlorine residual assimilation within a water body. Some water bodies within the State may have *assimilative capacity* to consume a minute amount of chlorine residual instantaneously. Other water bodies may be able to naturally expend a small amount of chlorine without impairing water quality or harming aquatic life. In developing SSOs for TRC or CPO, the Regional Water Boards should consider all aspects of the receiving water that bear on appropriate objectives. These include *chlorine demand*, chlorine decay, formation of chlorinated compounds that may be harmful in the environment, differences between resident species sensitivity versus those used to develop the statewide objectives, differences in biological availability and toxicity of chlorine due to physical and chemical characteristics of the site water.

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Acronyms

CFR	Code of Federal Regulations
CPO	Chlorine-Produced Oxidants
ND	Non-Detect
NPDES	National Pollutant Discharge Elimination System
POTW	Publicly Owned Treatment Works
SSO	Site-Specific Objective
TRC	Total Residual Chlorine
U.S. EPA	United States Environmental Protection Agency
WET	Whole Effluent Toxicity

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Definition of Terms

Acute Toxicity

Refers to a stimulus severe enough to rapidly induce an effect; in aquatic toxicity tests, an effect observed in 96- hours or less is typically considered acute. When referring to aquatic toxicology or human health, an acute affect is not always measured in terms of lethality.

Assimilative Capacity

For the purpose of this Policy, assimilative capacity is used to define the ability of a water body to naturally absorb and use a substance without impairing water quality or harming aquatic life.

Chlorine Demand

The difference between the amounts of chlorine added to water and the amount of residual chlorine remaining after a given contact time. Chlorine demand may change with dosage, time, temperature, pH, and nature and amount of impurities in the water. The specific method for chlorine demand is from Standard Methods for the Examination of Water and Wastewater, 20th ed. method 2350B.

Chlorine Produced Oxidants (CPO)

Refers to the sum of oxidative products [hypobromous acid (HOBr), hypobromous ion (OBr⁻), and bromamines] in salt water.

Continuous Monitoring

For the purpose of this Policy, continuous monitoring is defined as one data point or more every minute.

Dechlorination

A process by which residual chlorine is neutralized, usually through the addition of a sulfite or bisulfite reductant.

Enclosed Bays

Indentations along the coast that enclose an area of oceanic water within distinct headlands or harbor works. Enclosed bays include all bays where the narrowest distance between the headlands or outermost harbor works is less than 75 percent of the greatest dimension of the enclosed portion of the bay. Enclosed bays include, but are not limited to, Humboldt Bay, Bodega Harbor, Tomales Bay, Drake's Estero, San Francisco Bay, Morro Bay, and San Diego Bay. Enclosed bays do not include inland surface waters or ocean waters.

Estuaries

Water, including coastal lagoons, located at the mouths of streams that serve as areas of mixing for fresh and ocean waters. Coastal lagoon and mouths of

streams that are temporarily separated from the ocean by sandbars shall be considered estuaries. Estuarine waters shall be considered to extend from a bay or the open ocean to a point upstream where there is no significant mixing of fresh water and seawater. Estuarine waters include, but are not limited to, the Sacramento-San Joaquin Delta, as defined in Water Code Section 12220, Suisan Bay, Carquinez Strait downstream to the Carquinez Bridge, and appropriate areas of the Smith, Mad, Eel, Noyo, Russian, Klamath, San Diego, and Otay rivers. Estuaries do not include inland surface waters or ocean waters.

Existing

Any discharger that is not a new discharger. An existing discharger includes an “increasing discharger” (i.e., an existing facility with treatment systems in place for its current discharge that is or will be expanding, upgrading, or modifying its existing permitted discharge after the effective date of this Policy).

Four (4)-day Average

An average, whether discrete or rolling, from the data set in four-day intervals.

Freshwater

Waters in which the salinity is equal to or less than 1 part per thousand 95 percent or more of the time.

The applicable criteria for these waters are the freshwater criteria. For waters in which the salinity is between 1 and 10 parts per thousand, the applicable criteria are the more stringent of the freshwater and saltwater criteria unless defensible information and data demonstrate that on a site-specific basis the biology of the water body is dominated by freshwater aquatic life and that freshwater criteria are more appropriate; or, conversely, saltwater criteria are more appropriate.

Infeasible

Means not capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors.

Inland Surface Waters

All surface waters of the State that do not include the ocean, enclosed bays, or estuaries.

National Pollutant Discharge Elimination System

A permit program under Section 402 of the Clean Water Act that imposes discharge limitations on point sources by basing them on the effluent limitation capabilities of a control technology or on local water quality standards.

New Dischargers

Includes any building, structure, facility, or installation from which there is, or may be, a discharge of pollutants, the construction of which commenced after the effective date of this Policy.

One (1)-hour Average

For the purpose of this Policy, one-hour average is the average of 60 data points, whether discrete or rolling, from the data set in one-hour intervals.

Saltwater

Waters in which the salinity is equal to or greater than 10 parts per thousand 95 percent or more of the time.

The applicable criteria for these waters are the saltwater criteria. For waters in which the salinity is between 1 and 10 parts per thousand, the applicable criteria are the more stringent of the freshwater and saltwater criteria, unless defensible information and data demonstrate that on a site-specific basis the biology of the water body is dominated by freshwater aquatic life and that freshwater criteria are more appropriate; or, conversely, saltwater criteria are more appropriate.

Total Residual Chlorine (TRC)

Refers to the sum of free chlorine and combined chlorine in fresh water.

Whole Effluent Toxicity (WET)

The total toxic effect of an effluent measured directly with a toxicity test.