E. Calculation of Dissolved Metals Criteria

Metals criteria values in 40 CFR 131.36(b)(1), as amended today, are now shown as dissolved metal. These criteria have been calculated in one of two ways. For freshwater metals criteria that are hardness-dependent (denoted by footnote "e" in the matrix), the dissolved metal criteria value must be calculated separately for each hardness using the table at § 131.36(b)(2), as amended today. The hardness-dependent freshwater criteria values presented in the matrix at § 131.36(b)(1) have been calculated using a hardness of 100 mg/L $CaCO_3$ for comparative purposes only. Saltwater metals criteria and freshwater criteria that are not hardness-dependent (criteria denoted by footnote "m" in the matrix) are calculated by taking the total recoverable criteria values (from EPA National Ambient Water Quality Criteria Documents) before rounding, and multiplying them by the appropriate conversion factors from Table 2 or 3 of Section C of this preamble. (The total recoverable criteria values are shown to four figures, where available, because they are intermediate values in the calculation of dissolved metals criteria.) The final dissolved metals criteria values, as they appear in the matrix at § 131.36(b)(1), are rounded to two significant figures. Tables 4a and 4b below, summarize the conversions for saltwater criteria and freshwater criteria that are not hardness-dependent.

EPA notes that if a non-NTR State adopts standards, or an NTR State adopts its own standards (for subsequent withdrawal from the NTR), it may prefer a more conservative approach and adopt total recoverable metals criteria. In doing so, the State may use EPA's total recoverable criteria from Tables 4a and 4b (rounded to two significant figures) or, for hardness-dependent freshwater criteria, omit the conversion factor from the formula presented in § 131.36(b)(2).

Tables 4a and 4b use the following abbreviations and formulas for calculating dissolved metals criteria (CMC and CCC are defined in 40 CFR 131.36(b)(1), footnote d):

CMC—Criterion Maximum Concentration

CCC—Criterion Continuous Concentration

CF—Conversion Factor

Formulas for Calculating Dissolved Metals Criteria:

$CMC_{dissolved} = CMC_{total\ recoverable} \times$ Acute CF

$CCC_{dissolved} = CCC_{total\ recoverable} \times$ Chronic CF

TABLE 4a.—CALCULATION OF FRESHWATER DISSOLVED METALS CRITERIA THAT ARE NOT HARDNESS-DEPENDENT

METAL	Total Recoverable Metals Criteria[1] (µg/L)		Conversion factors[2]		Dissolved metals criteria[3]	
	CMC	CCC	Acute	Chronic	CMC	CCC
Arsenic	359.1	188.9	1.000	1.000	360	190
Chromium(VI)	15.74	10.80	0.982	0.962	15	10
Mercury	2.428	0.0122	0.85	N/A	2.1	N/A

[1] From EPA National Ambient Water Quality Criteria Documents.
[2] From Table 2.
[3] Final dissolved metals criteria have been rounded to two significant figures.

TABLE 4b.—CALCULATION OF SALTWATER DISSOLVED METALS CRITERIA

Metal	Total recoverable metals criteria[1] (µg/L)		Conversion factors[2]		Dissolved metals criteria[3]	
	CMC	CCC	Acute	Chronic	CMC	CCC
Arsenic	68.55	36.05	1.000	1.000	69	36
Cadmium	42.54	9.345	0.994	0.994	42	9.3
Chromium (III)	N/A[4]	N/A[4]	N/A[4]	N/A[4]	N/A[4]	N/A[4]
Chromium (VI)	1079	49.86	0.993	0.993	1100	50
Copper	2.916	2.916	0.83	0.83	2.4	2.4
Lead	217.16	8.468	0.951	0.951	210	8.1
Mercury	2.062	.0250	0.85	N/A[5]	1.8	N/A[5]
Nickel	74.60	8.293	0.990	0.990	74	8.2
Selenium	293.8	70.69	0.998	0.998	290	71
Silver	2.3	N/A[4]	0.85	N/A[4]	1.9	N/A[4]
Zinc	95.10	86.14	0.946	0.946	90	81

[1] From EPA National Ambient Water Quality Criteria Documents.
[2] From Table 3.
[3] Final dissolved metals criteria have been rounded to two significant figures.
[4] Not applicable, national criteria not available.
[5] The CCC for mercury is expressed as total recoverable.

F. Site-Specific Criteria Modifications

EPA has issued guidance (Water Quality Standards Handbook, Second Edition-1993, EPA–823–B–93–002 and update #1, EPA–823–B–94–006, August 1994, at page 3–38 and Appendix L), describing three site-specific criteria development methodologies: recalculation procedure, indicator species procedure (also known as the water-effect ratio (WER)) and resident species procedure. Only the first two of these have been widely used.

In the NTR, EPA identified the WER as the method for optional site-specific criteria development for certain metals. On February 22, 1994, EPA issued *Interim Guidance on the Determination and Use of Water-Effect Ratios for Metals*, EPA 823–B–94–001, now incorporated into the updated Second Edition of the Water Quality Standards Handbook, Appendix L. In accordance with the WER guidance and where application of the WER is deemed

appropriate, EPA strongly encourages the application of the WER on a watershed or waterbody basis as opposed to application on a discharger-by-discharger basis. This approach is technically sound, an efficient use of resources, and allowable for permitting authorities under the NTR.

EPA's endorsement of the use of the WER is not affected by today's rule. As noted in the NTR at 57 FR 60879, the WER is a more comprehensive mechanism for addressing bioavailability issues than simply expressing the criteria in terms of dissolved metal. Consequently, expressing the criteria in terms of dissolved metal, as done in today's rule, does not completely eliminate the utility of the WER. This is particularly true for copper, a metal that forms reduced-toxicity complexes with dissolved organic matter.

The *Interim Guidance on Determination and Use of Water-Effect Ratios for Metals*, Appendix D, explains the relationship between WERs for dissolved criteria, and WERs for total recoverable criteria. Dissolved measurements are to be used in the site-specific toxicity testing underlying the WERs for dissolved criteria. Because WERs for dissolved criteria generally are little affected by elevated particulate concentrations, EPA expects those WERs to be somewhat less than WERs for total recoverable criteria in such situations. Nevertheless, after the site-specific ratio of dissolved to total metal has been taken into account, EPA expects a permit limit derived using a WER for a dissolved criterion to be similar to the permit limit that would be derived from the WER for the corresponding total recoverable criterion.

Because WERs for dissolved criteria generally are little affected by particulate concentrations, those WERS also may often exhibit less time variability than WERs for total recoverable criteria. Consequently, WER-adjusted dissolved criteria may have somewhat greater certainty than WER-adjusted total recoverable criteria.

EPA expects the use of WERs for dissolved criteria to provide the same level of protection as the use of WERs for total recoverable criteria in the NTR. However, the increased reliability of the dissolved criteria prior to WER adjustment (compared to the total recoverable criteria unadjusted) will reduce the need for site-specific WER determinations.

G. Technical Guidance

EPA continues to urge the States affected by this rule to adopt their own standards and negate the need for Federal action. Should a State choose to adopt dissolved criteria, EPA recommends use of the Metals Policy, its attachments (as updated herein) and other guidance referenced in this preamble for implementation of dissolved metals criteria. Attachments to the Metals Policy include: guidance on dynamic modeling and translators (Attachment #3), and clean analytical techniques and monitoring (Attachment #4). Additional guidance on clean and ultra-clean techniques is available and under development (see discussion below). EPA will continue to update implementation guidance as needed in the future.

1. Total Maximum Daily Loads (TMDLs) and National Pollutant Discharge Elimination System (NPDES) Permits

EPA's NPDES regulations require that limits for metals in permits be stated as total recoverable in most cases {see 40 CFR § 122.45(c)} except when an effluent guideline specifies the limitation in another form of the metal, the approved analytical methods measure only dissolved metal, or the permit writer expresses a metal's limit in another form (e.g., dissolved, specific valence, or total) when required to carry out provisions of the Clean Water Act. This is because the chemical conditions in ambient waters frequently differ substantially from those in the effluent and there is no assurance that effluent particulate metal would not dissolve after discharge. The NPDES permit regulations do not require that State water quality standards be expressed as total recoverable; rather, the regulations require permit writers to develop permit limits that are expressed in terms of metals concentrations and loadings that are measured using the total recoverable method. Expressing criteria as dissolved metal requires translation between different metal forms in the calculation of the permit limit so that a total recoverable permit limit can be established that will achieve water quality standards. Both the TMDL and NPDES permit use of water quality criteria in NTR States now require the ability to translate between dissolved metal in ambient waters and total recoverable metal in effluents. In addition to the guidance on dynamic modeling and translators attached to the Metals Policy, EPA's *Interim Guidance on the Determination and Use of Water-Effect Ratios for Metals*, February 1994, EPA 823–B–94–001 (pages 116 and 128–130), presents an effluent-specific approach for calculating a total recoverable metal permit limit from a dissolved metal criterion. EPA is expecting to complete additional guidance on translators in 1995.

2. Monitoring

a. Use of Clean Sampling and Analytical Techniques

In assessing waterbodies to determine the potential for toxicity problems due to metals, the quality of the data used is an important issue. Depending on the concentration of metal present, the use of "clean" and "ultra-clean" techniques for sampling and analysis may be critical to accurate data for implementation of aquatic life criteria for metals.

"Clean" techniques refer to those requirements (or practices for sample collection and handling) necessary to produce reliable analytical data in the microgram per liter (µg/L) or part per billion (ppb) range. "Ultra-clean" techniques refer to those requirements or practices necessary to produce reliable analytical data in the nanogram per liter (ng/L) or part per trillion (ppt) range. Because typical concentrations of metals in surface waters and effluents vary from one metal to another, the effect of contamination on the quality of metals monitoring data varies appreciably.

EPA has developed protocols on the use of clean techniques in coordination with the United States Geological Survey (USGS). The guidance, entitled *Method 1669: Sampling Ambient Water for Determination of Trace Metals at EPA Water Quality Criteria Levels* is available from the Office of Water Resource Center as part of the Trace Metals Package. Draft protocols for ultra-clean techniques will be available in late calendar year 1995.

H. Saltwater Copper Criteria

The saltwater copper criteria in today's interim final rule are 2.4 µg/L dissolved copper for both CMC and CCC based on conversion of 2.9 µg/L for both the CMC and CCC from total recoverable to dissolved metal. New data collected from a study for the New York/New Jersey Harbor indicate the potential need to revise the copper criteria document to reflect a change in the saltwater CMC and CCC aquatic life values. A comprehensive literature search was conducted and toxicity test data for seven new species were added to the database for the saltwater copper criteria. EPA believes these new data have national implications and indicate the national criteria may be more accurate at a CMC of 4.8 µg/L dissolved and a CCC of 3.1 µg/L dissolved. In today's rulemaking, EPA is noticing the availability of data to support these

potential changes in the national saltwater copper criteria and solicits comments. The data can be found in the draft document entitled, *Ambient Water Quality Criteria—Copper, Addendum 1995*. This document is available from the Office of Water Resource Center or Water Docket. Based on those comments, the saltwater copper criteria in this interim final rule may be revised in the final rule to reflect these new data.

I. Procedural Requirements

Section 553 of the Administrative Procedure Act provides that when an agency, for good cause, finds that notice and public procedure are impracticable, unnecessary or contrary to the public interest, it may first issue a rule without providing notice and an opportunity to comment. EPA has concluded that there is good cause to issue this interim final rule without notice and comment and to make the rule effective immediately.

In 1987, Congress amended the Clean Water Act to provide that States must adopt numeric criteria to control the discharge of toxic pollutants. Before this requirement was enacted, few States had adopted numeric criteria for toxic pollutants and had to rely on "narrative" criteria (*e.g.*, "free from toxics in toxic amounts") to set discharge limits for such pollutants. Congress, expressing concern over the calculation of discharge limitations for toxics without numeric criteria, required States to adopt numeric, pollutant-specific criteria for toxic pollutants (56 FR 58423–58424, Nov. 19, 1991).

Following promulgation of the NTR, EPA continued to evaluate available information on metals. EPA held a public meeting of experts in which a recommendation was made to express the ambient water criteria as dissolved metal. This recommendation and others, were noticed for public comment at 58 FR 32131, June 8, 1993. It is EPA's judgment that aquatic life criteria for metals, when expressed as dissolved metal provide a more accurate measurement of metals bioavailability to organisms in the water column than when expressed as total recoverable metal. Thus, in some situations, the total recoverable metals criteria in the NTR may result in permit limits that are more stringent than if the criteria were expressed in a dissolved form. As a result, in these situations, permitting authorities in the NTR States may be imposing more stringent (and potentially more costly) effluent limitations on their dischargers than will be required to meet the new dissolved metals aquatic life criteria put in place today.

EPA considered the impacts of a stay of the current metals criteria while it undertook a standard rulemaking (*i.e.*, proposed rule followed by a final) to revise the aquatic life metals criteria to express them in a dissolved form. However, during the effective period of the stay (the interim between proposal and final rule), permitting authorities for the NTR States would generally need to use the States' narrative criteria (*e.g.*, free from toxics in toxic amounts) to develop permit limits for the discharge of toxics. Because the Congressional directive is clear that States must have numeric criteria for toxic pollutants, EPA rejected this approach in favor of an interim final rule.

By today's action the Agency upholds the intent of § 303(c)(2)(B) of the Clean Water Act and avoids the need for permitting authorities to rely on narrative criteria to develop permit limits. Further, this interim final rule is a temporary measure. The Agency notes that considerable public comment has already been obtained on the Metals Policy and the specific criteria being issued in this interim final rule. EPA held a meeting with invited experts in January 1993 in Annapolis, Maryland to further elicit comment on the use of dissolved metals for developing national metals criteria. The Agency solicited comments on the recommendations made by presenters at that meeting in the Federal Register on July 9, 1993 (58 FR 32131). The Metals Policy issued in October 1993 has received wide-spread distribution and informal response from many interested parties. In August 1994, EPA issued a Federal Register notice indicating that the Agency was considering the use of the Metals Policy to develop metals criteria in the Great Lakes Initiative (59 FR 44678, August 30, 1994) and comments were received on this issue. Today's action has the additional benefit of the comments received from the August 1994 notice on the Great Lakes Initiative.

EPA therefore concludes that public comment on this interim measure is unnecessary because ample comment has already been received on the numeric dissolved metals criteria and additional comment is being solicited and will be considered before a final rule is issued. Further, a public comment process before adopting the new metals criteria is contrary to the public interest because: 1) the current metals criteria place a potentially unnecessary regulatory burden on dischargers in the States covered by this rule, without necessarily providing additional protection to aquatic life in the water column and 2) it is in the public interest for the States to have numeric criteria protective of aquatic life.

Because of the potential adverse effect on public interest noted above, the Agency has determined there is good cause for making this regulation effective immediately.

J. Regulatory Assessment Requirements

1. Unfunded Mandates Reform Act of 1995

Section 201 of the Unfunded Mandates Reform Act of 1995 ("Unfunded Mandates Act"), signed into law on March 22, 1995, requires each Agency, unless prohibited by law, to assess the effects of Federal regulation on State, local and tribal governments and the private sector under section 202 of the Act. EPA must prepare a written statement to accompany any rules where the estimated costs to State, local and tribal governments, in the aggregate, or to the private sector will be $100 million or more in any one year. Under section 205, for rules that require a written statement under section 202, EPA must select the most cost-effective and least burdensome alternative that achieves the objective of such a rule and that is consistent with statutory requirements. Also, for such rules, section 203 requires EPA to establish a plan for informing and advising any small governments that may be significantly and uniquely affected by the rule.

EPA estimates that the costs to State, local, and tribal governments, or to the private sector, from today's interim final rule will not be $100 million or more. EPA has determined that this rule should reduce current regulatory requirements imposed by the NTR. By promulgating the metals criteria in the NTR as dissolved metals, rather than total recoverable, EPA is reducing potential costs to discharge permittees and other parties subject to the water quality criteria. Therefore, an unfunded mandates statement pursuant to section 202 is not necessary.

While an unfunded mandates statement is not necessary for this rule, EPA notes that it has previously considered the costs and benefits of promulgating Federal water quality criteria when the Agency issued the NTR in 1992. See 57 FR 60903–60909 (December 22, 1992). That analysis would continue to be relevant with respect to this issue of costs and benefits arising from Federal promulgation of criteria for states. Of course, to the extent today's interim final rule is putting in place less burdensome

potential changes in the national saltwater copper criteria and solicits comments. The data can be found in the draft document entitled, *Ambient Water Quality Criteria—Copper, Addendum 1995*. This document is available from the Office of Water Resource Center or Water Docket. Based on those comments, the saltwater copper criteria in this interim final rule may be revised in the final rule to reflect these new data.

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EPA considered the impacts of a stay of the current metals criteria while it undertook a standard rulemaking (*i.e.*, proposed rule followed by a final) to revise the aquatic life metals criteria to express them in a dissolved form. However, during the effective period of the stay (the interim between proposal and final rule), permitting authorities for the NTR States would generally need to use the States' narrative criteria (*e.g.*, free from toxics in toxic amounts) to develop permit limits for the discharge of toxics. Because the Congressional directive is clear that States must have numeric criteria for toxic pollutants, EPA rejected this approach in favor of an interim final rule.

By today's action the Agency upholds the intent of § 303(c)(2)(B) of the Clean Water Act and avoids the need for permitting authorities to rely on narrative criteria to develop permit limits. Further, this interim final rule is a temporary measure. The Agency notes that considerable public comment has already been obtained on the Metals Policy and the specific criteria being issued in this interim final rule. EPA held a meeting with invited experts in January 1993 in Annapolis, Maryland to further elicit comment on the use of dissolved metals for developing national metals criteria. The Agency solicited comments on the recommendations made by presenters at that meeting in the Federal Register on July 9, 1993 (58 FR 32131). The Metals Policy issued in October 1993 has received wide-spread distribution and informal response from many interested parties. In August 1994, EPA issued a Federal Register notice indicating that the Agency was considering the use of the Metals Policy to develop metals criteria in the Great Lakes Initiative (59 FR 44678, August 30, 1994) and comments were received on this issue. Today's action has the additional benefit of the comments received from the August 1994 notice on the Great Lakes Initiative.

EPA therefore concludes that public comment on this interim measure is unnecessary because ample comment has already been received on the numeric dissolved metals criteria and additional comment is being solicited and will be considered before a final rule is issued. Further, a public comment process before adopting the new metals criteria is contrary to the public interest because: 1) the current metals criteria place a potentially unnecessary regulatory burden on dischargers in the States covered by this rule, without necessarily providing additional protection to aquatic life in the water column and 2) it is in the public interest for the States to have numeric criteria protective of aquatic life.

Because of the potential adverse effect on public interest noted above, the Agency has determined there is good cause for making this regulation effective immediately.

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Section 201 of the Unfunded Mandates Reform Act of 1995 ("Unfunded Mandates Act"), signed into law on March 22, 1995, requires each Agency, unless prohibited by law, to assess the effects of Federal regulation on State, local and tribal governments and the private sector under section 202 of the Act. EPA must prepare a written statement to accompany any rules where the estimated costs to State, local and tribal governments, in the aggregate, or to the private sector will be $100 million or more in any one year. Under section 205, for rules that require a written statement under section 202, EPA must select the most cost-effective and least burdensome alternative that achieves the objective of such a rule and that is consistent with statutory requirements. Also, for such rules, section 203 requires EPA to establish a plan for informing and advising any small governments that may be significantly and uniquely affected by the rule.

EPA estimates that the costs to State, local, and tribal governments, or to the private sector, from today's interim final rule will not be $100 million or more. EPA has determined that this rule should reduce current regulatory requirements imposed by the NTR. By promulgating the metals criteria in the NTR as dissolved metals, rather than total recoverable, EPA is reducing potential costs to discharge permittees and other parties subject to the water quality criteria. Therefore, an unfunded mandates statement pursuant to section 202 is not necessary.

While an unfunded mandates statement is not necessary for this rule, EPA notes that it has previously considered the costs and benefits of promulgating Federal water quality criteria when the Agency issued the NTR in 1992. See 57 FR 60903–60909 (December 22, 1992). That analysis would continue to be relevant with respect to this issue of costs and benefits arising from Federal promulgation of criteria for states. Of course, to the extent today's interim final rule is putting in place less burdensome

requirements than the 1992 rule, the Agency is reducing any potential costs. It is important to note that the Federal criteria in today's rule, as the Federal criteria in the 1992 rule, only impose requirements until the States adopt, and EPA approves, criteria meeting the requirements of section 303(c)(2)(B) of the Clean Water Act. EPA continues to work with the States to assist them in adopting their own criteria thereby enabling EPA to withdraw the Federal criteria.

While section 205 of the Unfunded Mandates Act is not applicable to today's rule because the rule does not require a written statement under section 202, the Agency does believe that today's rule is consistent with the intent of section 205. Section 205 directs agencies to consider regulatory alternatives and to select the least costly, most cost-effective or least burdensome alternative that achieves the objectives of the rule. EPA's decision to promulgate metals criteria expressed as dissolved rather than total recoverable represents the Agency's selection of the least costly, most cost-effective and least burdensome alternative for setting metals criteria. The Agency addressed this issue in detail in the development of the Great Lakes Water Quality Guidance, promulgated on March 13, 1995 (60 FR 15366, March 23, 1995). For today's rule the Agency was obligated pursuant to section 303 to promulgate water quality criteria for states not in compliance with section 303(c)(2)(B). Today's rule achieves that objective consistent with the intent of section 205.

Finally, because today's rule relieves a regulatory requirement, EPA does not believe that the rule will establish requirements that might significantly or uniquely affect small governments within the meaning of section 203. However, the Agency is committed to working with affected small governments by providing notice of requirements that might potentially affect them, enable them to provide meaningful and timely input, and to inform, educate and advise small governments on compliance with any requirements. With respect to today's interim final rule, representatives of State and local governments participated in the development of, and provided comments to the Office of Water's current metals policy. The Agency recognizes the importance of soliciting the input of small governments and will be available to work with them to address any issues related to compliance with today's rule.

2. Executive Order 12866

Under Executive Order 12866 (56 FR 51735, October 4, 1993), the Agency must determine whether the regulatory action is "significant" and therefore subject to all the requirements of the Executive Order (i.e., Regulatory Impact Analysis and review by the Office of Management and Budget). Under section 3(f), the order defines "significant" as those actions likely to lead to a rule: (1) Having an annual effect on the economy of $100 million or more, or adversely and materially affecting a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities (also known as "economically significant"); (2) creating serious inconsistency or otherwise interfering with an action taken or planned by another agency; (3) materially altering the budgetary impacts of entitlements, grants, user fees, or loan programs; or (4) raising novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this order. Pursuant to the terms of this order, EPA has determined that this interim final rule would not be "significant".

3. Presidential Review of the Code of Federal Regulations

On February 22, 1995, President Clinton announced a review of the Code of Federal Regulations by all Federal agencies. The objective of the review is to: eliminate obsolete regulations, withdraw outdated or superseded regulations, propose modifications to simplify or reduce burden, and to identify legislation for needed change. Today's rule, revising the NTR, is consistent with the review announced by the President. EPA has reviewed the NTR (40 CFR 131.36) and determined that the use of dissolved metals criteria in the NTR States, for the metals listed in this rule, should reduce potential regulatory burden.

4. Regulatory Flexibility Act

The Regulatory Flexibility Act (5 U.S.C. 601, *et seq.*, Pub. L. 96–354) requires EPA to assess whether its regulations create a disproportionate effect on small entities. EPA discussed in the NTR rulemaking (December 22, 1992, 57 FR 60909), the potential effects of the rulemaking on small entities. The Agency concluded that the rulemaking would not result in a significant impact on small entities and a final regulatory flexibility analysis was not required.

Because the potential impact on small entities as a result of this interim final rule revision will be less burdensome on small entities than the original rule, EPA, based on the same factors discussed in the previous final rulemaking, continues to conclude this action will not result in a significant impact on small entities.

5. Paperwork Reduction Act

This interim final rule places no information collection activities on the affected States and therefore no information collection requirement will be submitted to the Office of Management and Budget for review in compliance with the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.*

List of Subjects in 40 CFR Part 131

Environmental Protection, Water pollution control, Water quality standards, Toxic pollutants.

Dated: April 14, 1995.

Carol Browner,

Administrator.

For the reasons set out in the preamble, title 40, chapter I part 131 of the Code of Federal Regulations is amended as follows:

PART 131–WATER QUALITY STANDARDS

1. The authority citation for part 131 continues to read as follows:

Authority: 33 U.S.C. 1251 et seq.

2. Section 131.36 is amended by revising entries 2, 4, 5a,5b,6,7,8,9,10,11, and 13 of the table at paragraph (b)(1), revising footnotes "e" and "l" adding footnotes "o" and "p" to the table in paragraph (b)(1), removing the "Note to paragraph (b)(1)", revising paragraph (b)(2) and by revising the first two sentences of paragraph (c)(4)(iii) to read as follows:

§ 131.36 Toxics criteria for those States not complying with Clean Water Act Section 303(c)(2)(B).

* * * * *

(b)(1) *EPA's Section 304(a) Criteria for Priority Toxic Pollutants.*

A		B		C		D	
		Freshwater		Saltwater		Human health (10^{-6} risk for carcinogens)	
(#) Compound	CAS N.	Criteria Maximum Conc.[d] (ug/L) B1	Criteria Continuous Conc.[d] (ug/L) B2	Criteria Maximum Conc.[d] (ug/L) C1	Criteria Continuous Conc.[d] (ug/L) C2	For consumption of: Water & Organisms (ug/L) D1	For consumption of: Organisms only (ug/L) D2
2 Arsenic	7440382	[m]360	[m]190	[m]69	[m]36	[a,b,c]0.018 a,b,c	[a,b,c]0.14
4 Cadmium	7440439	[e]3.7	[e]1.0	[m]42	[m]9.3	[n]	[n]
5a Chromium (III)	16065831	[e]550	[e]180			[n]	[n]
b Chromium (VI)	18540299	[m]15	[m]10	[m]1100	[m]50	[n]	[n]
6 Copper	7440508	17[e]	11[e]	[m]2.4	[m]2.4		
7 Lead	7439921	[e]65	[e]2.5	[m]210	[m]8.1	[n]	[n]
8 Mercury	7439976	[m]2.1	[i,p]0.012	[m]1.8	[i,p]0.025	0.14	0.15
9 Nickel	7440020	[e]1400	[e]160	[m]74	[m]8.2	[a]610	[a]4600
10 Selenium	7782492	[p]20	[p]5.0	[m]290	[m]71	[n]	[n]
11 Silver	7440224	[e]3.4	[m]1.9				
13 Zinc	7440666	[e]110	[e]100	[m]90	[m]81		

Footnotes:

a. Criteria revised to reflect current agency q_1^* or RfD, as contained in the Integrated Risk Information System (IRIS). The fish tissue bioconcentration factor (BCF) from the 1980 criteria documents was retained in all cases.

b. The criteria refers to the inorganic form only.

c. Criteria in the matrix based on carcinogenicity (10^{-6} risk). For a risk level of 10^{-5}, move the decimal point in the matrix value one place to the right.

d. Criteria Maximum Concentration (CMC) = the highest concentration of a pollutant to which aquatic life can be exposed for a short period of time (1-hour average) without deleterious effects. Criteria Continuous Concentration (CCC) = the highest concentration of a pollutant to which aquatic life can be exposed for an extended period of time (4 days) without deleterious effects. ug/L = micrograms per liter

e. Freshwater aquatic life criteria for these metals are expressed as a function of total hardness (mg/L as $CaCO_3$), the pollutant's water effect ratio (WER) as defined in § 131.36(c) and multiplied by an appropriate dissolved conversion factor as defined in § 131.36(b)(2). For comparative purposes, the values displayed in this matrix are shown as dissolved metal and correspond to a total hardness of 100 mg/L and a water effect ratio of 1.0.

i. If the CCC for total mercury exceeds 0.012 ug/l more than once in a 3-year period in the ambient water, the edible portion of aquatic species of concern must be analyzed to determine whether the concentration of methyl mercury exceeds the FDA action level (1.0 mg/kg). If the FDA action level is exceeded, the State must notify the appropriate EPA Regional Administrator, initiate a revision of its mercury criterion in its water quality standards so as to protect designated uses, and take other appropriate action such as issuance of a fish consumption advisory for the affected area.

l. [Reserved: this letter not used as a footnote].

m. Criteria for these metals are expressed as a function of the water effect ratio, WER, as defined in 40 CFR 131.36 (c).

CMC=column B1 or C1 value x WER

CCC=column B2 or C2 value x WER

n. EPA is not promulgating human health criteria for this contaminant. However, permit authorities should address this contaminant in NPDES permit actions using the State's existing narrative criteria for toxics.

o. [Reserved: This letter not used as a footnote].

p. Criterion expressed as total recoverable.

(2) Factors for Calculating Hardness-Dependent, Freshwater Metals Criteria

CMC=WER exp $\{m_A[\ln(\text{hardness})]+b_A\}$ x Acute Conversion Factor

CCC=WER exp $\{m_C[\ln(\text{hardness})]+b_C\}$ x Chronic Conversion Factor

Final CMC and CCC values should be rounded to two significant figures.

Metal	m_A	b_A	m_C	b_C	Freshwater conversion factors	
					Acute	Chronic
Cadmium	1.128	−3.828	0.7852	−3.490	[a] 0.944	[a] 0.909
Chromium (III)	0.8190	3.688	0.8190	1.561	0.316	0.860
Copper	0.9422	−1.464	0.8545	−1.465	0.960	0.960
Lead	1.273	-1.460	1.273	−4.705	[a] 0.791	[a] 0.791
Nickel	0.8460	3.3612	0.8460	1.1645	0.998	0.997
Silver	1.72	−6.52	[b] N/A	[b] N/A	0.85	[b] N/A
Zinc	0.8473	0.8604	0.8473	0.7614	0.978	0.986

Note to table: The term "exp" represents the base e exponential function.

Footnotes to table:

[a] The freshwater conversion factors (CF) for cadmium and lead are hardness-dependent and can be calculated for any hardness [see limitations in § 131.36(c)(4)] using the following equations:

Cadmium

Acute: CF=1.136672—[(ln hardness)(0.041838)]

Chronic: CF=1.101672—[(ln hardness)(0.041838)]

Lead (Acute and Chronic): CF = 1.46203—[(ln hardness)(0.145712)]

[b] No chronic criteria are available for silver.

(c) * * *

(4) * * *

(iii) Except where otherwise noted, the criteria for metals (compounds #2, #4–# 11, and #13, in paragraph (b) of this section) are expressed as dissolved metal. For purposes of calculating aquatic life criteria for metals from the equations in footnote m. in the criteria matrix in paragraph (b)(1) of this section and the equations in paragraphs (b)(2) of this section, the water-effect ratio is computed as a specific pollutant's acute or chronic toxicity values measured in water from the site covered by the standard, divided by the respective acute or chronic toxicity value in laboratory dilution water. * * *

* * * * *

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San Francisco Bay Regional Water Quality Control Board Narrative Objectives for Surface Water and Groundwater and Numerical Objectives for Fresh Surface Water, Fresh Groundwater, and Saltwater (1995 SFBRWQCB Basin Plan)

SAN FRANCISCO BAY BASIN (REGION 2)

JUNE 21, 1995

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

2101 Webster Street, Suite 500
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Approved by

California State Water Resources Control Board on July 20, 1995.
California State Office of Administrative Law on November 13, 1995.

WATER QUALITY CONTROL PLAN

WATER QUALITY OBJECTIVES

INTRODUCTION

The overall goals of water quality regulation are to protect and maintain thriving aquatic ecosystems and the resources those systems provide to society and to accomplish these in an economically and socially sound manner. California's regulatory framework uses water quality objectives both to define appropriate levels of environmental quality and to control activities that can adversely affect aquatic systems.

WATER QUALITY OBJECTIVES

There are two types of objectives: narrative and numerical. Narrative objectives present general descriptions of water quality that must be attained through pollutant control measures and watershed management. They also serve as the basis for the development of detailed numerical objectives.

Historically, numerical objectives were developed primarily to limit the adverse effect of pollutants in the water column. Two decades of regulatory experience and extensive research in environmental science have demonstrated that beneficial uses are not fully protected unless pollutant levels in all parts of the aquatic system are also monitored and controlled. The Regional Board is actively working towards an integrated set of objectives, including numerical sediment objectives, that will ensure the protection of all current and potential beneficial uses.

Numerical objectives typically describe pollutant concentrations, physical/chemical conditions of the water itself, and the toxicity of the water to aquatic organisms. These objectives are designed to represent the maximum amount of pollutants that can remain in the water column without causing any adverse effect on organisms using the aquatic system as habitat, on people consuming those organisms or water, and on other current or potential beneficial uses (as described in Chapter 2).

The technical bases of the region's water quality objectives include extensive biological, chemical, and physical partitioning information reported in the scientific literature, national water quality criteria, studies conducted by other agencies, and information gained from local environmental and discharge monitoring (as described in Chapter 6). The Regional Board recognizes that limited information exists in some cases, making it difficult to establish definitive numerical objectives, but the Regional Board believes its conservative approach to setting objectives has been proper. In addition to the technical review, the overall feasibility of reaching objectives in terms of technological, institutional, economic, and administrative factors is considered at many different stages of objective derivation and implementation of the water quality control plan.

Together, the narrative and numerical objectives define the level of water quality that shall be maintained within the region. In instances where water quality is better than that prescribed by the objectives, the state Antidegradation Policy applies (State Board Resolution 68-16: Statement of Policy With Respect to Maintaining High Quality of Waters in California). This policy is aimed at protecting relatively uncontaminated aquatic systems where they exist and preventing further degradation.

When uncontrollable water quality factors result in the degradation of water quality beyond the levels or limits established herein as water quality objectives, the Regional Board will conduct a case-by-case analysis of the benefits and costs of preventing further degradation. In cases where this analysis indicates that beneficial uses will be adversely impacted by allowing further degradation, then the Regional Board will not allow controllable water quality factors to cause any further degradation of water quality. Controllable water quality factors are those actions, conditions, or circumstances resulting from human activities that may influence the quality of the waters of the state and that may be reasonably controlled.

QUICK INDEX PAGE

Water Quality Objectives for:

The Regional Board establishes and enforces waste discharge requirements for point and nonpoint source of pollutants at levels necessary to meet numerical and narrative water quality objectives. In setting waste discharge requirements, the Regional Board will consider, among other things, the potential impact on beneficial uses within the area of influence of the discharge, the existing quality of receiving waters, and the appropriate water quality objectives.

In general, the objectives are intended to govern the concentration of pollutant constituents in the main water mass. The same objectives cannot be applied at or immediately adjacent to submerged effluent discharge structures. Zones of initial dilution within which higher concentrations can be tolerated will be allowed for such discharges.

For a submerged buoyant discharge, characteristic of most municipal and industrial wastes that are released from submerged outfalls, the momentum of the discharge and its initial buoyancy act together to produce turbulent mixing. Initial dilution in this case is completed when the diluting wastewater ceases to rise in the water column and first begins to spread horizontally.

For shallow water submerged discharges, surface discharges, and nonbuoyant discharges, characteristic of cooling water wastes and some individual discharges, turbulent mixing results primarily from the momentum of discharge. Initial dilution, in these cases, is considered to be completed when the momentum-induced velocity of the discharge ceases to produce significant mixing of the waste, or the diluting plume reaches a fixed distance from the discharge to be specified by the Regional Board, whichever results in the lower estimate for initial dilution.

Compliance with water quality objectives may be prohibitively expensive or technically impossible in some cases. The Regional Board will consider modification of specific water quality objectives as long as the discharger can demonstrate that the alternate objective will protect existing beneficial uses, is scientifically defensible, and is consistent with the state Antidegradation Policy. This exception clause properly indicates that the Regional Board will conservatively compare benefits and costs in these cases because of the difficulty in quantifying beneficial uses.

These water quality objectives are considered necessary to protect the present and potential beneficial uses described in Chapter 2 of this Plan and to protect existing high quality waters of the state. These objectives will be achieved primarily through establishing and enforcing waste discharge requirements and by implementing this water quality control plan.

OBJECTIVES FOR OCEAN WATERS

The provisions of the State Board's "Water Quality Control Plan for Ocean Waters of California" (Ocean Plan) and "Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California" (Thermal Plan) and any revision to them will apply to ocean waters. These plans describe objectives and effluent limitations for ocean waters.

OBJECTIVES FOR SURFACE WATERS

The following objectives apply to all surface waters within the region, except the Pacific Ocean.

BACTERIA

Table 3-1 provides a summary of the bacterial water quality objectives and identifies the sources of those objectives. Table 3–2 summarizes U.S. EPA's water quality criteria for water contact recreation based on the frequency of use a particular area receives. These criteria will be used to differentiate between pollution sources or to supplement objectives for water contact recreation.

BIOACCUMULATION

Many pollutants can accumulate on particles, in sediment, or bioaccumulate in fish and other aquatic organisms. Controllable water quality factors shall not cause a detrimental increase in concentrations of toxic substances found in bottom sediments or aquatic life. Effects on aquatic organisms, wildlife, and human health will be considered.

BIOSTIMULATORY SUBSTANCES

Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses. Changes in chlorophyll a and associated phytoplankton communities follow complex dynamics that are sometimes associated with a discharge of biostimulatory substances. Irregular and extreme levels of chlorophyll a

or phytoplankton blooms may indicate exceedance of this objective and require investigation.

COLOR

Waters shall be free of coloration that causes nuisance or adversely affects beneficial uses.

DISSOLVED OXYGEN

For all tidal waters, the following objectives shall apply:

In the Bay:

Downstream of
Carquinez Bridge.....5.0 mg/l minimum

Upstream of
Carquinez Bridge.....7.0 mg/l minimum

For nontidal waters, the following objectives shall apply:

Waters designated as:

Cold water habitat.....7.0 mg/l minimum

Warm water habitat.....5.0 mg/l minimum

The median dissolved oxygen concentration for any three consecutive months shall not be less than 80 percent of the dissolved oxygen content at saturation.

Dissolved oxygen is a general index of the state of the health of receiving waters. Although minimum concentrations of 5 mg/l and 7 mg/l are frequently used as objectives to protect fish life, higher concentrations are generally desirable to protect sensitive aquatic forms. In areas unaffected by waste discharges, a level of about 85 percent of oxygen saturation exists. A three-month median objective of 80 percent of oxygen saturation allows for some degradation from this level, but still requires a consistently high oxygen content in the receiving water.

FLOATING MATERIAL

Waters shall not contain floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses.

OIL AND GREASE

Waters shall not contain oils, greases, waxes, or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect beneficial uses.

POPULATION AND COMMUNITY ECOLOGY

All waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce significant alterations in population or community ecology or receiving water biota. In addition, the health and life history characteristics of aquatic organisms in waters affected by controllable water quality factors shall not differ significantly from those for the same waters in areas unaffected by controllable water quality factors.

pH

The pH shall not be depressed below 6.5 nor raised above 8.5. This encompasses the pH range usually found in waters within the basin. Controllable water quality factors shall not cause changes greater than 0.5 units in normal ambient pH levels.

SALINITY

Controllable water quality factors shall not increase the total dissolved solids or salinity of waters of the state so as to adversely affect beneficial uses, particularly fish migration and estuarine habitat.

SEDIMENT

The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.

Controllable water quality factors shall not cause a detrimental increase in the concentrations of toxic pollutants in sediments or aquatic life.

SETTLEABLE MATERIAL

Waters shall not contain substances in concentrations that result in the deposition of material that cause nuisance or adversely affect beneficial uses.

SUSPENDED MATERIAL

Waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses.

SULFIDE

All water shall be free from dissolved sulfide concentrations above natural background levels. Sulfide occurs in Bay muds as a result of bacterial action on organic matter in an anaerobic environment.

Concentrations of only a few hundredths of a milligram per liter can cause a noticeable odor or be toxic to aquatic life. Violation of the sulfide objective will reflect violation of dissolved oxygen objectives as sulfides cannot exist to a significant degree in an oxygenated environment.

TASTES AND ODORS

Waters shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to fish flesh or other edible products of aquatic origin, that cause nuisance, or that adversely affect beneficial uses.

TEMPERATURE

Temperature objectives for enclosed bays and estuaries are as specified in the "Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays of California," including any revisions to the plan.

In addition, the following temperature objectives apply to surface waters:

- The natural receiving water temperature of inland surface waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Board that such alteration in temperature does not adversely affect beneficial uses.

- The temperature of any cold or warm freshwater habitat shall not be increased by more than 5°F (2.8°C) above natural receiving water temperature.

TOXICITY

All waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce other detrimental responses in aquatic organisms. Detrimental responses include, but are not limited to, decreased growth rate and decreased reproductive success of resident or indicator species. There shall be no acute toxicity in ambient waters. Acute toxicity is defined as a median of less than 90 percent survival, or less than 70 percent survival, 10 percent of the time, of test organisms in a 96-hour static or continuous flow test.

There shall be no chronic toxicity in ambient waters. Chronic toxicity is a detrimental biological effect on growth rate, reproduction, fertilization success, larval development, population abundance, community composition, or any other relevant measure of the health of an organism, population, or community. Chronic toxicity generally results from exposures to pollutants exceeding 96 hours. However, chronic toxicity may also be detected through short-term exposure of critical life stages of organisms.

As a minimum, compliance will be evaluated using the bioassay requirements contained in Chapter 4.

The health and life history characteristics of aquatic organisms in waters affected by controllable water quality factors shall not differ significantly from those for the same waters in areas unaffected by controllable water quality factors.

TURBIDITY

Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases from normal background light penetration or turbidity relatable to waste discharge shall not be greater than 10 percent in areas where natural turbidity is greater than 50 NTU.

UN-IONIZED AMMONIA

The discharge of wastes shall not cause receiving waters to contain concentrations of un-ionized ammonia in excess of the following limits (in mg/l as N):

Annual Median 0.025

Maximum, Central Bay (as depicted in Figure 2-5) and upstream.....0.16

Maximum, Lower Bay (as depicted in Figures 2-6 and 2-7) 0.4

The intent of this objective is to protect against the chronic toxic effects of ammonia in the receiving waters. An ammonia objective is needed for the following reasons:

- Ammonia (specifically un-ionized ammonia) is a demonstrated toxicant. Ammonia is generally accepted as one of the principle toxicants in municipal waste discharges. Some industries also discharge significant quantities of ammonia.

- Exceptions to the effluent toxicity limitations in Chapter 4 of the Plan allow for the discharge of ammonia in toxic amounts. In most instances, ammonia will be diluted or degraded to a nontoxic state fairly rapidly. However, this does not occur in all cases, the South Bay being a notable example. The ammonia limit is recommended in order to preclude any build up of ammonia in the receiving water.

- A more stringent maximum objective is desirable for the northern reach of the Bay for the protection of the migratory corridor running through Central Bay, San Pablo Bay, and upstream reaches.

OBJECTIVES FOR SPECIFIC CHEMICAL CONSTITUENTS

Surface waters shall not contain concentrations of chemical constituents in amounts that adversely affect any designated beneficial use. Water quality objectives for selected toxic pollutants developed in 1986 for surface waters are given in Tables 3-3 and 3-4.

The Regional Board intends to work towards the derivation of site-specific objectives for the Bay-Delta estuarine system. Site-specific objectives to be considered by the Regional Board shall be developed in accordance with the provisions of the federal Clean Water Act, the State Water Code, State Board water quality control plans, and this Plan. These site-specific objectives will take into consideration factors such as all available scientific information and monitoring data and the latest U.S. EPA guidance, and local environmental conditions and impacts caused by bioaccumulation. Copper, mercury, PCBs, and selenium will be the highest priorities in this effort. Pending the adoption of site-specific objectives, the objectives in Tables 3-3 and 3-4 apply throughout the region.

Based on the concerns raised in the Regional Monitoring Program, pilot fish contamination study, cooperative striped bass study, and other studies, water quality objectives for aromatic hydrocarbons are also needed.

The South Bay below the Dumbarton Bridge is a unique, water-quality-limited, hydrodynamic and biological environment that merits continued special attention by the Regional Board. Site-specific water quality objectives are absolutely necessary in this area for two reasons. First, its unique hydrodynamic environment dramatically affects the environmental fate of pollutants. Second, potentially costly nonpoint source pollution control measures must be implemented to attain any objectives for this area. The costs of those measures must be factored into economic impact considerations by the Regional Board in adopting any objectives for this area. Nowhere else in the region will nonpoint source economic considerations have such an impact on the attainability of objectives. Therefore, for this area, the objectives contained in Tables 3-3 and 3-4 will be considered guidance only, and should be used as part of the basis for site-specific objectives. Programs described in Chapter 4 will be used to develop site-specific objectives. Ambient conditions shall be maintained until site-specific objectives are developed.

CONSTITUENTS OF CONCERN FOR MUNICIPAL AND AGRICULTURAL WATER SUPPLIES

At a minimum, surface waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of constituents in excess of the maximum (MCLs) or secondary maximum contaminant levels (SMCLs) specified in the following provisions of Title 22 of the California Code of Regulations, which are incorporated by reference into this plan: Tables 64431-A (Inorganic Chemicals) and 64431-B (Fluoride) of Section 64431, Table 64444-A (Organic Chemicals) of Section 64444, and Table 64449-A (SMCLs-Consumer Acceptance Limits) and 64449-B (SMCLs-Ranges) of Section 64449. This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect. Table 3-5 contains water quality objectives for municipal supply, including the MCLs contained in various sections of Title 22 as of the adoption of this plan.

At a minimum, surface waters designated for use as agricultural supply (AGR) shall not contain concentrations of constituents in excess of the levels specified in Table 3-6.

RADIOACTIVITY

Radionuclides shall not be present in concentrations that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal, or aquatic life. Waters designated for use as domestic or municipal supply shall not contain concentrations of radionuclides in excess of the limits specified in Table 4 of Section 64443 (Radioactivity) of Title 22 of the California Code of Regulations, which is incorporated by reference into this Plan. This incorporation is prospective, including future changes to the incorporated provisions as the changes take effect (see Table 3-5).

OBJECTIVES FOR GROUNDWATERS

Groundwater objectives consist primarily of narrative objectives combined with a limited number of numerical objectives. Additionally, the Regional Board will establish basin-

and/or site-specific numerical groundwater objectives as necessary. For example, the Regional Board has groundwater basin-specific objectives for the Alameda Creek watershed above Niles to include the Livermore-Amador Valley as shown in Table 3-7.

The maintenance of existing high quality of groundwater (i.e., "background") is the primary groundwater objective.

In addition, at a minimum, groundwaters shall not contain concentrations of bacteria, chemical constituents, radioactivity, or substances producing taste and odor in excess of the objectives described below unless naturally occurring background concentrations are greater.

BACTERIA

In groundwaters with a beneficial use of municipal and domestic supply, the median of the most probable number of coliform organisms over any seven-day period shall be less than 1.1 MPN/100 mL (based on multiple tube fermentation technique; equivalent test results based on other analytical techniques as specified in the National Primary Drinking Water Regulation, 40 CFR, Part 141.21 (f), revised June 10, 1992, are acceptable).

ORGANIC AND INORGANIC CHEMICAL CONSTITUENTS

All groundwaters shall be maintained free of organic and inorganic chemical constituents in concentrations that adversely affect beneficial uses. To evaluate compliance with water quality objectives, the Regional Board will consider all relevant and scientifically valid evidence, including relevant and scientifically valid numerical criteria and guidelines developed and/or published by other agencies and organizations (e.g.,U.S. EPA, the State Water Resources Control Board, California Department of Health Services, U.S. Food and Drug Administration, National Academy of Sciences, Cal/EPA Office of Environmental Health Hazard Assessment, U.S. Agency for Toxic Substances and Disease Registry, Cal/EPA Department of Toxic Substances Control, and other appropriate organizations.)

At a minimum, groundwaters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of constituents in excess of the maximum (MCLs) or secondary maximum contaminant levels (SMCLs) specified in the following provisions of Title 22 of the California Code of Regulations, which are incorporated by reference into this plan: Tables 64431-A (Inorganic Chemicals) and 64431-B (Fluoride) of Section 64431, and Table 64444-A (Organic Chemicals) of Section 64444. This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect. (See Table 3-5.)

Groundwaters with a beneficial use of agricultural supply shall not contain concentrations of chemical constituents in amounts that adversely affect such beneficial use. In determining compliance with this objective, the Regional Board will consider as evidence relevant and scientifically valid water quality goals from sources such as the Food and Agricultural Organizations of the United Nations; University of California Cooperative Extension, Committee of Experts; and McKee and Wolf's "Water Quality Criteria," as well as other relevant and scientifically valid evidence. At a minimum, groundwaters designated for use as agricultural supply (AGR) shall not contain concentrations of constituents in excess of the levels specified in Table 3-6.

Groundwaters with a beneficial use of freshwater replenishment shall not contain concentrations of chemicals in amounts that will adversely affect the beneficial use of the receiving surface water.

Groundwaters with a beneficial use of industrial service supply or industrial process supply shall not contain pollutant levels that impair current or potential industrial uses.

To assist dischargers and other interested parties, the Central Valley Regional Board's staff has compiled many numerical water quality criteria from other appropriate agencies and organizations in its staff report, "A Compilation of Water Quality Goals." This staff report is updated regularly to reflect changes in these numerical criteria.

RADIOACTIVITY

At a minimum, groundwaters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of radionuclides in excess of the maximum contaminant levels (MCLs) specified in Table 4 (Radioactivity) of Section 64443 of Title 22 of the California Code of Regulations, which is incorporated by reference into this plan. This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect. (See Table 3-5.)

TASTE AND ODOR

Groundwaters designated for use as domestic or municipal supply (MUN) shall not contain taste- or odor-producing substances in concentrations that cause a nuisance or adversely affect beneficial uses. At a minimum, groundwaters designated for use as domestic or municipal supply shall not contain concentrations in excess of the secondary maximum contaminant levels (Secondary MCLs) specified in Tables 64449-A (Secondary MCLs-Consumer Acceptance Limits) and 64449-B (Secondary MCLs-Ranges) of Section 64449 of Title 22 of the California Code of Regulations, which is incorporated by reference into this plan. This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect. (See Table 3-5.)

OBJECTIVES FOR THE DELTA AND SUISUN MARSH

The objectives contained in the State Board's "Water Quality Control Plan for the Sacramento-San Joaquin Delta and Suisun Marsh" and any revisions thereto shall apply to the waters of the Sacramento-San Joaquin Delta and Suisun Marsh.

OBJECTIVES FOR ALAMEDA CREEK WATERSHED

The water quality objectives contained in Table 3-7 apply to the surface and groundwaters of the Alameda Creek watershed above Niles.

Wastewater discharges that cause the surface water limits in Table 3-7 to be exceeded may be allowed if they are part of an overall waterwastewater resource operational program developed by those agencies affected and approved by the Regional Board.

TABLE 3-1 WATER QUALITY OBJECTIVES FOR COLIFORM BACTERIA [a]

BENEFICIAL USE	FECAL COLIFORM (MPN /100ML)	TOTAL COLIFORM (MPN/100ML)
Water Contact Recreation	log mean < 200 90th percentile < 400	median < 240 no sample > 10,000
Shellfish Harvesting[b]	median < 14 90th percentile < 43	median < 70 90th percentile < 230[c]
Non-contact Water Recreation[d]	mean < 2000 90th percentile < 4000	
Municipal Supply: - Surface Water[e] - Groundwater	log mean < 20	log mean < 100 < 1.1[f]

NOTES:

a. Based on a minimum of five consecutive samples equally spaced over a 30-day period.
b. Source: National Shellfish Sanitation Program.
c. Based on a five-tube decimal dilution test or 300 MPN/100 ml when a three-tube decimal dilution test is used.
d. Source: Report of the Committee on Water Quality Criteria, National Technical Advisory Committee, 1968.
e. Source: DOHS recommendation.
f. Based on multiple tube fermentation technique; equivalent test results based on other analytical techniques, as specified in the National Primary Drinking Water Regulation, 40 CFR, Part 141.21(f), revised June 10, 1992, are acceptable.

TABLE 3-2 U.S. EPA BACTERIOLOGICAL CRITERIA FOR WATER CONTACT RECREATION[1,2] (IN COLONIES PER 100 ML)

	FRESH WATER		SALT WATER
	ENTEROCOCCI	E. COLI	ENTEROCOCCI
Steady State (all areas)	33	126	35
Maximum at:			
- designated beach	61	235	104
- moderately used area	89	298	124
- lightly used area	108	406	276
- infrequently used area	151	576	500

NOTES:

1. The criteria were published in the Federal Register, Vol. 51, No. 45 / Friday, March 7, 1986 / 8012 - 8016. The Criteria are based on:
   (a) Cabelli, V.J. 1983. Health Effects Criteria for Marine Recreational Waters. U.S. EPA, EPA 600/1-80-031, Cincinnati, Ohio, and
   (b) Dufour, A.P. 1984. Health Effects Criteria for Fresh Recreational Waters. U.S. EPA, EPA 600/1-84-004, Cincinnati, Ohio.
2. The U.S. EPA criteria apply to water contact recreation only. The criteria provide for a level of protection based on the frequency of usage of a given water contact recreation area. The criteria may be employed in special studies within this region to differentiate between pollution sources or to supplement the current coliform objectives for water contact recreation.

TABLE 3-3 WATER QUALITY OBJECTIVES FOR TOXIC POLLUTANTS FOR SURFACE WATERS WITH SALINITIES GREATER THAN 5 PPT [a,b]

(ALL VALUES IN UG/L)

COMPOUND	4-DAY AVERAGE [c]	1-HR AVERAGE [c]	24-HR AVERAGED	INSTANTANEOUS MAXIMUM [d]
Arsenic	36.0	69.0		
Cadmium	9.3	43.0		
Chromium (VI)[e]	50.0	1100.0		
Copper		[f]		
Cyanide		5.0		
Lead	5.6	140.0		
Mercury	0.025	2.1		
Nickel[g]			7.1	140.0
Selenium				
Silver				2.3
Tributyltin[h]				
Zinc			58.0	170.0
PAHs[i]			15.0	

NOTES:

a. These objectives shall apply to all estuarine waters within the region, according to the salinity threshold, except for the South Bay below Dumbarton Bridge.

b. The values reported in this table are derived from the 1980 and 1984 U.S. EPA Ambient Water Quality Criteria for salt water and fresh water (unless otherwise specified) and were adopted by the Board in 1986. In 1992, the Regional Board adopted a more inclusive set of objectives reflecting more recent technical information; this set of objectives had been developed and adopted as part of the statewide Inland Surface Waters and Enclosed Bays and Estuaries Plan and was ruled invalid by a court decision in 1993. The U.S. EPA is expected to promulgate final water quality standards for California in late 1995. The national standards will then apply to all planning, monitoring, NPDES permitting, enforcement, and compliance programs conducted under the Clean Water Act within the state.

c. Source: U.S. EPA 1984.

d. Source: U.S. EPA 1980.

e. This objective may be met as total chromium.

f. The current U.S. EPA criterion is 2.9 ug/l. However, copper toxicity varies with the complexing capacity of specific receiving waters, and background concentrations in the Bay typically vary from 1 to 4 ug/l. The Regional Board conducted scientific studies on Bay waters between 1986 and 1992 and determined that 4.9 ug/l was a more appropriate value for a site-specific objective, given U.S. EPA's derivation method. U.S. EPA is reviewing that method as part of its national rulemaking for California water quality standards. A site-specific criterion for copper is urgently needed.

g. The current U.S. EPA criterion is 8.3 ug/l (4-day average).

h. Tributyltin is a compound used as an antifouling ingredient in marine paints and toxic to aquatic life in low concentrations (<1 ppb). Based on technical information, a value of 0.005 ug/l (30-day average) would be protective of human health.

i. U.S. EPA water quality criteria indicate that 0.031 ug/l in both fresh water and salt water is protective of human health, based on setting the acceptable lifetime risk for cancer at the 10-6 risk level. PAHs are those compounds identified by EPA Method 610.

TABLE 3-4 WATER QUALITY OBJECTIVES FOR TOXIC POLLUTANTS FOR SURFACE WATERS WITH SALINITIES LESS THAN 5 PPT[a,b]

(ALL VALUES IN UG/L)

COMPOUND	4-DAY AVERAGE [c]	1-HR AVERAGE [c]	24-HR AVERAGE [d]	INSTANTANEOUS MAXIMUM [d]
Arsenic	190.0	360.0		
Cadmium	e	e		
Chromium (VI)[f]	11.0	16.0		
Copper[g]	6.5	9.2		
Cyanide	5.2	22.0		
Lead	h	h		
Mercury	0.025[i]	2.4		
Nickel	j	j	56.0	1100.0
Selenium				
Silver[k]				1.2
Tributyltin[l]				
Zinc	m	m	58.0	170.0
PAHs[n]				

NOTES:

a. These objectives shall apply to all estuarine and inland surface waters within the region where the salinity is less than 5 ppt, except for the South Bay below Dumbarton Bridge.

b. The values reported in this table are derived from the 1980 and 1984 U.S. EPA Ambient Water Quality Criteria for salt water and fresh water (unless otherwise specified) and were adopted by the Regional Board in 1986. In 1992, the Regional Board adopted a more inclusive set of objectives reflecting more recent technical information; this set of objectives had been developed and adopted as part of the statewide Inland Surface Waters and Enclosed Bays and Estuaries Plan and was ruled invalid by a court decision in 1993. The U.S. EPA is expected to promulgate final water quality standards for the California in late 1995. The national standards will then apply to all planning, monitoring, NPDES permitting, enforcement, and compliance programs conducted under the Clean Water Act within the state.

c. Source: U.S. EPA 1984.

d. Source: U.S. EPA 1980.

e. The objectives for cadmium and other noted metals are expressed by formulas where H = ln (hardness) as $CaCO_3$ in mg/l: The four-day average objective for cadmium is $e^{(0.7852\,H\,-3.490)}$. This is 1.1 µg/l at a hardness of 100 mg/l as $CaCO_3$. The one-hour average objective for cadmium is $e^{(1.128\,H\,-3.828)}$. This is 3.9 µg/l at a hardness of 100 mg/l as $CaCO_3$.

f. This limit may be met as total chromium.

g. The U.S. EPA water quality criteria for copper are hardness-dependent. The current objectives are equivalent to these criteria as calculated for 50 mg/l hardness as $CaCO_3$. The four-day average EPA criterion for copper is $e^{(0.8545H\,-1.465)}$; the one-hour average criterion is $e^{(0.9422H-1.464)}$.

h. The four-day average objective for lead is $e^{(1.273H-4.705)}$. This is 3.2 µg/l at at hardness of 100 mg/l as $CaCO_3$. The one-hour average objective for lead is $e^{(1.273H-1.460)}$. This is 81 µg/l at a hardness of 100 mg/l as $CaCO_3$.

i. The U.S. EPA Water Quality Criterion for mercury is 0.012 µg/l, which is below the level of detection of 0.025 µg/l. An objective of 0.012 µg/l is desirable, but attainment can only be determined at the level of detection.

j. The U.S. EPA criteria for nickel are hardness-dependent; the 4-day average criterion is $e^{(0.846\,H+1.1645)}$, which is 158 µg/l at a hardness of 100 mg/l as $CaCO_3$. The 1-hour average is $e^{(0.846H+3.3612)}$, which is 1,419 µg/l at a hardness of 100 mg/l as $CaCO_3$.

k. The U.S. EPA water quality criterion for silver is hardness-dependent. This objective is equivalent to these criteria as calculated for 50 mg/l hardness as $CaCO_3$. The instantaneous maximum EPA criterion is $e^{(1.72H-6.52)}$.

l. Tributyltin is a compound used as an antifouling ingredient in marine paints and toxic to aquatic life in low concentrations (<1 ppb). Based on technical information, values of 0.02 µg/l (4-day average), 0.04 µg/l (24-hour average), and 0.06 µg/l (instantaneous maximum) would be protective of aquatic life.

m. The U.S. EPA criteria for zinc are hardness-dependent: the 4-day average criterion is $e^{(0.8473H-0.7614)}$, which is 23 µg/l at a hardness of 100 mg/l as $CaCO_3$. The 1-hour average is $e^{(0.8473H-0.8604)}$, which is 21 µg/l at a hardness of 100 mg/l as $CaCO_3$.

n. U.S. EPA water quality criteria indicate that 0.031 µg/l in both fresh water and salt water is protective of human health, based on setting the acceptable lifetime risk for cancer at the 10^{-6} risk level. PAHs are those compounds identified by EPA Method 610.

TABLE 3-5 WATER QUALITY OBJECTIVES FOR MUNICIPAL SUPPLY

PARAMETER	OBJECTIVE (IN MG/L)
Physical:	
Color (units)[a]	15.0
Odor (number)[a]	3.0
Turbidity (NTU)[a]	5.0
pH[b]	6.5
TDS[c]	500.0
EC (mmhos/cm)[c]	0.9
Corrosivity	non-corrosive
Inorganic Parameters:	
Aluminum[d]	1.0[d] /0.2[a]
Antimony[d]	0.006
Arsenic[d]	0.05
Asbestos[d]	7 MFL[e]
Barium[d]	1.0
Beryllium[d]	0.004
Chloride[c]	250.0
Cadmium[d]	0.005
Chromium[d]	0.05
Copper[a]	1.0
Cyanide[d]	0.2
Fluoride[f]	0.8-1.7[g]
Iron[a]	0.3
Lead[b]	0.05
Manganese[a]	0.05
Mercury[d]	0.002
Nickel[d]	0.1
Nitrate (as NO_3)[d]	45.0
Nitrate + Nitrite (as N)[d]	10.0
Nitrite (as N)[d]	1.0
Selenium[d]	0.05
Silver[b]	0.05
Sulfate[c]	250.0
Thallium[d]	0.002
Zinc[a]	5.0
Organic Parameters:	
MBAS (Foaming agents)[a]	0.5
Oil and grease[b]	none
Phenols[b]	0.001
Trihalomethanes[b]	0.1
Chlorinated Hydrocarbons:	
Endrin[h]	0.002
Lindane[h]	0.0002
Methoxychlor[h]	0.04
Toxaphene[h]	0.003
2,3,7,8-TCDD (Dioxin)[h]	3×10^{-8}
2,4-D[h]	0.07
2,4,4-TP Silvex[h]	0.05
Synthetics:	
Alachlor[h]	0.002
Atrazine[h]	0.003
Bentazon[h]	0.018
Benzo(a)pyrene[h]	0.0002
Dalapon[h]	0.2
Dinoseb[h]	0.007
Diquat[h]	0.02
Endothall[h]	0.1

PARAMETER	OBJECTIVE (IN MG/L)
Benzene[h]	0.001
Carbon Tetrachloride[h]	0.0005
Carbofuran[h]	0.018
Chlordane[h]	0.0001
1,2-Dibromo-3 -chloropropane[h]	0.0002
1,2-Dichlorobenzene[h]	0.6
1,4-Dichlorobenzene[h]	0.005
1,1-Dichloroethane[h]	0.005
1,2-Dichloroethane[h]	0.0005
cis-1,2-Dichloroethlyene[h]	0.006
trans-1,2-Dichloroethylene[h]	0.01
1,1-Dichloroethylene[h]	0.006
Dichloromethane[h]	0.005
1,2-Dichloropropane[h]	0.005
1,3-Dichloropropene[h]	0.0005
Di (2-ethylhexyl) adipate[h]	0.4
Di(2-ethylhexyl) phthalate[h]	0.004
Ethylbenzene[h]	0.7
Ethylene dibromide[h]	0.00005
Glyphosate[h]	0.7
Heptachlor[h]	0.00001
Heptachlor epoxide[h]	0.00001
Hexachlorobenzene[h]	0.001
Hexachlorocyclopentadiene[h]	0.05
Molinate[h]	0.02
Monochlorobenzene[h]	0.07
Oxarnyl[h]	0.2
Pentachlorophenol[h]	0.001
Picloram[h]	0.5
Polychlorinated Biphenyls[h]	0.0005
Simazine[h]	0.004
Styrene[h]	0.1
1,1,2,2-Tetrachloroethane[h]	0.001
Tetrachloroethylene[h]	0.005
Thiobencarb[h]	0.001
1,2,4-Trichlorobenzene[h]	0.07
1,1,1-Trichloroethane[h]	0.2
1,1,2-Trichloroethane[h]	0.005
Trichloroethylene[h]	0.005
Trichlorofluoromethane[h]	0.15
1,1,2-Trichloro-1,2,2-trifluoroethane[h]	1.2
Toluene[h]	0.15
Vinyl chloride[h]	0.0005
Xylenes (single or sum of isomers)[h]	1.75

PARAMETER	OBJECTIVE (IN pCi/l)
Radioactivity:	
Combined Radium-226 and Radium-228[i]	5
Gross Alpha Particle Activity[j]	15[j]
Tritium[i]	20,000
Strontium-90[i]	8
Gross Beta Particle Activity[j]	50
Uranium[i]	20

NOTES:

a. Secondary Maximum Contaminant Levels as specified in Table 64449-A of Section 64449, Title 22 of the California Code of Regulations, as of June 19, 1995.
b. Table III-2, 1986 Basin Plan.
c. Secondary Maximum Contaminant Levels as specified in Table 64449-B of Section 64449, Title 22 of the California Code of Regulations, as of June 19, 1995. (Levels indicated are "recommended" levels. Table 64449-B contains a complete list of upper and short-term ranges.)
d. Maximum Contaminant Levels as specified in Table 64431-A (Inorganic Chemicals) of Section 64431, Title 22 of the California Code of Regulations, as of June 19, 1995.
e. MFL = million fibers per liter; MCL for fibers exceeding 10 µm in length.
f. Flouride objectives depend on temperature.
g. A complete list of optimum and limiting concentrations is specified in Table 64431-B of Section 64431, Title 22 of the California Code of Regulations, as of June 19, 1995.
h. Maximum Contaminant Levels as specified in Table 64444-A (Organic Chemicals) of Section 64444, Title 22 of the California Code of Regulations, as of June 19, 1995.
i. Maximum Contaminant Levels as specified in Table 4 (Radioactivity) of Section 64443, Title 22 of the California Code of Regulations, as of December 22, 1988.
j. Includes Radium-226 but excludes Radon and Uranium.

Central Valley Regional Water Quality Control Board Water Quality Objectives (CVRWQCB 1994)

THE WATER QUALITY CONTROL PLAN (BASIN PLAN)

FOR THE

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

CENTRAL VALLEY REGION

THIRD EDITION - 1994

THE SACRAMENTO RIVER BASIN AND THE SAN JOAQUIN RIVER BASIN

COVER PHOTO ACKNOWLEDGMENTS:

Rafting the American River: Rapid Shooters, Lotus CA
Yosemite: David Rosen/ Ducks Unlimited
Sunset Waterfowl: David Rosen/ Ducks Unlimited
Sugar Beets: Brenda Grewell/ Dept. of Water Resources

The Porter-Cologne Water Quality Control Act defines water quality objectives as "...the limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area" [Water Code Section 13050(h)]. It also requires the Regional Water Board to establish water quality objectives, while acknowledging that it is possible for water quality to be changed to some degree without unreasonably affecting beneficial uses. In establishing water quality objectives, the Regional Water Board must consider, among other things, the following factors:

- Past, present, and probable future beneficial uses;
- Environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto;
- Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area;
- Economic considerations;
- The need for developing housing within the region;
- The need to develop and use recycled water. (Water Code Section 13241)

The Federal Clean Water Act requires a state to submit for approval of the Administrator of the U.S. Environmental Protection Agency *(USEPA)* all new or revised water quality standards which are established for surface and ocean waters. As noted earlier, California water quality standards consist of both beneficial uses (identified in Chapter II) and the water quality objectives based on those uses.

There are **six important points** that apply to water quality objectives.

The first point is that water quality objectives can be revised through the basin plan amendment process. Objectives may apply region-wide or be specific to individual water bodies or parts of water bodies. Site-specific objectives may be developed whenever the Regional Water Board believes they are appropriate. As indicated previously, federal regulations call for each state to review its water quality standards at least every three years. These Triennial Reviews provide one opportunity to evaluate changing water quality objectives, because they begin with an identification of potential and actual water quality problems, i.e., beneficial use impairments. Since impairments may be associated with water quality objectives being exceeded, the Regional Water Board uses the results of the Triennial Review to implement actions to assess, remedy, monitor, or otherwise address the impairments, as appropriate, in order to achieve objectives and protect beneficial uses. If a problem is found to occur because, for example, a water quality objective is too weak to protect beneficial uses, the Basin Plan should be amended to make the objective more stringent. (Better enforcement of the water quality objectives or adoption of certain policies or redirection of staff and resources may also be proper responses to water quality problems. See the Implementation chapter for further discussion.)

Changes to the objectives can also occur because of new scientific information on the effects of water contaminants. A major source of information is the USEPA which develops data on the effects of chemical and other constituent concentrations on particular aquatic species and human health. Other information sources for data on protection of beneficial uses include the National Academy of Science which has published data on bioaccumulation and the Federal Food and Drug Administration which has issued criteria for unacceptable levels of chemicals in fish and shellfish used for human consumption. The Regional Water Board may make use of those and other state or federal agency information sources in assessing the need for new water quality objectives.

The second point is that achievement of the objectives depends on applying them to controllable water quality factors. *Controllable water quality factors* are those actions, conditions, or circumstances resulting from human activities that may influence the quality of the waters of the State, that are subject to the authority of the State Water Board or the Regional Water Board, and that may be reasonably controlled. Controllable factors are not

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- The need for developing housing within the region;
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The **second point** is that achievement of the objectives depends on applying them to controllable water quality factors. *Controllable water quality factors* are those actions, conditions, or circumstances resulting from human activities that may influence the quality of the waters of the State, that are subject to the authority of the State Water Board or the Regional Water Board, and that may be reasonably controlled. Controllable factors are not

allowed to cause further degradation of water quality in instances where uncontrollable factors have already resulted in water quality objectives being exceeded. The Regional Water Board recognizes that man made changes that alter flow regimes can affect water quality and impact beneficial uses.

The **third point** is that objectives are to be achieved primarily through the adoption of waste discharge requirements (including permits) and cleanup and abatement orders. When adopting requirements and ordering actions, the Regional Water Board considers the potential impact on beneficial uses within the area of influence of the discharge, the existing quality of receiving waters, and the appropriate water quality objectives. It can then make a finding as to the beneficial uses to be protected within the area of influence of the discharge and establish waste discharge requirements to protect those uses and to meet water quality objectives. The objectives contained in this plan, and any State or Federally promulgated objectives applicable to the basins covered by the plan, are intended to govern the levels of constituents and characteristics in the main water mass unless otherwise designated. They may not apply at or in the immediate vicinity of effluent discharges, but at the edge of the *mixing zone* if areas of dilution or criteria for diffusion or dispersion are defined in the waste discharge specifications.

The **fourth point** is that in cases where water quality objectives are formulated to preserve historic conditions, there may be insufficient data to determine completely the temporal and hydrologic variability representative of historic water quality. When violations of such objectives occur, the Regional Water Board judges the reasonableness of achieving those objectives through regulation of the controllable factors in the areas of concern.

The **fifth point** is that the State Water Board adopts policies and plans for water quality control which can specify water quality objectives or affect their implementation. Chief among the State Water Board's policies for water quality control is State Water Board Resolution No. 68-16 (Statement of Policy with Respect to Maintaining High Quality of Waters in California). It requires that wherever the existing quality of surface or ground waters is better than the objectives established for those waters in a basin plan, the existing quality will be maintained unless as otherwise provided by Resolution No. 68-16 or any revisions thereto. This policy and others establish general objectives. The State Water Board's water quality control plans applicable to the Sacramento and San Joaquin River Basins are the Thermal Plan and Water Quality Control Plan for Salinity. The Thermal Plan and its water quality objectives are in the Appendix. The Water Quality Control Plan for Salinity water quality objectives are listed as Table III-5. The State Water Board's plans and policies that the Basin Plan must conform to are addressed in Chapter IV, Implementation.

The **sixth point** is that water quality objectives may be in numerical or narrative form. The enumerated milligram-per-liter (mg/l) limit for copper is an example of a numerical objective; the objective for color is an example of a narrative form.

Information on the application of water quality objectives is contained in the section, *Policy for Application of Water Quality Objectives*, in Chapter IV.

WATER QUALITY OBJECTIVES FOR INLAND SURFACE WATERS

The objectives below are presented by categories which, like the Beneficial Uses of Chapter II, were standardized for uniformity among the Regional Water Boards. The water quality objectives apply to all surface waters in the Sacramento and San Joaquin River Basins, including the Delta, or as noted. *(The legal boundary of the Delta is contained in Section 12220 of the Water Code and identified in Figure III-1.)* The numbers in parentheses following specific water bodies are keyed to Figure II-1.

Bacteria

In waters designated for contact recreation (REC-1), the fecal coliform concentration based on a minimum of not less than five samples for any 30-day period shall not exceed a geometric mean of 200/100 ml, nor shall more than ten percent of the total number of samples taken during any 30-day period exceed 400/100 ml.

For Folsom Lake (50), the fecal coliform concentration based on a minimum of not less than five samples for any 30-day period, shall not exceed a geometric mean of 100/100 ml, nor shall more than ten percent of the total number of samples taken during any 30-day period exceed 200/100 ml.

Biostimulatory Substances

Water shall not contain biostimulatory substances which promote aquatic growths in concentrations that cause nuisance or adversely affect beneficial uses.

Chemical Constituents

Waters shall not contain chemical constituents in concentrations that adversely affect beneficial uses. The chemical constituent objectives in Table III-1 apply to the water bodies specified. Metal objectives in the table are dissolved concentrations. Selenium, molybdenum, and boron objectives are total concentrations. Water quality objectives are also contained in the Water Quality Control Plan for Salinity, adopted by the State Water Board in May 1991.

At a minimum, water designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents in excess of the maximum contaminant levels (MCLs) specified in the following provisions of Title 22 of the California Code of Regulations, which are incorporated by reference into this plan: Tables 64431-A (Inorganic Chemicals) and 64431-B (Fluoride) of Section 64431, Table 64444-A (Organic Chemicals) of Section 64444, and Tables 64449-A (Secondary Maximum Contaminant Levels-Consumer Acceptance Limits) and 64449-B (Secondary Maximum Contaminant Levels-Ranges) of Section 64449. This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect. At a minimum, water designated for use as domestic or municipal supply (MUN) shall not contain lead in excess of 0.015 mg/l. The Regional Water Board acknowledges that specific treatment requirements are imposed by state and federal drinking water regulations on the consumption of surface waters under specific circumstances. To protect all beneficial uses the Regional Water Board may apply limits more stringent than MCLs.

TABLE III-1
TRACE ELEMENT WATER QUALITY OBJECTIVES

CONSTITUENT	MAXIMUM CONCENTRATION[a] (mg/l)	APPLICABLE WATER BODIES
Arsenic	0.01	Sacramento River from Keswick Dam to the I Street Bridge at City of Sacramento (13, 30); American River from Folsom Dam to the Sacramento River (51); Folsom Lake (50); and the Sacramento-San Joaquin Delta.
Barium	0.1	As noted above for Arsenic.
Boron	2.0 (15 March through 15 September) 0.8 (monthly mean, 15 March through 15 September)	San Joaquin River, mouth of the Merced River to Vernalis
	2.6 (16 September through 14 March) 1.0 (monthly mean, 16 September through 14 March)	
	1.3 (monthly mean, critical year[b])	
	5.8[c] 2.0 (monthly mean[c], 15 March through 15 September)[c]	Salt Slough, Mud Slough (north), San Joaquin River from Sack Dam to the mouth of Merced River
Cadmium	0.00022[d]	Sacramento River and its tributaries above State Hwy 32 bridge at Hamilton City.
Copper	0.0056[d]	As noted above for Cadmium.
	0.01[e]	As noted above for Arsenic.[e]

TABLE III-1 TRACE ELEMENT
WATER QUALITY OBJECTIVES
(Continued)

CONSTITUENT	MAXIMUM CONCENTRATION[a] (mg/l)	APPLICABLE WATER BODIES
Cyanide	0.01	As noted above for Arsenic.
Iron	0.3	As noted above for Arsenic.
Manganese	0.05	As noted above for Arsenic.
Molybdenum	0.015 0.010 (monthly mean)	San Joaquin River, mouth of the Merced River to Vernalis
	0.050[c] 0.019 (monthly mean)[c]	Salt Slough, Mud Slough (north), San Joaquin River from Sack Dam to the mouth of Merced River
Selenium	0.012 0.005 (4-day average)[f]	San Joaquin River, mouth of the Merced River to Vernalis
	0.020[f] 0.005 (4-day average)[f]	Salt Slough, Mud Slough (north), San Joaquin River from Sack Dam to the mouth of Merced River
	0.002 (monthly mean)	Any water supplies used for waterfowl habitat in the Grassland Water District, San Luis National Wildlife Refuge, and Los Banos State Wildlife Area.
Silver	0.01	As noted above for Arsenic.
Zinc	0.1[e]	As noted above for Arsenic.[e]
	0.016[d]	As noted above for Cadmium.

a Metal objectives in this table are dissolved concentrations. Selenium, molybdenum, and boron objectives are total concentrations.

b See Table IV-3.

c An alternate set of objectives is proposed to go into effect if the plan to use the San Luis Drain is implemented. The alternate set of objectives provide for better water quality in Salt Slough and the San Joaquin River, Sack Dam to the mouth of Mud Slough (north) and a longer compliance period for Mud Slough (north) and the San Joaquin River, mouth of Mud Slough (north) to mouth of the Merced River.

d The effects of these concentrations were measured by exposing test organisms to dissolved aqueous solutions of 40 mg/l hardness that had been filtered through a 0.45 micron membrane filter. Where deviations from 40 mg/l of water hardness occur, the objectives, in mg/l, shall be determined using the following formulas:

$$Cu = e^{(0.905)(\ln \text{hardness}) - 1.612} \times 10^{-3}$$

$$Zn = e^{(0.830)(\ln \text{hardness}) - 0.289} \times 10^{-3}$$

$$Cd = e^{(1.160)(\ln \text{hardness}) - 5.777} \times 10^{-3}$$

e Does not apply to Sacramento River above State Hwy. 32 bridge at Hamilton City. See relevant objectives (*) above.

f The Regional Water Board has not adopted these selenium concentrations. These selenium concentrations were promulgated by USEPA on 22 December 1992 after USEPA disapproved the Regional Water Board's selenium concentrations. (See 57 Fed.Reg. 60848, 60920.) The selenium concentrations promulgated by USEPA are currently in effect, and are provided in this table solely for reference.

Color

Water shall be free of discoloration that causes nuisance or adversely affects beneficial uses.

Dissolved Oxygen

Within the legal boundaries of the Delta, the dissolved oxygen concentration shall not be reduced below:

7.0 mg/l in the Sacramento River (below the I Street Bridge) and in all Delta waters west of the Antioch Bridge; 6.0 mg/l in the San Joaquin River (between Turner Cut and Stockton, 1 September through 30 November); and 5.0 mg/l in all other Delta waters except for those bodies of water which are constructed for special purposes and from which fish have been excluded or where the fishery is not important as a beneficial use.

For surface water bodies outside the legal boundaries of the Delta, the monthly median of the mean daily dissolved oxygen *(DO)* concentration shall not fall below 85 percent of saturation in the main water mass, and the 95 percentile concentration shall not fall below 75 percent of saturation. The dissolved oxygen concentrations shall not be reduced below the following minimum levels at any time:

Waters designated WARM 5.0 mg/l
Waters designated COLD 7.0 mg/l
Waters designated SPWN 7.0 mg/l

The more stringent objectives in Table III-2 apply to specific water bodies in the Sacramento and San Joaquin River Basins:

TABLE III-2
SPECIFIC DISSOLVED OXYGEN WATER QUALITY OBJECTIVES

AMOUNT	TIME	PLACE
9.0 mg/l*	1 June to 31 August	Sacramento River from Keswick Dam to Hamilton City (13)
8.0 mg/l	1 September to 31 May	Feather River from Fish Barrier Dam at Oroville to Honcut Creek (40)
8.0 mg/l	all year	Merced River from Cressy to New Exchequer Dam (78)
8.0 mg/l	15 October to 15 June	Tuolumne River from Waterford to La Grange (86)

* When natural conditions lower dissolved oxygen below this level, the concentrations shall be maintained at or above 95 percent of saturation.

Floating Material

Water shall not contain floating material in amounts that cause nuisance or adversely affect beneficial uses.

Oil and Grease

Waters shall not contain oils, greases, waxes, or other materials in concentrations that cause nuisance, result in a visible film or coating on the surface of the water or on objects in the water, or otherwise adversely affect beneficial uses.

pH

The pH shall not be depressed below 6.5 nor raised above 8.5. Changes in normal ambient pH levels shall not exceed 0.5 in fresh waters with designated COLD or WARM beneficial uses. In determining

compliance with the water quality objective for pH, appropriate averaging periods may be applied provided that beneficial uses will be fully protected.

For Goose Lake (2), pH shall be less than 9.5 and greater than 7.5 at all times.

Pesticides

- No individual pesticide or combination of pesticides shall be present in concentrations that adversely affect beneficial uses.
- Discharges shall not result in pesticide concentrations in bottom sediments or aquatic life that adversely affect beneficial uses.
- Total identifiable persistent chlorinated hydrocarbon pesticides shall not be present in the water column at concentrations detectable within the accuracy of analytical methods approved by the Environmental Protection Agency or the Executive Officer.
- Pesticide concentrations shall not exceed those allowable by applicable antidegradation policies (see State Water Resources Control Board Resolution No. 68-16 and 40 C.F.R. Section 131.12.).
- Pesticide concentrations shall not exceed the lowest levels technically and economically achievable.
- Waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of pesticides in excess of the Maximum Contaminant Levels set forth in California Code of Regulations, Title 22, Division 4, Chapter 15.
- Waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of thiobencarb in excess of 1.0 μg/l.

Where more than one objective may be applicable, the most stringent objective applies.

For the purposes of this objective, the term pesticide shall include: (1) any substance, or mixture of substances which is intended to be used for defoliating plants, regulating plant growth, or for preventing, destroying, repelling, or mitigating any pest, which may infest or be detrimental to vegetation, man, animals, or households, or be present in any agricultural or nonagricultural environment whatsoever, or (2) any spray adjuvant, or (3) any breakdown products of these materials that threaten beneficial uses. Note that discharges of "inert" ingredients included in pesticide formulations must comply with all applicable water quality objectives.

Radioactivity

Radionuclides shall not be present in concentrations that are harmful to human, plant, animal or aquatic life nor that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal or aquatic life.

At a minimum, waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of radionuclides in excess of the maximum contaminant levels (MCLs) specified in Table 4 (MCL Radioactivity) of Section 64443 of Title 22 of the California Code of Regulations, which are incorporated by reference into this plan. This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect.

Salinity

Electrical Conductivity and Total Dissolved Solids--Special Cases in the Sacramento and San Joaquin River Basins Other Than the Delta

The objectives for electrical conductivity and total dissolved solids in Table III-3 apply to the water bodies specified. To the extent of any conflict with the general Chemical Constituents water quality objectives, the more stringent shall apply.

Electrical Conductivity, Total Dissolved Solids, and Chloride--Delta Waters

The objectives for salinity (electrical conductivity, total dissolved solids, and chloride) which apply to the Delta are listed in Table III-5 at the chapter's end. See Figure III-2 for an explanation of the hydrologic year type classification system. The objectives in Table III-5 were adopted by the State Water Board in May 1991 in the Water Quality Control Plan for Salinity.

Table III-3

ELECTRICAL CONDUCTIVITY AND TOTAL DISSOLVED SOLIDS

PARAMETER	WATER QUALITY OBJECTIVES	APPLICABLE WATER BODIES
Electrical Conductivity (at 25°C)	Shall not exceed 230 micromhos/cm (50 percentile) or 235 micromhos/cm (90 percentile) at Knights Landing above Colusa Basin Drain; or 240 micromhos/cm (50 percentile) or 340 micromhos/cm (90 percentile) at I Street Bridge, based upon previous 10 years of record.	Sacramento River (13, 30)
	Shall not exceed 150 micromhos/cm (90 percentile) in well-mixed waters of the Feather River.	North Fork of the Feather River (33); Middle Fork of the Feather River from Little Last Chance Creek to Lake Oroville (36); Feather River from the Fish Barrier Dam at Oroville to Sacramento River (40)
	Shall not exceed 150 micromhos/cm from Friant Dam to Gravelly Ford (90 percentile).	San Joaquin River, Friant Dam to Mendota Pool (69)
Total Dissolved Solids	Shall not exceed 125 mg/l (90 percentile)	North Fork of the American River from the source to Folsom Lake (44); Middle Fork of the American River from the source to Folsom Lake (45); South Fork of the American River from the source to Folsom Lake (48, 49); American River from Folsom Dam to Sacramento River (51)
	Shall not exceed 100 mg/l (90 percentile)	Folsom Lake (50)
	Shall not exceed 1,300,000 tons	Goose Lake (2)

Sediment

The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.

Settleable Material

Waters shall not contain substances in concentrations that result in the deposition of material that causes nuisance or adversely affects beneficial uses.

Suspended Material

Waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses.

Tastes and Odors

Water shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to domestic or municipal water supplies or to fish flesh or other edible products of aquatic origin, or that cause nuisance, or otherwise adversely affect beneficial uses.

Temperature

The natural receiving water temperature of intrastate waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Water Board that such alteration in temperature does not adversely affect beneficial uses.

Temperature objectives for COLD interstate waters, WARM interstate waters, and Enclosed Bays and Estuaries are as specified in the *Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays of California* including any revisions. There are also temperature objectives for the Delta in the State Water Board's May 1991 *Water Quality Control Plan for Salinity*.

At no time or place shall the temperature of COLD or WARM intrastate waters be increased more than 5°F above natural receiving water temperature. Temperature changes due to controllable factors shall be limited for the water bodies specified as described in Table III-4. To the extent of any conflict with the above, the more stringent objective applies.

In determining compliance with the water quality objectives for temperature, appropriate averaging periods may be applied provided that beneficial uses will be fully protected.

TABLE III-4
SPECIFIC TEMPERATURE OBJECTIVES

DATES	APPLICABLE WATER BODY
From 1 December to 15 March, the maximum temperature shall be 55°F. From 16 March to 15 April, the maximum temperature shall be 60°F. From 16 April to 15 May, the maximum temperature shall be 65°F. From 16 May to 15 October, the maximum temperature shall be 70°F. From 16 October to 15 November, the maximum temperature shall be 65°F. From 16 November to 30 November, the maximum temperature shall be 60°F.	Sacramento River from its source to Box Canyon Reservoir (9); Sacramento River from Box Canyon Dam to Shasta Lake (11)
The temperature in the epilimnion shall be less than or equal to 75°F or mean daily ambient air temperature, whichever is greater.	Lake Siskiyou (10)
The temperature shall not be elevated above 56°F in the reach from Keswick Dam to Hamilton City nor above 68°F in the reach from Hamilton City to the I Street Bridge during periods when temperature increases will be detrimental to the fishery.	Sacramento River from Shasta Dam to I Street Bridge (13, 30)

Toxicity

All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life. This objective applies regardless of whether the toxicity is caused by a single substance or the interactive effect of multiple substances. Compliance with this objective will be determined by analyses of indicator organisms, species diversity, population density, growth anomalies, and biotoxicity tests of appropriate duration or other methods as specified by the Regional Water Board.

The Regional Water Board will also consider all material and relevant information submitted by the discharger and other interested parties and numerical criteria and guidelines for toxic substances developed by the State Water Board, the California Office of Environmental Health Hazard Assessment, the California Department of Health Services, the U.S. Food and Drug Administration, the National Academy of Sciences, the U.S. Environmental Protection Agency, and other appropriate organizations to evaluate compliance with this objective.

The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors shall not be less than that for the same water body in areas unaffected by the waste discharge, or, when necessary, for other control water that is consistent with the requirements for "experimental water" as described in *Standard Methods for the Examination of Water and Wastewater*, latest edition. As a minimum, compliance with this objective as stated in the previous sentence shall be evaluated with a 96-hour bioassay.

In addition, effluent limits based upon acute biotoxicity tests of effluents will be prescribed where appropriate; additional numerical receiving water quality objectives for specific toxicants will be established as sufficient data become available; and source control of toxic substances will be encouraged.

Turbidity

Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases in turbidity attributable to controllable water quality factors shall not exceed the following limits:

- Where natural turbidity is between 0 and 5 Nephelometric Turbidity Units (NTUs), increases shall not exceed 1 NTU.
- Where natural turbidity is between 5 and 50 NTUs, increases shall not exceed 20 percent.
- Where natural turbidity is between 50 and 100 NTUs, increases shall not exceed 10 NTUs.
- Where natural turbidity is greater than 100 NTUs, increases shall not exceed 10 percent.

In determining compliance with the above limits, appropriate averaging periods may be applied provided that beneficial uses will be fully protected.

Exceptions to the above limits will be considered when a dredging operation can cause an increase in turbidity. In those cases, an allowable zone of dilution within which turbidity in excess of the limits may be tolerated will be defined for the operation and prescribed in a discharge permit.

For Folsom Lake (50) and American River (Folsom Dam to Sacramento River) (51), except for periods of storm runoff, the turbidity shall be less than or equal 10 NTUs. To the extent of any conflict with the general turbidity objective, the more stringent applies.

For Delta waters, the general objectives for turbidity apply subject to the following: except for periods of storm runoff, the turbidity of Delta waters shall not exceed 50 NTUs in the waters of the Central Delta and 150 NTUs in other Delta waters. Exceptions to the Delta specific objectives will be considered when a dredging operation can cause an increase in turbidity. In this case, an allowable zone of dilution within which turbidity in excess of limits can be tolerated will be defined for the operation and prescribed in a discharge permit.

WATER QUALITY OBJECTIVES FOR GROUND WATERS

The following objectives apply to all ground waters of the Sacramento and San Joaquin River Basins, as the objectives are relevant to the protection of designated beneficial uses. These objectives do not require improvement over naturally occurring background concentrations. The ground water objectives contained in this plan are not required by the federal Clean Water Act.

Bacteria

In ground waters used for domestic or municipal supply (MUN) the most probable number of coliform organisms over any seven-day period shall be less than 2.2/100 ml.

Chemical Constituents

Ground waters shall not contain chemical constituents in concentrations that adversely affect beneficial uses.

At a minimum, ground waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents in excess of the maximum contaminant levels (MCLs) specified in the following provisions of Title 22 of the California Code of Regulations, which are incorporated by reference into this plan: Tables 64431-A (Inorganic Chemicals) and 64431-B

(Fluoride) of Section 64431, Table 64444-A (Organic Chemicals) of Section 64444, and Tables 64449-A (Secondary Maximum Contaminant Levels-Consumer Acceptance Limits) and 64449-B (Secondary Maximum Contaminant Levels-Ranges) of Section 64449. This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect. At a minimum, water designated for use as domestic or municipal supply (MUN) shall not contain lead in excess of 0.015 mg/l. To protect all beneficial uses, the Regional Water Board may apply limits more stringent than MCLs.

Radioactivity

At a minimum, ground waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of radionuclides in excess of the maximum contaminant levels (MCLs) specified in Table 4 (MCL Radioactivity) of Section 64443 of Title 22 of the California Code of Regulations, which are incorporated by reference into this plan. This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect.

Tastes and Odors

Ground waters shall not contain taste- or odor-producing substances in concentrations that cause nuisance or adversely affect beneficial uses.

Toxicity

Ground waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life associated with designated beneficial use(s). This objective applies regardless of whether the toxicity is caused by a single substance or the interactive effect of multiple substances.