SECTION V ANALYSES OF ISSUES AND ALTERNATIVES

This section presents analyses of the issues being considered in the development of the proposed Policy. Each chapter and subchapter in the section addresses a specific issue as follows:

Each chapter/subchapter is organized according to the following format:

I. PRESENT STATE POLICY

II. ISSUE DESCRIPTION

III. ALTERNATIVES FOR SWRCB CONSIDERATION

IV. STAFF RECOMMENDATION

The PRESENT STATE POLICY provides a brief summary of the current SWRCB and/or RWQCB policies, plans, and programs related to the issues. Generally, more detailed information is presented in the ISSUE DESCRIPTION. Due to rescission of the ISWP/EBEP, most current State policy on the issues is contained in the RWQCBs' basin plans.

The ISSUE DESCRIPTION presents a discussion of the issue that generally includes: a definition or description of the issue; historical development of the issue; what, if any, Federal and State statutes, regulations, policies, plans, programs, and guidance are relevant to the issue; why the issue is important or being addressed for the proposed Policy; and the relevant recommendations of the ISWP/EBEP public advisory task forces.

The ALTERNATIVES FOR SWRCB CONSIDERATION presents two or more feasible alternative approaches to addressing the issue in the proposed Policy. In all cases, Alternative 1 is "No action", which means that the proposed Policy will not change the status quo concerning the issue (as described under the PRESENT STATE POLICY and the ISSUE DESCRIPTION). For some issues, "options" are presented that may supplement one or more of the alternatives.

The STAFF RECOMMENDATION for each issue selects one or more alternatives (and, if applicable, one or more options). These draft staff recommendation are made to the SWRCB for consideration of adoption and, taken together, form the basis for the language of the proposed Policy (located near the beginning of this document).

CHAPTER 1 - ESTABLISHING EFFLUENT LIMITATIONS FOR PRIORITY POLLUTANT CRITERIA/OBJECTIVES

This chapter will briefly describe and compare the alternatives identified by the SWRCB for establishing water quality-based effluent limitations for the chemical-specific priority pollutant criteria contained in the CTR or the water quality objectives for priority pollutants contained in basin plans. The sub-chapters are organized according to the procedures a permit writer would follow when establishing water quality-based effluent limitations for pollutant sources that enter the water bodies to which these criteria/objectives apply.

Pollutants may enter a water body from either point sources or nonpoint sources. Point source discharges have a definable point of discharge, such as a pipe, whereas pollutants from nonpoint sources enter the water body in a diffuse manner. These two sources of pollutants are generally regulated differently.

Point source discharges to navigable surface waters of the U.S. are regulated under federal National Pollutant Discharge Elimination System (NPDES) permits. The NPDES program was established by the CWA, and is implemented in California by the SWRCB and the RWQCBs, under an approved program. The CWA requires that NPDES permits include technology-based and, where appropriate, water quality-based effluent limitations.

The NPDES permits are primarily aimed at controlling point source discharges to navigable surface waters of the U.S. Discharges to waste water treatment systems, such as percolation ponds, generally do not need an NPDES permit. Similarly, point source discharges of agricultural drainage waters do not need an NPDES permit, even if they discharge to waters of the U.S. Some nonpoint source discharges to non-attainment waters may be regulated under other provisions of the CWA.

Under the Porter-Cologne Water Quality Control Act, the term waste discharge requirements (WDRs) includes both waste discharge requirements regulating nonpoint sources and NPDES permits for point source discharges. NPDES permits in California are, therefore, also WDRs, and must comply with the Porter-Cologne Water Quality Control Act to the extent that these provisions are consistent with the CWA.

Discharges that are not subject to regulation under an NPDES permit are regulated under non-NPDES WDRs. Any person discharging waste or proposing to discharge waste that could affect the quality of waters of the State, other than into a community sewer system, must file a report of waste discharge with the RWQCB, which may then prescribe WDRs.

The CWA Sections 301 and 402, in particular) and the Porter-Cologne Water Quality Control Act, as well as federal and State regulations implementing these laws, provide the overall authority for regulating discharges by establishing effluent limitations in WDRs. Effluent limitations are restrictions imposed on the concentrations, discharge rates, and mass quantities of discharged pollutants. Effluent limitations may be either technology-based or water quality-based.

Technology-based effluent limitations, for the purposes of the CWA, are national performance standards set by the U.S. EPA, for point source dischargers that define achievable treatment levels for a particular pollutant or class of pollutant (CWA Section 301; 40 CFR 125, 133, 401-471). Technology-based effluent limitations must be met at the end-of-pipe (i.e., prior to the discharge entering the receiving water). If technology-based effluent limitations are not stringent enough to ensure that applicable water quality criteria or water quality objectives for priority pollutants are met, water quality-based effluent limitations are required (CWA Section 302; 40 CFR 122). Additionally, water quality-based effluent limitations are developed to meet narrative or numeric chemical-specific and toxicity criteria.

Water quality-based effluent limitations are established primarily to ensure that the water quality is attained or maintained at a level that protects aquatic life, human health, and other beneficial uses against adverse impacts. Beneficial uses of water, which are water quality dependent, include municipal and domestic supply, agricultural supply, industrial supply, aquatic habitats, recreation including fishing, ground water recharge, etc.

The following sub-chapters will describe alternative methods for establishing water quality-based effluent limitations for applicable priority pollutant criteria/objectives for inclusion in WDRs. The numeric criteria in the CTR, which the proposed Policy will implement, have been developed to protect aquatic life and human health. The CTR aquatic life criteria have been developed for both fresh and salt water. They are specified as 1-hour average concentrations to protect against acute adverse impacts, and as 4-day average concentrations to protect against chronic adverse impacts. The CTR human health criteria are set as 30-day average concentrations which account for consumption of water, fish, and shellfish.

For both NPDES permits and other WDRs, the permit writer must first determine if it is necessary to control a pollutant in a discharge by establishing effluent limitations (discussed in Chapter 1.1). If effluent limitations are necessary for the pollutant, the permit writer then must calculate these limitations (discussed in Chapter 1.2). Subheadings under Chapter 1.2 include issues that must be considered when calculating effluent limitations, such as metals translators, mixing zones, background levels, intake water credit, and interim limitations. Each section includes the present State policy, a description of the issue, the various alternatives, and the alternative recommended by SWRCB staff.

CHAPTER 1.1 DETERMINATION OF POLLUTANTS

I. PRESENT STATE POLICY

Currently, no statewide law, regulation, plan, or policy specifies procedures for determining when effluent limitations are necessary to control discharged pollutants and prevent adverse impacts to receiving waters. Permit writers at most RWQCBs presently use their best professional judgement[1] and guidance found in various technical documents when identifying the pollutants in a discharge requiring water quality-based effluent limitations. Only the basin plan of the San Francisco Bay RWQCB includes specific procedures for determining when water quality-based effluent limitations should be established for substances in a discharge.

The San Francisco Bay Basin Plan requires water quality-based effluent limitations to be developed for all pollutants of concern unless dischargers certify that the pollutant is not present in the discharge and no change has occurred that may cause release of pollutants. This certification must be accompanied by monitoring results, and process and treatment descriptions, before issuance and reissuance of WDRs. The basin plan further states that dischargers must demonstrate to the satisfaction of the San Francisco Bay RWQCB that particular substances do not cause, or have the reasonable potential to cause, or contribute to an excursion (defined in Appendix B) above numerical or narrative objectives. Low volume discharges may be exempted from certification and monitoring if the discharges have been determined to have no significant adverse impact on water quality.

II. ISSUE DESCRIPTION

The analysis to determine pollutants requiring water quality-based effluent limitations is intended to be used as a screening tool to identify pollutants in the effluent that may adversely affect ambient water quality. Effluent limitations can then be developed to control these pollutants. Once effluent limitations have been established for a pollutant, monitoring must be performed regularly by the discharger to assess compliance with the effluent limitations (see Chapter 2 for discussion on compliance determination and monitoring and reporting requirements). The monitoring results must be submitted to the RWQCB for evaluation with a frequency dependent on the nature and effect of the discharge, but at least annually (see 40 CFR 122.44). If no effluent limitation or interim requirements (see Chapter 2.2) have been established for a priority pollutant in a discharge, the pollutant need only be monitored periodically (at least once prior to the issuance and reissuance of the permit) in the effluent to reassess the need for water quality-based

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1 Best professional judgement means the highest quality technical opinion developed by a permit writer after consideration of all reasonably available and pertinent data and information that forms the basis for the terms and conditions of an NPDES permit (U.S. EPA 1993). Best professional judgement, as used in this context, should be distinguished from the use of best professional judgement to develop technology-based effluent limitations in cases where an applicable effluent guideline has not been promulgated for an industry (see 40 CFR 125.3).

effluent limitations and to monitor effluent changes. The frequency of monitoring and reporting is determined by the RWQCBs.

Under State law, the RWQCBs are required to prescribe WDRs that implement the relevant water quality control plan, including any applicable water quality objectives (Water Code §13263). State law does not provide any further guidance on the selection of pollutants to be regulated under WDRs.

Federal NPDES regulations for NPDES permits (40 CFR 122.44 (d)(1)) require that water-quality based effluent limitations be established for any pollutants discharged "at a level that will cause, have the reasonable potential to cause, or contribute to an excursion above any state water quality standard." If a numeric criterion/objective exists for a pollutant, the permitting authority must determine whether that pollutant is present in the discharge at a level that has "reasonable potential".

When determining if a potential for excursion of a water quality criterion/objective exists, all relevant available data and the following elements must be considered: (1) existing controls on point and nonpoint source pollution, (2) variability of the pollutant or pollutant parameter in the effluent, and (3) dilution of the effluent in the receiving water (where appropriate) (40 CFR 122.44 (d)(1)).

Because the Federal regulation on "reasonable potential" is written broadly, it is open to a range of interpretations. The U.S. EPA has, however, published procedural guidance on determining "reasonable potential" in the Technical Support Document for Water Quality-based Toxics Control (TSD) (U.S. EPA 1991). This guidance recommends a sequential process. Pollutants of concern are first identified based on available data, then the applicable water quality criteria or objectives for these pollutants are determined. For each pollutant, a critical effluent concentration is calculated based on statistical analysis of historical effluent data (if a dynamic model is used, this step may not be necessary). If a mixing zone is allowed (see Chapter 1.2.2), dilution is also considered when calculating the critical effluent concentration by using either a steady-state or a dynamic model (see Chapter 1.2). If the critical effluent concentration is greater than the most stringent applicable criterion/objective for the pollutant, "reasonable potential" has been established and a water quality-based effluent limitation must be developed. The TSD also describes alternate methods for determining if the potential for an excursion of a water quality criterion/objective exists, such as using stochastic models. Where available effluent and ambient data are insufficient to make the determination, the TSD recommends that the permit writer use other information, if it exists, that indicates the presence of the pollutant in the discharge (such as facility type and plant process data), and require the discharger to monitor for the pollutant (see Chapter 2.2 on interim requirements). When sufficient pollutant data have been collected, the permit can be reopened and the potential for an excursion of a water quality criterion/objectives can be reassessed.

The same approach is further defined in the Guidance for NPDES Permit Issuance (GNPI) (U.S. EPA 1994), prepared by U.S. EPA, Region IX in cooperation with the SWRCB and RWQCBs. The GNPI specifically suggests using a steady-state mass balance equation (see Chapter 1.2) to calculate the maximum downstream concentration of the pollutant after considering allowable dilution and then directly comparing this calculated value with the applicable criteria and objectives. If the calculated pollutant concentration is greater than the most stringent applicable water quality criterion or objective, the potential for an excursion of a water quality criterion/objective has been established and an effluent limitation must be developed. Statistical analysis of the effluent variability is only performed if the difference between the calculated maximum downstream concentration and the criterion/objective is small (as judged by the permit writer). The statistical analysis, which is also described in the TSD, compensates for uncertainty related to sample size (the fewer monitoring samples that are available, the less probability of accurately characterizing the critical effluent concentration). A 99 percent confidence level and 99 percent probability basis is recommended in this guidance (the TSD will allow equations that calculate values at a lower confidence level and probability base). After the critical effluent concentration has been statistically projected, the maximum downstream concentration is calculated and compared with the applicable criteria/objectives. This method is described in greater detail in Alternative 2.

The Great Lakes Initiative (GLI) (U.S. EPA 1995) also applies a sequential process for determining "reasonable potential". The GLI method builds on the guidance found in the TSD, but steps of the process have been reversed. As in the TSD, the pollutants of concern, the applicable water quality criteria/objectives for the water body, and the allowable dilution are determined. In the next step, which is different from the TSD guidance, a preliminary effluent limitation (PEL) for each pollutant is calculated such that no applicable criterion or objective is exceeded downstream. The PEL is basically the applicable water quality criterion or objective adjusted to reflect an allowed dilution credit and background concentration, and is, therefore, the waste load allocation (WLA) used in the TSD for calculating effluent limitations.

Next, the projected effluent quality (PEQ) is determined as the 95 percent confidence level of the 95th percentile of the effluent concentration data (assuming a log-normal distribution) or the maximum observed effluent concentration, whichever is greater. As the last step, the PEQ is compared with the PEL. If the PEQ is greater than the PEL, then "reasonable potential" exists and an effluent limitation must be established. In essence, the TSD method uses the effluent data to project a maximum downstream concentration (considering dilution and background concentration) which is compared with the criterion or objective, whereas the GLI method uses the criterion or objective to calculate a preliminary effluent limitation (considering dilution and background concentration) which is compared with the effluent data. The GLI method is more refined than the TSD method because it attempts to match averaging periods and allows a more direct comparison of the criterion or objective with the effluent data. Alternative 3 is based on the GLI method for establishing "reasonable potential", and describes the approach in greater detail.

In the absence of sufficient data to apply the method described above, the GLI recommends relying on existing regulations and procedures for determining "reasonable potential". The GLI also allows a permitting authority to consider if the return of an identified intake water pollutant to the same water body under specified conditions will have "reasonable potential" to cause or contribute to an excursion of a water quality criterion or objective. The permitting authority may find that no "reasonable potential" exists for an intake water pollutant if the facility: (1) returns the intake water to the same water body; (2) does not contribute any additional mass of the pollutant; (3) does not increase the concentration of the pollutant; and (4) does not discharge at a time or location or alter the pollutant in a way that would cause adverse impacts to occur that would not occur if the pollutant was left in-stream. Option A allows consideration of intake water pollutants when establishing "reasonable potential" and is based on the GLI requirements. If "reasonable potential" is found to exist for the intake water pollutant, but there is no *net* addition of the pollutant, then effluent limitations may be derived that considers pollutants in the intake water. Establishing effluent limitations with a consideration of pollutants in the intake water is further discussed in Chapter 1.2.4.

Lacking a statewide policy, little consistency is found between RWQCBs in the procedures used for determining when effluent limitations are necessary to control discharged pollutants. The San Francisco Bay Basin Plan requires water quality-based effluent limitations to be developed for all pollutants of concern unless dischargers certify that the pollutant is not present in the discharge and no change has occurred that may cause release of pollutants. This certification must be accompanied by monitoring results, and process and treatment descriptions, before issuance and reissuance of WDRs. Low volume discharges may be exempted from certification and monitoring if the discharges have been determined to have no significant adverse impact on water quality. The language in the rescinded ISWP and EBEP contained similar requirements. This approach minimizes the analysis required by the permit writer when determining reasonable potential, and may allow potential water quality problems to be detected and controlled early, because all pollutants, for which effluent limitations have been established, must be monitored regularly by dischargers. However, this approach levies a large monitoring and reporting demand on dischargers. RWQCBs must also calculate and enforce more effluent limitations, and must analyze more monitoring data, when this approach is taken. This approach is discussed further under Alternative 6.

If no requirements in the applicable basin plan for the selection of pollutants for establishing effluent limitations exist, a permit writer may rely on Federal guidance, guidance in other basin plans, the rescinded ISWP/EBEP, or other information, instead.

The Permitting and Compliance Issues Task Force made recommendations on "reasonable potential" determinations, among other issues. They recommended that the SWRCB adopt a statewide policy and provide methods for determining "reasonable potential", as well as guidance on the use of any selected methods. Alternatives 2 through 7, described below, would establish a statewide policy and provide methods for determining "reasonable potential". The task force also recommended that the SWRCB address pollutants in the intake water when determining "reasonable potential". This recommendation is addressed in Option A. Many of the more specific recommendations of the task force regarding "reasonable potential" have not been developed as separate alternatives (e.g., the use of monitoring data below detection limits), but are included in the seven alternatives described below. Some of the task force recommendations are addressed in other subchapters. For example, provisions for establishing a monitoring program instead of final effluent limitations where available data are not adequate for determining "reasonable potential" have been addressed in Chapter 2.2 (Interim Requirements). Critical design flows are discussed in Chapter 1.2.2 (Mixing Zones), and the use of dissolved metals criteria are discussed in Chapter 1.2.1 (Metal Translators). Specific guidance on various situations related to “reasonable potential” determinations, such as considering seasonal variation, may be developed by SWRCB staff at a later date, when a general method for establishing “reasonable potential” has been adopted.

The seven alternatives below have been developed with an emphasis on various methods for determining when effluent limitations are necessary to control discharged pollutants. Due to the nature and methods of estimating “reasonable potential”, the alternatives presented below do not differ in their impact on the environment. Rather, differences in data requirements, ease of calculation, and regulatory demands are analyzed. In addition to the seven alternatives, three options are presented that complement Alternatives 2 and 3. Option A allows intake water pollutants to be considered when determining “reasonable potential”. Options B and C consider different confidence levels and percentiles (99/99 percent for Option B and 95/95 percent for Option C) when determining the critical effluent concentration. The options are discussed after the alternatives. The main features of the various alternatives and options are shown in Table V-1.

III. ALTERNATIVES FOR SWRCB ACTION

Alternative 1. No action. This alternative would defer to the RWQCBs for the selection of pollutants for which effluent limitations are necessary. The San Francisco Bay RWQCB would apply its basin plan provisions on selection of pollutants to the CTR criteria. This alternative would not address inconsistencies between RWQCBs, but would allow RWQCBs the flexibility to determine which methods better suit the individual regions.

Table V-1. Main Features of the Alternatives and Options for Selection of Parameters.

Alternative	Description	Options			Data Needs			Relative Difficulty	Relative Number of Effluent Limitations
		Combine with Option A	Combine with Option B	Combine with Option C	Effluent Data	Ambient Data	Dilution Data		
1	no action								
2	TSD method	yes	yes	yes	yes	yes	yes	high	low
3	GLI method	yes	yes	yes	yes	yes	yes	high	low
4	dilution method				yes	yes		medium	medium
5	when detected				yes			low	high
6	when present							low	very high
7	all							very low	very high

Alternative 2. Determine "reasonable potential" based on the general method described in the TSD and the GNPI. RWQCBs would select pollutants for establishing effluent limitations by using the following procedure:

Part A. Where facility-specific effluent monitoring data are available, the RWQCB would determine "reasonable potential" by calculating a maximum projected downstream concentration and comparing it with the applicable criteria or objectives as follows:

Step 1. Determine the applicable water quality criteria or objectives for the receiving water body. Follow the steps outlined below for each pollutant for which criteria or objectives apply.

Step 2. Identify the maximum observed pollutant concentration in the undiluted effluent. If the pollutant is not detected in the effluent in any samples, the highest of the reported detection limits for the pollutant in the examined samples may be used in place of the maximum observed effluent concentration, at the RWQCBs discretion. If the reported detection limits for the pollutant in these samples are above any applicable criteria or objectives, the effluent data are considered insufficient for determining whether an effluent limitation is necessary (see part B for further instructions); otherwise, proceed with step 3.

Step 3. Calculate the projected critical effluent concentration (PEQ[2]) as follows: Determine the total number of effluent samples. Determine the coefficient of variation (CV) (see Appendix B for definition) for the effluent data. For less than ten samples[3], CV may be set equal to 0.6, or a larger calculated value may be used. CV is calculated by dividing the estimated standard deviation (see Appendix B for definition) by the arithmetic mean (see Appendix B for definition). Locate the uncertainty factor in Table V-2 (if Option B is chosen) or Table V-3 (if Option C is chosen) that corresponds to the number of effluent samples and the calculated CV. The uncertainty factor may also be calculated as follows:

a. First calculate the percentile (p) represented by the highest effluent concentration in the data set:
$p = (1 - \text{desired confidence level})^{1/n}$
where n is the number of samples.

b. Next calculate the uncertainty factor:
$\text{uncertainty factor} = \exp((z - z_p) * (\ln(CV^2 + 1))^{0.5})$
where z_p is the z-score associated with the probability p; and z is the z-score associated with the desired percentile (for a 99 percentile effluent concentration, z is 2.326).

2 Identical to the PEQ in the GLI method for determining "reasonable potential".

3 Typical values for CV range from 0.2 to 1.2. A value of 0.6 is a relatively conservative estimate that may be used for CV when available data sets are small, and the uncertainty on the calculated standard deviation and arithmetic mean are, therefore, high (U.S. EPA 1991).

Table V-2. Uncertainty Factors: 99% Confidence Level and 99th Percentile

Coefficient of Variation (CV)	Number of Samples (n)													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
0.1	1.6	1.4	1.4	1.3	1.3	1.3	1.3	1.2	1.2	1.2	1.2	1.2	1.2	1.2
0.2	2.5	2.0	1.9	1.7	1.7	1.6	1.6	1.5	1.5	1.5	1.5	1.4	1.4	1.4
0.3	3.9	2.9	2.5	2.3	2.1	2.0	2.0	1.9	1.8	1.8	1.8	1.7	1.7	1.7
0.4	6.0	4.0	3.3	2.9	2.7	2.5	2.4	2.3	2.2	2.2	2.1	2.0	2.0	2.0
0.5	9.0	5.5	4.4	3.8	3.4	3.1	2.9	2.8	2.7	2.6	2.5	2.4	2.3	2.3
0.6	13	7.4	5.6	4.7	4.2	3.8	3.5	3.3	3.2	3.0	2.9	2.8	2.7	2.6
0.7	19	9.8	7.1	5.9	5.1	4.6	4.2	3.9	3.7	3.5	3.4	3.2	3.1	3.0
0.8	26	13	8.9	7.2	6.2	5.5	5.0	4.6	4.3	4.1	3.9	3.7	3.5	3.4
0.9	36	16	11	8.7	7.3	6.4	5.8	5.3	4.9	4.6	4.4	4.2	4.0	3.8
1.0	48	20	13	10	8.6	7.5	6.7	6.1	5.6	5.3	4.9	4.7	4.5	4.3
1.1	63	25	16	12	10	8.6	7.6	6.9	6.3	5.9	5.5	5.2	5.0	4.7
1.2	81	30	19	14	11	9.8	8.6	7.8	7.1	6.6	6.1	5.8	5.5	5.2
1.3	102	36	22	16	13	11	9.7	8.7	7.9	7.3	6.8	6.3	6.0	5.7
1.4	127	43	26	19	15	12	11	9.6	8.7	8.0	7.4	6.9	6.5	6.2
1.5	156	50	29	21	17	14	12	11	9.5	8.7	8.0	7.5	7.0	6.6
1.6	189	58	33	24	18	15	13	12	10	9.4	8.7	8.1	7.6	7.1
1.7	226	67	38	26	20	17	14	13	11	10	9.4	8.7	8.1	7.6
1.8	268	76	42	29	22	18	16	14	12	11	10	9.3	8.7	8.1
1.9	314	87	47	32	24	20	17	15	13	12	11	9.9	9.2	8.6
2.0	366	97	52	35	27	21	18	16	14	13	11	11	9.8	9.1
2.1	422	109	57	38	29	23	19	17	15	13	12	11	10	9.6
2.2	483	121	63	42	31	25	21	18	16	14	13	12	11	10
2.3	549	133	68	45	33	26	22	19	17	15	14	12	11	11
2.4	621	147	74	48	36	28	23	20	18	16	14	13	12	11
2.5	698	160	80	52	38	30	25	21	19	17	15	14	13	12
2.6	780	175	86	55	40	32	26	22	19	17	16	14	13	12
2.7	867	190	93	59	43	34	28	23	20	18	16	15	14	13
2.8	961	206	99	63	45	35	29	25	21	19	17	15	14	13
2.9	1059	222	106	67	48	37	30	26	22	20	18	16	15	14
3.0	1163	239	113	71	51	39	32	27	23	21	18	17	15	14
3.1	1273	256	120	74	53	41	33	28	24	21	19	17	16	15
3.2	1389	274	127	78	56	43	35	29	25	22	20	18	16	15
3.3	1510	292	134	83	58	45	36	30	26	23	21	19	17	16
3.4	1636	311	142	87	61	47	38	32	27	24	21	19	17	16
3.5	1769	330	149	91	64	49	39	33	28	25	22	20	18	17
3.6	1907	350	157	95	66	51	41	34	29	25	23	20	18	17
3.7	2050	370	165	99	69	52	42	35	30	26	23	21	19	17
3.8	2200	391	173	104	72	54	44	36	31	27	24	22	20	18
3.9	2355	412	181	108	75	56	45	37	32	28	25	22	20	18
4.0	2516	434	189	112	78	58	46	39	33	29	25	23	21	19

Table V-2 continued.

Coefficient of Variation (CV)	Number of Samples (n)													
	15	16	17	18	19	20	30	40	50	60	70	80	90	100
0.1	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
0.2	1.4	1.4	1.4	1.4	1.4	1.3	1.3	1.2	1.2	1.2	1.2	1.2	1.1	1.1
0.3	1.6	1.6	1.6	1.6	1.6	1.6	1.4	1.4	1.3	1.3	1.3	1.2	1.2	1.2
0.4	1.9	1.9	1.9	1.8	1.8	1.8	1.6	1.5	1.5	1.4	1.4	1.3	1.3	1.3
0.5	2.2	2.2	2.1	2.1	2.1	2.0	1.8	1.7	1.6	1.5	1.5	1.4	1.4	1.3
0.6	2.6	2.5	2.4	2.4	2.3	2.3	2.0	1.8	1.7	1.6	1.6	1.5	1.5	1.4
0.7	2.9	2.8	2.8	2.7	2.6	2.6	2.2	2.0	1.8	1.7	1.7	1.6	1.5	1.5
0.8	3.3	3.2	3.1	3.0	2.9	2.9	2.4	2.2	2.0	1.9	1.8	1.7	1.6	1.6
0.9	3.7	3.6	3.5	3.4	3.3	3.2	2.6	2.3	2.1	2.0	1.9	1.8	1.7	1.6
1.0	4.1	4.0	3.8	3.7	3.6	3.5	2.8	2.5	2.2	2.1	1.9	1.8	1.8	1.7
1.1	4.5	4.4	4.2	4.1	3.9	3.8	3.1	2.6	2.4	2.2	2.0	1.9	1.8	1.8
1.2	5.0	4.8	4.6	4.4	4.3	4.1	3.3	2.8	2.5	2.3	2.1	2.0	1.9	1.8
1.3	5.4	5.2	5.0	4.8	4.6	4.5	3.5	3.0	2.6	2.4	2.2	2.1	2.0	1.9
1.4	5.9	5.6	5.4	5.2	5.0	4.8	3.7	3.1	2.8	2.5	2.3	2.2	2.0	1.9
1.5	6.3	6.0	5.7	5.5	5.3	5.1	3.9	3.3	2.9	2.6	2.4	2.2	2.1	2.0
1.6	6.8	6.4	6.1	5.9	5.7	5.5	4.1	3.4	3.0	2.7	2.5	2.3	2.2	2.0
1.7	7.2	6.9	6.5	6.3	6.0	5.8	4.3	3.6	3.1	2.8	2.5	2.4	2.2	2.1
1.8	7.7	7.3	6.9	6.6	6.4	6.1	4.5	3.7	3.2	2.9	2.6	2.4	2.3	2.1
1.9	8.1	7.7	7.3	7.0	6.7	6.4	4.7	3.9	3.3	3.0	2.7	2.5	2.3	2.2
2.0	8.6	8.1	7.7	7.4	7.0	6.7	4.9	4.0	3.4	3.0	2.8	2.5	2.4	2.2
2.1	9.1	8.6	8.1	7.7	7.4	7.1	5.1	4.1	3.5	3.1	2.8	2.6	2.4	2.3
2.2	9.5	9.0	8.5	8.1	7.7	7.4	5.3	4.3	3.6	3.2	2.9	2.7	2.5	2.3
2.3	10	9.4	8.9	8.4	8.0	7.7	5.5	4.4	3.7	3.3	3.0	2.7	2.5	2.4
2.4	10	9.8	9.3	8.8	8.4	8.0	5.7	4.5	3.8	3.4	3.0	2.8	2.6	2.4
2.5	11	10	9.7	9.2	8.7	8.3	5.9	4.7	3.9	3.4	3.1	2.8	2.6	2.4
2.6	11	11	10	9.5	9.0	8.6	6.0	4.8	4.0	3.5	3.1	2.9	2.6	2.5
2.7	12	11	10	9.9	9.4	8.9	6.2	4.9	4.1	3.6	3.2	2.9	2.7	2.5
2.8	12	11	11	10	9.7	9.2	6.4	5.0	4.2	3.7	3.3	3.0	2.7	2.5
2.9	13	12	11	11	10	9.5	6.6	5.1	4.3	3.7	3.3	3.0	2.8	2.6
3.0	13	12	12	11	10	9.8	6.7	5.3	4.4	3.8	3.4	3.1	2.8	2.6
3.1	14	13	12	11	11	10	6.9	5.4	4.5	3.9	3.4	3.1	2.8	2.6
3.2	14	13	12	12	11	10	7.1	5.5	4.5	3.9	3.5	3.1	2.9	2.7
3.3	14	13	13	12	11	11	7.2	5.6	4.6	4.0	3.5	3.2	2.9	2.7
3.4	15	14	13	12	12	11	7.4	5.7	4.7	4.0	3.6	3.2	2.9	2.7
3.5	15	14	13	13	12	11	7.5	5.8	4.8	4.1	3.6	3.3	3.0	2.8
3.6	16	15	14	13	12	12	7.7	5.9	4.9	4.2	3.7	3.3	3.0	2.8
3.7	16	15	14	13	12	12	7.8	6.0	4.9	4.2	3.7	3.3	3.0	2.8
3.8	17	15	14	14	13	12	8.0	6.1	5.0	4.3	3.8	3.4	3.1	2.8
3.9	17	16	15	14	13	12	8.1	6.2	5.1	4.3	3.8	3.4	3.1	2.9
4.0	17	16	15	14	13	13	8.3	6.3	5.1	4.4	3.9	3.5	3.1	2.9

Table V-3. Uncertainty Factors: 95% Confidence Level and 95th Percentile

Coefficient of Variation (CV)	Number of Samples (n)													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
0.1	1.4	1.3	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
0.2	1.9	1.6	1.5	1.4	1.4	1.3	1.3	1.3	1.2	1.2	1.2	1.2	1.2	1.2
0.3	2.6	2.0	1.8	1.7	1.6	1.5	1.4	1.4	1.4	1.3	1.3	1.3	1.3	1.3
0.4	3.6	2.5	2.1	1.9	1.8	1.7	1.6	1.6	1.5	1.5	1.4	1.4	1.4	1.3
0.5	4.7	3.1	2.5	2.2	2.1	1.9	1.8	1.7	1.7	1.6	1.6	1.5	1.5	1.4
0.6	6.2	3.8	3.0	2.6	2.3	2.1	2.0	1.9	1.8	1.7	1.7	1.6	1.6	1.5
0.7	8.0	4.6	3.5	3.0	2.6	2.4	2.2	2.1	2.0	1.9	1.8	1.7	1.7	1.6
0.8	10	5.4	4.0	3.3	2.9	2.6	2.4	2.3	2.1	2.0	1.9	1.9	1.8	1.7
0.9	13	6.4	4.6	3.7	3.2	2.9	2.6	2.4	2.3	2.2	2.1	2.0	1.9	1.8
1.0	15	7.4	5.2	4.2	3.6	3.1	2.8	2.6	2.4	2.3	2.2	2.1	2.0	1.9
1.1	19	8.5	5.8	4.6	3.9	3.4	3.1	2.8	2.6	2.4	2.3	2.2	2.1	2.0
1.2	22	10	6.5	5.0	4.2	3.7	3.3	3.0	2.8	2.6	2.4	2.3	2.2	2.1
1.3	26	11	7.2	5.5	4.5	3.9	3.5	3.2	2.9	2.7	2.5	2.4	2.3	2.2
1.4	31	12	7.9	6.0	4.9	4.2	3.7	3.3	3.1	2.8	2.6	2.5	2.4	2.2
1.5	36	14	8.6	6.4	5.2	4.4	3.9	3.5	3.2	3.0	2.8	2.6	2.4	2.3
1.6	41	15	9.3	6.9	5.6	4.7	4.1	3.7	3.3	3.1	2.9	2.7	2.5	2.4
1.7	46	17	10	7.4	5.9	5.0	4.3	3.8	3.5	3.2	3.0	2.8	2.6	2.5
1.8	52	18	11	7.8	6.2	5.2	4.5	4.0	3.6	3.3	3.1	2.9	2.7	2.5
1.9	58	20	12	8.3	6.6	5.5	4.7	4.2	3.8	3.4	3.2	3.0	2.8	2.6
2.0	65	21	12	8.8	6.9	5.7	4.9	4.3	3.9	3.5	3.3	3.0	2.8	2.7
2.1	72	23	13	9.3	7.2	6.0	5.1	4.5	4.0	3.7	3.4	3.1	2.9	2.7
2.2	79	24	14	10	7.6	6.2	5.3	4.6	4.2	3.8	3.5	3.2	3.0	2.8
2.3	87	26	15	10	7.9	6.4	5.5	4.8	4.3	3.9	3.5	3.3	3.1	2.9
2.4	94	28	15	11	8.2	6.7	5.7	4.9	4.4	4.0	3.6	3.4	3.1	2.9
2.5	103	30	16	11	8.5	6.9	5.8	5.1	4.5	4.1	3.7	3.4	3.2	3.0
2.6	111	31	17	12	8.8	7.1	6.0	5.2	4.6	4.2	3.8	3.5	3.3	3.0
2.7	120	33	18	12	9.1	7.4	6.2	5.4	4.8	4.3	3.9	3.6	3.3	3.1
2.8	129	35	19	13	9.5	7.6	6.4	5.5	4.9	4.4	4.0	3.6	3.4	3.1
2.9	138	37	19	13	10	7.8	6.5	5.6	5.0	4.5	4.0	3.7	3.4	3.2
3.0	147	38	20	13	10	8.0	6.7	5.8	5.1	4.6	4.1	3.8	3.5	3.3
3.1	157	40	21	14	10	8.3	6.9	5.9	5.2	4.6	4.2	3.8	3.5	3.3
3.2	167	42	22	14	11	8.5	7.0	6.0	5.3	4.7	4.3	3.9	3.6	3.3
3.3	177	44	23	15	11	8.7	7.2	6.2	5.4	4.8	4.3	4.0	3.7	3.4
3.4	187	46	23	15	11	8.9	7.4	6.3	5.5	4.9	4.4	4.0	3.7	3.4
3.5	198	48	24	16	12	9.1	7.5	6.4	5.6	5.0	4.5	4.1	3.8	3.5
3.6	209	50	25	16	12	9.3	7.7	6.5	5.7	5.1	4.6	4.1	3.8	3.5
3.7	220	52	26	17	12	10	7.8	6.7	5.8	5.1	4.6	4.2	3.9	3.6
3.8	231	53	27	17	12	10	8.0	6.8	5.9	5.2	4.7	4.3	3.9	3.6
3.9	243	55	27	17	13	10	8.1	6.9	6.0	5.3	4.8	4.3	4.0	3.7
4.0	254	57	28	18	13	10	8.3	7.0	6.1	5.4	4.8	4.4	4.0	3.7

Table V-3 continued.

Coefficient of Variation (CV)	Number of Samples (n)													
	15	16	17	18	19	20	30	40	50	60	70	80	90	100
0.1	1.1	1.1	1.1	1.1	1.1	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
0.2	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0
0.3	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.0	1.0	1.0	1.0	0.9	0.9
0.4	1.3	1.3	1.3	1.3	1.3	1.2	1.1	1.1	1.0	1.0	1.0	0.9	0.9	0.9
0.5	1.4	1.4	1.4	1.3	1.3	1.3	1.2	1.1	1.0	1.0	1.0	0.9	0.9	0.9
0.6	1.5	1.5	1.4	1.4	1.4	1.4	1.2	1.1	1.0	1.0	1.0	0.9	0.9	0.9
0.7	1.6	1.5	1.5	1.5	1.5	1.4	1.2	1.1	1.0	1.0	0.9	0.9	0.9	0.9
0.8	1.7	1.6	1.6	1.5	1.5	1.5	1.3	1.1	1.1	1.0	0.9	0.9	0.9	0.8
0.9	1.8	1.7	1.7	1.6	1.6	1.5	1.3	1.2	1.1	1.0	0.9	0.9	0.9	0.8
1.0	1.8	1.8	1.7	1.7	1.6	1.6	1.3	1.2	1.1	1.0	0.9	0.9	0.8	0.8
1.1	1.9	1.9	1.8	1.7	1.7	1.6	1.3	1.2	1.1	1.0	0.9	0.9	0.8	0.8
1.2	2.0	1.9	1.9	1.8	1.7	1.7	1.4	1.2	1.1	1.0	0.9	0.9	0.8	0.8
1.3	2.1	2.0	1.9	1.9	1.8	1.7	1.4	1.2	1.1	1.0	0.9	0.9	0.8	0.8
1.4	2.1	2.1	2.0	1.9	1.9	1.8	1.4	1.2	1.1	1.0	0.9	0.9	0.8	0.8
1.5	2.2	2.1	2.0	2.0	1.9	1.8	1.4	1.2	1.1	1.0	0.9	0.9	0.8	0.8
1.6	2.3	2.2	2.1	2.0	1.9	1.9	1.5	1.2	1.1	1.0	0.9	0.8	0.8	0.8
1.7	2.4	2.2	2.2	2.1	2.0	1.9	1.5	1.2	1.1	1.0	0.9	0.8	0.8	0.8
1.8	2.4	2.3	2.2	2.1	2.0	2.0	1.5	1.2	1.1	1.0	0.9	0.8	0.8	0.7
1.9	2.5	2.4	2.3	2.2	2.1	2.0	1.5	1.3	1.1	1.0	0.9	0.8	0.8	0.7
2.0	2.5	2.4	2.3	2.2	2.1	2.0	1.5	1.3	1.1	1.0	0.9	0.8	0.8	0.7
2.1	2.6	2.5	2.3	2.2	2.2	2.1	1.5	1.3	1.1	1.0	0.9	0.8	0.8	0.7
2.2	2.7	2.5	2.4	2.3	2.2	2.1	1.6	1.3	1.1	1.0	0.9	0.8	0.8	0.7
2.3	2.7	2.6	2.4	2.3	2.2	2.1	1.6	1.3	1.1	1.0	0.9	0.8	0.8	0.7
2.4	2.8	2.6	2.5	2.4	2.3	2.2	1.6	1.3	1.1	1.0	0.9	0.8	0.8	0.7
2.5	2.8	2.7	2.5	2.4	2.3	2.2	1.6	1.3	1.1	1.0	0.9	0.8	0.8	0.7
2.6	2.9	2.7	2.6	2.4	2.3	2.2	1.6	1.3	1.1	1.0	0.9	0.8	0.8	0.7
2.7	2.9	2.7	2.6	2.5	2.4	2.3	1.6	1.3	1.1	1.0	0.9	0.8	0.8	0.7
2.8	3.0	2.8	2.6	2.5	2.4	2.3	1.6	1.3	1.1	1.0	0.9	0.8	0.7	0.7
2.9	3.0	2.8	2.7	2.5	2.4	2.3	1.7	1.3	1.1	1.0	0.9	0.8	0.7	0.7
3.0	3.0	2.9	2.7	2.6	2.5	2.3	1.7	1.3	1.1	1.0	0.9	0.8	0.7	0.7
3.1	3.1	2.9	2.7	2.6	2.5	2.4	1.7	1.3	1.1	1.0	0.9	0.8	0.7	0.7
3.2	3.1	2.9	2.8	2.6	2.5	2.4	1.7	1.3	1.1	1.0	0.9	0.8	0.7	0.7
3.3	3.2	3.0	2.8	2.7	2.5	2.4	1.7	1.3	1.1	1.0	0.9	0.8	0.7	0.7
3.4	3.2	3.0	2.8	2.7	2.6	2.4	1.7	1.3	1.1	1.0	0.9	0.8	0.7	0.7
3.5	3.3	3.1	2.9	2.7	2.6	2.5	1.7	1.3	1.1	1.0	0.9	0.8	0.7	0.7
3.6	3.3	3.1	2.9	2.7	2.6	2.5	1.7	1.4	1.1	1.0	0.9	0.8	0.7	0.7
3.7	3.3	3.1	2.9	2.8	2.6	2.5	1.7	1.4	1.1	1.0	0.9	0.8	0.7	0.7
3.8	3.4	3.2	3.0	2.8	2.7	2.5	1.7	1.4	1.1	1.0	0.9	0.8	0.7	0.7
3.9	3.4	3.2	3.0	2.8	2.7	2.6	1.7	1.4	1.1	1.0	0.9	0.8	0.7	0.7
4.0	3.4	3.2	3.0	2.9	2.7	2.6	1.8	1.4	1.1	1.0	0.9	0.8	0.7	0.7

Multiply the uncertainty factor with the maximum observed effluent concentration. The result is the PEQ.

Step 4. Determine allowable dilution, if applicable (see Chapter 1.2.2).

Step 5. If dilution is available, proceed with step 6. Otherwise, compare PEQ directly with the applicable criteria or objectives for the pollutant. An effluent limitation is necessary if the PEQ is greater than the applicable criteria or objectives.

Step 6. Calculate the projected maximum downstream concentration (MDC) using the following steady-state equation:

$MDC = (PEQ + B * D) / (1 + D)$

where B is the background concentration (see Chapter 1.2.3); and
D is the allowable dilution.

Step 7. Compare the MDC with the applicable criteria or objectives for the pollutant. An effluent limitation is necessary if the MDC is greater than the applicable criteria or objectives.

Part B. Where facility-specific effluent monitoring data are not available or are insufficient to determine “reasonable potential” using the above procedures, the RWQCB may determine "reasonable potential" based on other information that indicates the presence or amount of pollutant in the discharge (see the TSD for further discussion) and/or may require additional monitoring for the pollutant with detection limits below the criterion or objective (see Chapter 2.2 for further discussion). When sufficient data has been collected, the WDR can be reopened and “reasonable potential” reassessed.

Under this alternative, an effluent limitation would be established if an applicable criterion or objective is expected to be exceeded. This alternative would address many of the recommendations of the Permitting and Compliance Issues Task Force and provide statewide consistency. However, this alternative does not attempt to match the averaging period of the effluent data to the criterion or objective. Compared to Alternatives 4, 5, 6, and 7, this alternative would result in substantially fewer effluent limitations, reducing the monitoring and reporting demands for dischargers. Calculating and enforcing effluent limitations would be easier for RWQCBs than under Alternatives 4, 5, 6, and 7, but determining “reasonable potential” under this alternative requires more calculations and data. This alternative would probably result in the same number of effluent limitations as Alternative 3.

Alternative 3. Determine “reasonable potential” based on the general method described in the GLI, but with no special provisions for intake water pollutants. RWQCBs would follow these steps when determining “reasonable potential”:

Part A. Where facility-specific effluent monitoring data are available, the RWQCB would determine “reasonable potential” by developing a PEL (which has the same meaning as the WLA) and comparing it with the PEQ of the discharge as follows:

Step 1. Determine the applicable water quality criteria or objectives for the receiving water body. Follow the steps outlined below for each pollutant for which criteria or objectives apply.

Step 2. Determine allowable dilution, if applicable (see Chapter 1.2.2).

Step 3. Calculate the PEL(s) using a steady-state equation:

$$PEL = C + D (C - B)$$

where C is the criterion or objective;
D is the allowable dilution; and
B is the background concentration (see Chapter 1.2.2).

If the background concentration exceeds the criterion or objective or no dilution is allowed, PEL is set equal to the criterion/objective. The PEL based on a human health criterion/objective is expressed as a monthly limitation. The PEL based on an acute aquatic life criterion/objective is expressed as a daily limitation. The PEL based on a chronic aquatic life criterion/objective is expressed as a weekly limitation.

Step 4. Identify the maximum observed pollutant concentration for the undiluted effluent. If the pollutant was not detected in the effluent in any samples, the highest of the reported detection limits for the pollutant may be used in place of the maximum observed effluent concentration, at the RWQCB's discretion. If reported detection limits are above the applicable criteria or objectives, the effluent data are considered insufficient to determine whether an effluent limitation is necessary (see part B for further instructions); otherwise, proceed with step 5.

Step 5. Compare the maximum observed effluent concentration to the PEL. An effluent limitation is necessary if the maximum observed effluent concentration is greater than the PEL. Otherwise, proceed with step 6.

Step 6. Calculate the PEQ as follows: Determine the total number of effluent samples. Find the coefficient of variation (CV) for the effluent data. For less than ten samples, CV may be set equal to 0.6, or a larger calculated value may be used. Otherwise, determine CV for the effluent data by dividing the standard deviation by the arithmetic mean. Locate the uncertainty factor in Table V-2 or Table V-3 that corresponds to the number of effluent samples and the calculated CV. The uncertainty factor may also be calculated as described under Alternative 2, step 3. Multiply the uncertainty factor with the maximum observed effluent concentration. The result is the PEQ.

Step 7. Compare the PEQ with the PEL. An effluent limitation is necessary if the PEQ is greater than the PEL.

Part B. Where facility-specific effluent monitoring data are not available or are insufficient to determine "reasonable potential" using the above procedures, the RWQCB may determine "reasonable potential" based on other information that indicates the presence or amount of pollutant in the discharge (see the TSD for further discussion) and/or may require additional monitoring for the pollutant with detection limits below the criterion or objective (see Chapter 2.2 for further discussion). When sufficient data has been collected, the WDR can be reopened and "reasonable potential" reassessed.

Under this alternative, an effluent limitation would be established if an applicable criterion or objective is expected to be exceeded. Like Alternative 2, this alternative would address many of the recommendations of the Permitting and Compliance Issues Task Force and provide statewide Furthermore, because the effluent data can be compared directly to the PEL, it is easier for the permit writers to consider all of the effluent data when determining "reasonable potential". Compared to Alternatives 4, 5, 6, and 7, this alternative would require substantially fewer effluent limitations, thus reducing monitoring, reporting, and enforcement requirements. However, determining "reasonable potential" under this alternative requires more calculations and data than under Alternatives 4, 5, 6, and 7.

Alternative 4. Require effluent limitations for priority pollutants present in the receiving water at levels above any applicable water quality criterion/objective or present in the discharger's undiluted effluent at levels above any applicable water quality criterion/objective. RWQCBs would determine the pollutants for establishing effluent limitations by using the following procedure:

Except where a Total Maximum Daily Load (TMDL) has been developed, the RWQCB shall conduct the following analysis for each priority pollutant with an established criterion or objective to determine if a water quality-based effluent limitation is required in the discharger's WDR. It is the discharger's responsibility to provide all information requested by the RWQCB for use in the analysis. The RWQCB shall use all available, valid, relevant, representative information, as described in section 1.2, to determine whether a discharge may: (1) cause, (2) have a reasonable potential to cause, or (3) contribute to an excursion above any applicable priority pollutant criterion or objective. If the following analysis indicates that a limitation for a pollutant is required, the RWQCB shall establish the limitation in accordance with section 1.4.

Step 1: Identify applicable water quality criteria and objectives for priority pollutants as described in section 1.1. Determine the lowest (most stringent) water quality criterion or objective for the pollutant applicable to the receiving water (C). Adjust the criterion or objective, if applicable, as described in section 1.2.

Step 2: Identify all effluent data for the pollutant as described in section 1.2 and proceed with Step 3. If effluent data are unavailable or insufficient, proceed with Step 5.

Step 3: Determine the maximum observed pollutant concentration for the effluent (MEC). If the pollutant was **not** detected in any of the effluent samples **and** any of the detection limits are below the C, use the lowest detection limit as the MEC and proceed with Step 4. If the pollutant was **not** detected in any of the effluent samples **and** all of the detection levels are greater than or equal to the C value, proceed with Step 5.

Step 4: Adjust the MEC from Step 3, if applicable, as described in section 1.2. Compare the MEC from Step 3 to the C from Step 1. If the MEC is greater than or equal to the C, an effluent limitation is required and the analysis for the subject pollutant is complete. If the MEC is less than the C, proceed with Step 5.

Step 5: Determine the ambient background concentration for the pollutant (B) as described in section 1.4.3.1 and proceed with Step 6. If B data are unavailable or insufficient, proceed with Step 7.

Step 6: Adjust the B from Step 5, if applicable, as described in section 1.2. Compare the B from Step 5 to the C from Step 1. If the B is greater than the C, an effluent limitation is required and the analysis for the subject pollutant is complete. If the B is less than or equal to the C, proceed with Step 7.

Step 7: Review other information available to determine if a water quality-based effluent limitation is required, notwithstanding the above analysis in Steps 1 through 6, to protect beneficial uses.

Information that may be used includes: the facility type, the discharge type, solids loading analysis, lack of dilution, history of compliance problems, potential toxic impact of discharge, fish tissue residue data, water quality and beneficial uses of the receiving water, CWA 303(d) listing for the pollutant, and other information. If information is unavailable or insufficient to determine if a water quality-based effluent limitation is required, proceed with Step 8.

Step 8: If data are unavailable or insufficient to conduct the above analysis for the pollutant, or if all detection levels of the pollutant in the effluent are greater than or equal to the C value, the RWQCB shall establish interim requirements, in accordance with section 2.2.A, that require additional monitoring for the pollutant in place of a water quality-based effluent limitation. Upon completion of the required monitoring, the RWQCB shall use the gathered data to conduct the analysis in Steps 1 through 7 above and determine if a water quality-based effluent limitation is required.

Under this alternative, an effluent limitation would be established for a pollutant, if any applicable criterion or objective is not being met in the receiving water, or if the pollutant concentration in the discharge was greater than any applicable criterion. This alternative would provide statewide consistency. It would result in fewer effluent limitations than Alternatives 5, 6, and 7, but more than Alternatives 2 and 3. Where facility-specific effluent monitoring data are available, this alternative requires more calculations and data than Alternatives 5, 6, and 7, but less than Alternatives 2 and 3.

Alternative 5. Require effluent limitations for priority pollutants detected in the discharger's effluent. Where facility-specific effluent monitoring data are available, the RWQCB would make a "reasonable potential" determination by using the following method:

Step 1. Determine the applicable water quality criteria or objectives for the receiving water body.

Step 2. Determine if the pollutants, for which criteria or objectives apply, have been detected in the discharger's effluent. An effluent limitation is necessary if the pollutant has been detected in the effluent. If reported detection limits for all samples are above any applicable criteria or objectives, the effluent data are considered insufficient to determine whether an effluent limitation is necessary, the RWQCB may determine "reasonable potential" based on other information that indicates the presence or amount of pollutant in the discharge (see the TSD for further discussion) and/or may require additional monitoring for the pollutant with detection limits below the criterion or objective (see Chapter 2.2 for further discussion). When sufficient data has been collected, the WDR can be reopened and "reasonable potential" reassessed.

Determining "reasonable potential" would be simpler for permit writers under this alternative than under Alternatives 2, 3, or 4 because no calculations would be required and only effluent pollutant data would be needed. However, in comparison, more effluent limitations would need to be calculated and enforced, and the monitoring and reporting requirements for dischargers would be greater. This alternative would provide statewide consistency.

Alternative 6. Require effluent limitations for priority pollutants that are not certified to be absent in the discharger's effluent. Under this alternative, the RWQCB would make a "reasonable potential" determination by using the following method:

Step 1. Determine the applicable water quality criteria or objectives for the receiving water body.

Step 2. Effluent limitations are necessary for all pollutants, for which criteria or objectives apply, unless a discharger certifies to the satisfaction of the RWQCB that a pollutant is not present in the discharge and that no source has been identified or process change has occurred which could result in the presence of the pollutant in the discharge. The certification needs to be accompanied by monitoring results, and process and treatment descriptions. It is the responsibility of the discharger to provide monitoring results and other information used for certification purposes to the RWQCB before issuance and reissuance of a WDR. The RWQCBs may choose to forego certification and periodic monitoring for priority pollutants in low volume discharges determined to not adversely impact water quality.

This alternative would be simpler to implement than any of the above alternatives because no calculations or data would be required; however, more effluent limitations would need to be calculated and established. The monitoring, reporting, and regulatory requirements would, therefore, be greater for this alternative. The certification process may prove cumbersome. This alternative would provide statewide consistency and is consistent with the San Francisco Bay Basin Plan and the rescinded ISWP and EBEP.

Alternative 7. Require effluent limitations for all priority pollutants. The RWQCB would make a "reasonable potential" determination by using the following method:

Step 1. Determine the applicable water quality criteria or objectives for the receiving water body.

Step 2. Effluent limitations are necessary for all pollutants for which criteria or objectives apply.

This alternative would be simpler to implement than the other alternatives because no data, calculations, data analysis, or certification is required. However, the monitoring, reporting, and regulatory demands would be greater for this alternative than for the other alternatives, because more effluent limitations would need to be calculated and established. This alternative would provide statewide consistency, but could be considered arbitrary because dischargers could be required to incur costs for monitoring and reporting that would be unjustified in some circumstances.

Options that may supplement Alternatives 2 and 3:

Option A. Consider pollutants in the intake water when determining "reasonable potential" (may be combined with Alternatives 2 and 3). Selection of this option would allow the RWQCBs to determine that the return of an identified intake water pollutant to the same water body under specified circumstances would not cause, have the reasonable potential to cause, or contribute to an excursion above applicable criteria or objectives. An effluent limitation would not be required for a pass-through intake water pollutant if the following conditions were met: (a) the water quality criterion/objective is exceeded in the water body immediately upstream of the facility's intake and discharge points, and no TMDL for the discharge has been prepared; (b) the facility's intake is located in the vicinity of and in the same water body as the discharge point; (c) the facility withdraws 100 percent of the intake water containing the pollutant from the same water body into which the discharge is made; (d) the facility does not contribute any mass of the identified intake pollutant to its intake water or discharge (i.e., the pollutant present in the discharge must be due exclusively to its presence in the intake water from the receiving water body); (e) the concentration of the pollutant in the intake water is identical to the concentration of pollutant in the receiving water; (f) the concentration of the pollutant in the discharge is not higher than the concentration of the pollutant in the receiving water; and (g) the pollutant was not discharged at a time or location, nor altered so that it would cause adverse impacts to occur that would not otherwise occur, if the pollutant was left in-stream. If a RWQCB determined that "reasonable potential" was established for an intake water pollutant, water quality-based effluent limitations would be established for intake water pollutants according to Chapter 1.2.4.

When the above listed conditions are met, the GLI allows the permit writer to find that the intake water pollutant has no greater impact on the receiving water than if the discharger had not diverted and returned the intake water pollutant to the same body of water, and that the intake water pollutant, therefore, does not exhibit "reasonable potential". Implementation of this option would probably reduce the number of effluent limitations slightly. Receiving water quality is likely to remain unchanged.

Option B. Determine the critical effluent concentration as the 99th percentile concentration with a 99 percent confidence level (may be combined with Alternatives 2 and 3). Table V-2 is used to find the uncertainty factor. This option was recommended in the GNPI and is more conservative than Option C.

Option C. Determine the critical effluent concentration as the 95th percentile concentration with a 95 percent confidence level (may be combined with Alternatives 2 and 3). Table V-3 is used to find the uncertainty factor. This option was used in the GLI and is less conservative than Option B.

IV. STAFF RECOMMENDATION

Adopt Alternative 4.

CHAPTER 1.2 CALCULATION OF EFFLUENT LIMITATIONS

I. PRESENT STATE POLICY

Currently, no statewide policy exists that stipulates how water quality-based effluent limitations for the discharges to inland surface waters, enclosed bays, and estuaries of California should be calculated. Most of the basin plans for the RWQCBs also do not provide detailed instructions on calculating water quality-based effluent limitations, but refer to or list various methods described in State and federal documents. Only the 1995 basin plan for the San Francisco Bay RWQCB specifies that a particular method be used for calculating water quality-based effluent limitations. The San Francisco Bay Basin Plan requires that a steady-state mass balance equation be used to directly calculate water quality-based effluent limitations when ambient concentrations are equal to or less than the water quality criteria. The mass balance equation considers dilution credit, and the water quality objective and the ambient background concentration of each substance. The Ocean Plan applies a similar steady-state mass balance equation for calculation of water quality-based effluent limitations.

II. ISSUE DESCRIPTION

Effluent limitations are restrictions in permits imposed on the concentrations, discharge rates, and quantities of discharged pollutants. Water quality-based effluent limitations are established for discharges when necessary to ensure that the water quality of the receiving water is attained or maintained at a level that protects the associated beneficial uses. Federal NPDES regulations (40 CFR 122.44 (d)), and the California Code of Regulations (CCR, Title 23, Chapters 3 and 4) provide the overall framework for establishing water quality-based effluent limitations.

Water quality-based effluent limitations are required for all pollutants in a point-source discharge that cause, have the reasonable potential to cause, or contribute to an excursion (defined in Appendix B) above a water quality criterion (40 CFR 122.44 (d)(1)(iii)). Determination of pollutants for calculating water quality-based effluent limitations is discussed in Chapter 1.1. Federal regulations (40 CFR 122.44 (d)(1)(vii)) require that water quality-based effluent limitations be derived from and comply with all applicable water quality standards, and be consistent with the assumptions and requirements of applicable, approved waste load allocations (WLAs) (see Appendix 4). The permit writer must consider water quality criteria, beneficial uses and conditions of the receiving water, effluent variability, applicable dilution, compliance monitoring frequency, and existing controls on point and nonpoint sources of pollution such as technology-based effluent limitations and Total Maximum Daily Loads (TMDLs) (see Appendix 4) when developing water quality-based effluent limitations. The effluent limitation must protect against both acute and chronic impacts. The permit writer must impose more restrictive limitations where necessary for the protection of beneficial uses or where otherwise required by law.

The water quality criteria contained in the CTR provide a foundation from which water quality-based effluent limitations can be derived. The CTR criteria are expressed as 1-hour averages and/or 4-day averages for protection of aquatic life, and 30-day averages for protection of human health. Based on the CTR criteria, a waste load allocation is derived that must be converted to appropriate water quality-based effluent limitations. Federal regulations (40 CFR 122.45) require that water quality-based effluent limitations generally be expressed as average weekly limitations (defined in Appendix B) and average monthly limitations (defined in Appendix B) for POTWs, and maximum daily limitations (defined in Appendix B) and average monthly limitations for all discharges other than POTWs. As stated in the Technical Support Document for Water Quality-based Toxics Control (TSD) (U.S. EPA 1991), in lieu of an average weekly limitation (AML) for POTWs, U.S. EPA recommends establishing a maximum daily limitation (MDL) for toxic pollutants and pollutant parameters in water quality permitting. This is appropriate for at least two reasons. First, the basis for the 7-day average for POTWs derives from the secondary treatment requirements. This basis is not related to the need for ensuring achievement of water quality standards. Second, a 7-day average, which could comprise up to seven or more daily samples, could average out peak toxic concentrations and, therefore, the discharge's potential for causing toxic effects would be missed. An MDL, which is measured by grab sample, would be toxicologically protective of potential acute toxicity impacts.

The federal regulations also require that all pollutants in NPDES permits have effluent limitations expressed in terms of mass, unless it is inappropriate to do so (40 CFR 122.45(f)). The U.S. EPA considers mass limitations to be necessary to prevent the use of dilution as a means of treatment, and finds mass limitations a valuable regulatory tool in many discharge situations (U.S. EPA 1995). For example, mass limitations may enable a POTW to better control bioaccumulative substances from indirect dischargers and aid in establishing TMDLs. Effluent limitations may also be expressed in terms of concentration or other unit of measurement, and the discharger must comply with all effluent limitations (40 CFR 122.45(f)).

While federal and State regulations describe the permit conditions and the issuance process, they do not, however, specify a method for calculating water quality-based effluent limitations, which is the main subject of this chapter. However, several guidance documents exist. The U.S. EPA has provided detailed technical guidance on various methods of calculating water quality-based effluent limitations in the TSD. The Guidance for NPDES Permit Issuance (GNPI)(U.S. EPA 1994) was written specifically for California permit writers by U.S. Region IX with assistance from the SWRCB and the RWQCBs. This guidance builds on the technical guidance in the TSD, but is more specific.

The TSD describes several methods for calculating water quality-based effluent limitations that rely on mass balance equations to calculate the effluent quality required to meet water quality criteria. These methods can generally be divided into steady-state models and dynamic models. Other methods include assigning loading capacities based on a TMDL (see Appendix 4), considering intake water pollutants (see Chapter 1.2.4), and prohibiting discharge.

The U.S. EPA recommends that a steady-state model be used to derive water quality-based effluent limitations in most cases. Steady-state models use a single constant value as input for each variable. Variables include effluent concentration, effluent flow, background concentration, and receiving water flow. Critical conditions are usually assumed for each variable when steady-state models are used, because the calculated water quality-based effluent limitations must protect against excursions of criteria under a variety of conditions. The assumed combination of critical conditions may never occur, leading to water quality-based effluent limitations that are more stringent than necessary to meet water quality criteria or objectives in the receiving water body. Conversely, if the assumed values for the variables do not represent critical conditions because of insufficient data or incorrect assumptions, the derived water quality-based effluent limitations may not be protective enough.

Dynamic models require much more data than steady-state models because the variability of the data and interactions between the variables are considered; however, they generally also produce more accurate water quality-based effluent limitations. Averaging periods, exceedance frequencies, complex mixing situations, pollutant fate and transport, pollutant interactions, and other factors can often be incorporated into dynamic models. U.S. EPA recommends that a dynamic model be used to derive water quality-based effluent limitations if sufficient data exist (typically, sufficient data will not be available), and time and resources are available. The TSD recommends three types of dynamic models: continuous simulation, Monte Carlo simulation, and log-normal probability modeling. All three types calculate probability distributions of downstream concentrations from which the allowable water quality-based effluent limitations can be derived.

Continuous simulation models predict downstream concentrations in chronological order based on daily historical data. Monte Carlo simulation models randomly generate downstream concentrations based on probability distributions of each variable such as effluent flow, effluent concentrations, etc. Log-normal probability models use the log-normal probability distributions of the variables to calculate probability distributions of the downstream concentrations. Continuous simulation requires the most data (about 20-25 years of continuous flow data); Monte Carlo simulation requires less data that are not required to be in chronological order; and log-normal probability modeling only requires the statistical parameters of the input variables. Continuous simulation models offer an array of effluent data that require further manipulation to develop an LTA and a coefficient of variation (CV). Both Monte Carlo and lognormal probabilistic models produce an LTA and a CV, which can be used directly in developing effluent limitations.

Generally, when using a steady-state equation for calculating water quality-based effluent limitations, the U.S. EPA guidance recommends that permit writers use the following procedure: First, the water quality standards applicable to the water body are identified. Then, it is determined which of the pollutants in the discharge need to be controlled by establishing water quality-based effluent limitations (see Chapter 1.1). Next, WLAs are calculated for each pollutant for which water quality-based effluent limitations are necessary. Where a TMDL exists, the WLA is that portion of the allowable load assigned to a particular discharge. Where a TMDL does not exist, a steady-state mass balance model is generally recommended for deriving an effluent concentration allowance (ECA), unless there are sufficient data, time, and resources to use a dynamic model. The ECA is subsequently converted to an effluent limitation. The following steady-state mass balance equation is generally used:

$Cd * Qd = Cu * Qu + Ce * Qe$ º *which solved for Ce is*
$Ce = ECA = (Cd * Qd - Cu * Qu) / Qe$ º *because Qd = Qu + Qe*
$Ce = ECA = (Cd * (Qu + Qe) - Cu * Qu) / Qe$ º *which can be rearranged to*
$Ce = ECA = Cd * Qu/Qe + Cd * Qe/Qe - Cu * Qu/Qe$ º *which can be rearranged to*
$Ce = ECA = Cd + Qu/Qe * (Cd - Cu)$

where *C* = pollutant concentration
Q = flow
d = downstream from the discharge point
u = upstream from the discharge point
e = effluent

The initial equation assumes that the pollutant is conservative, i.e., it stays in the water column and does not immediately decay. The downstream pollutant mass (found by multiplying the concentration with the flow) can therefore be found by adding the effluent pollutant mass to the pollutant mass upstream of the discharge. The units for the concentrations should be identical and the units for the flows should be identical. *Ce* is the effluent concentration allowance or ECA, *Cd* is the numeric protective level (usually the water quality criterion adjusted, if necessary, for hardness, pH, and metals translators (see Chapter 1.2.1), and *Cu* is the ambient background concentration. *Qu/Qe* is the available dilution (see Chapter 1.2.2).

Once the ECA has been calculated, it must be translated into maximum daily, average weekly, and/or average monthly water quality-based effluent limitations because the WLA does not account for effluent variability, uncertainty related to sample size, averaging periods, and exceedance frequencies. Using the WLA directly as an effluent limitation may result in an overly stringent effluent limitation, which may cause compliance problems for the discharger or, conversely, may result in an overly lenient effluent limitation that does not adequately protect water quality. The U.S. EPA, therefore, recommends a statistical procedure to convert the WLA into water quality-based effluent limitations. From the vast amount of data U.S. EPA has examined (TSD), it is reasonable to assume (unless specific data show otherwise) that treated effluent data follow a lognormal distribution. This is because effluent values are non-negative and treatment efficiency at the low end of the concentration scale is limited, while effluent concentrations may vary widely at the high end of the scale, reflecting various degrees of treatment system performance and loadings. These factors combine to produce the characteristically positively skewed appearance of the lognormal curve when data are plotted in a frequency histogram.

The ECAs are used to define the long-term average discharge conditions (LTA) that will maintain water quality at a level that will meet applicable water quality standards. For ECAs calculated based on human health criteria, the LTA is set equal to the ECA:

$$LTA_{human\ health} = WLA_{human\ health}$$

For ECAs calculated based on aquatic life criteria, the LTA is determined by multiplying the ECA with a factor (the WLA multiplier):

$$LTA_{acute\ aquatic} = ECA_{acute\ aquatic} * ECA\ multiplier_{acute}$$
$$LTA_{chronic\ aquatic} = ECA_{chronic\ aquatic} * ECA\ multiplier_{chronic}$$

The value of the ECA multiplier depends on the number of effluent concentration data points, the standard deviation of the effluent concentration data, the occurrence probability desired, and whether the criterion used for calculating the ECA is an acute or chronic aquatic life criterion. The ECA multipliers can be calculated as follows:

$$ECA\ multiplier_{acute} = exp(\ 0.5\ s^2 -\ z * s)$$
$$ECA\ multiplier_{chronic} = exp(\ 0.5\ s_4^2 -\ z * s_4)$$

where:

s^2 = ln $(CV^2 + 1)$;
s_4^2 = ln $(CV^2/4 + 1)$; and
z = z-score for the probability desired for the WLA multiplier

The U.S. EPA recommends using a 99th percentile occurrence probability (z = 2.326) to calculate both acute and chronic LTAs, although other occurrence probabilities are allowed. Rather than calculating the LTA factors, these factors (i.e., the ECA multipliers) can be found in Table V-4 based on a 99th percentile occurrence probability. To use Table V-4, the coefficient of variation (*CV*) for the effluent data must be calculated by dividing the standard deviation (see Appendix B) of the data by the arithmetic mean (see Appendix B). If the number of effluent data points is less than ten, the *CV* shall be set equal to 0.6, or a larger calculated value may be used. Typical values for CV range from 0.2 to 1.2. A value of 0.6 is a relatively conservative estimate that may be used for CV when available data sets are small, and the uncertainty of the calculated standard deviation and arithmetic mean is, therefore, high (U.S. EPA 19991). The factor that corresponds to the calculated *CV* can then be found in Table V-4. The lowest (most limiting) of calculated LTAs for a pollutant should be selected for deriving water quality-based effluent limitations.

Appropriate water quality-based effluent limitations are calculated by multiplying the lowest LTA with a factor that adjusts for the averaging period and exceedance frequency

Table V-4. ~~Waste Load Allocation (WLA)~~ Effluent Concentration Allowance (ECA) Multipliers for Calculating Long-Term Averages (LTAs)

Coefficient of Variation (CV)	Acute Factor 99th Percentile Occurrence Probability	Chronic Factor 99th Percentile Occurrence Probability
0.1	0.797	0.891
0.2	0.643	0.797
0.3	0.527	0.715
0.4	0.440	0.643
0.5	0.373	0.581
0.6	0.321	0.527
0.7	0.281	0.481
0.8	0.249	0.440
0.9	0.224	0.404
1.0	0.204	0.373
1.1	0.187	0.345
1.2	0.174	0.321
1.3	0.162	0.300
1.4	0.153	0.281
1.5	0.144	0.264
1.6	0.137	0.249
1.7	0.131	0.236
1.8	0.126	0.224
1.9	0.121	0.214
2.0	0.117	0.204
2.1	0.113	0.195
2.2	0.110	0.187
2.3	0.107	0.180
2.4	0.104	0.174
2.5	0.102	0.168
2.6	0.100	0.162
2.7	0.098	0.157
2.8	0.096	0.153
2.9	0.094	0.148
3.0	0.093	0.144
3.1	0.091	0.141
3.2	0.090	0.137
3.3	0.089	0.134
3.4	0.088	0.131
3.5	0.087	0.128
3.6	0.086	0.126
3.7	0.085	0.123
3.8	0.084	0.121
3.9	0.083	0.119
4.0	0.082	0.117

of the criterion, and the effluent monitoring frequency. The factor varies depending on whether the lowest LTA is based on a human health criterion or an aquatic life criterion:

For an LTA based on a human health criterion:
Average monthly limitation (AML) = *LTA*
Maximum daily limitation (MDL) = *LTA* MDL/AML multiplier*

For an LTA based on an aquatic life criterion:
Average monthly limitation = *LTA * AML multiplier*
Maximum daily limitation = *LTA * MDL multiplier*

The MDL/AML multiplier, the AML multiplier, and the MDL multiplier are calculated based on the monthly sampling frequency, the standard deviation of the effluent concentration data, and the occurrence probability desired:

$$\text{MDL multiplier} = \exp(-0.5\, s^2 + z_1 * s)$$
$$\text{AML multiplier} = \exp(-0.5\, s_n^2 + z_2 * s_n)$$
$$\text{MDL/AML multiplier} = \text{MDL multiplier} / \text{AML multiplier} = \exp(-0.5\, s^2 + z_1 * s) / \exp(-0.5\, s_n^2 + z_2 * s_n) = \exp(s * (z_1 - z_2))$$

where:
s^2 = ln [CV^2 + 1] ;
s_n^2 = ln [CV^2/n + 1];
z_1 = z-score for the probability desired for the MDL multiplier;
z_2 = z-score for the probability desired for the MDL multiplier; and
n = monthly sampling frequency.

The U.S. EPA guidance (TSD) recommends using a 99th percentile occurrence probability for the MDL multiplier (z_1 = 2.326) and a 95th percentile occurrence probability for the AML multiplier (z_2 = 1.645) , but will allow a lower confidence level and probability base to be used. The U.S. EPA guidance does not specifically recommend a percentile occurrence probability to use for the MDL/AML multiplier, but the percentiles used for the MDL/AML multiplier should reflect the percentiles used for the MDL multiplier and the AML multiplier.

Table V-5 contains values for the MDL, AML, and MDL/AML multipliers calculated using the percentiles recommended in the U.S. EPA guidance. The correct multiplier can be located in the table by using the previously calculated *CV* and the monthly sampling frequency. The TSD recommends that if the sampling frequency is four times a month or less, that the monthly sampling frequency (n) be set equal to 4, in order to get valid results. The TSD also recommends that maximum daily limitations be used in place of average weekly limitations for POTWs, as it is for non-POTWs.

Table V-5. Long-Term Average (LTA) Multipliers for Calculating Effluent Limitations

Coefficient of Variation	MDL Multiplier	AML Multiplier					MDL/AML Multiplier				
	99th Percentile Occurrence Probability	95th Percentile Occurrence Probability					MDL = 99th Percentile AML = 95th Percentile Occurrence Probability				
(CV)		n = 1	n = 2	n = 4	n = 8	n = 30	n = 1	n = 2	n = 4	n = 8	n = 30
0.1	1.25	1.17	1.12	1.08	1.06	1.03	1.07	1.12	1.16	1.18	1.22
0.2	1.55	1.36	1.25	1.17	1.12	1.06	1.14	1.25	1.33	1.39	1.46
0.3	1.90	1.55	1.38	1.26	1.18	1.09	1.22	1.37	1.50	1.60	1.74
0.4	2.27	1.75	1.52	1.36	1.25	1.12	1.30	1.50	1.67	1.82	2.02
0.5	2.68	1.95	1.66	1.45	1.31	1.16	1.38	1.62	1.84	2.04	2.32
0.6	3.11	2.13	1.80	1.55	1.38	1.19	1.46	1.73	2.01	2.25	2.62
0.7	3.56	2.31	1.94	1.65	1.45	1.22	1.54	1.84	2.16	2.45	2.91
0.8	4.01	2.48	2.07	1.75	1.52	1.26	1.61	1.94	2.29	2.64	3.19
0.9	4.46	2.64	2.20	1.85	1.59	1.29	1.69	2.03	2.41	2.81	3.45
1.0	4.90	2.78	2.33	1.95	1.66	1.33	1.76	2.11	2.52	2.96	3.70
1.1	5.34	2.91	2.45	2.04	1.73	1.36	1.83	2.18	2.62	3.09	3.93
1.2	5.76	3.03	2.56	2.13	1.80	1.39	1.90	2.25	2.70	3.20	4.13
1.3	6.17	3.13	2.67	2.23	1.87	1.43	1.97	2.31	2.77	3.30	4.31
1.4	6.56	3.23	2.77	2.31	1.94	1.47	2.03	2.37	2.83	3.39	4.47
1.5	6.93	3.31	2.86	2.40	2.00	1.50	2.09	2.42	2.89	3.46	4.62
1.6	7.29	3.38	2.95	2.48	2.07	1.54	2.15	2.47	2.93	3.52	4.74
1.7	7.63	3.45	3.03	2.56	2.14	1.57	2.21	2.52	2.98	3.57	4.85
1.8	7.95	3.51	3.10	2.64	2.20	1.61	2.27	2.56	3.01	3.61	4.94
1.9	8.26	3.56	3.17	2.71	2.27	1.64	2.32	2.60	3.05	3.65	5.02
2.0	8.55	3.60	3.24	2.78	2.33	1.68	2.37	2.64	3.07	3.67	5.09

Notes:
n = monthly sampling frequency of the effluent concentration data.

Table V-5 continued.

Coefficient of Variation	MDL Multiplier	AML Multiplier					MDL/AML Multiplier				
	99th Percentile Occurrence Probability	95th Percentile Occurrence Probability					MDL = 99th Percentile AML = 95th Percentile Occurrence Probability				
(CV)		n = 1	n = 2	n = 4	n = 8	n = 30	n = 1	n = 2	n = 4	n = 8	n = 30
2.1	8.83	3.64	3.30	2.85	2.39	1.72	2.42	2.68	3.10	3.70	5.14
2.2	9.09	3.68	3.35	2.91	2.45	1.75	2.47	2.71	3.12	3.72	5.19
2.3	9.34	3.71	3.40	2.97	2.50	1.79	2.52	2.75	3.15	3.73	5.22
2.4	9.58	3.74	3.45	3.03	2.56	1.82	2.56	2.78	3.17	3.74	5.25
2.5	9.81	3.76	3.49	3.08	2.61	1.86	2.61	2.81	3.18	3.75	5.27
2.6	10.0	3.78	3.53	3.13	2.67	1.90	2.65	2.84	3.20	3.76	5.29
2.7	10.2	3.80	3.56	3.18	2.72	1.93	2.69	2.87	3.22	3.76	5.30
2.8	10.4	3.81	3.60	3.23	2.77	1.97	2.73	2.90	3.23	3.77	5.30
2.9	10.6	3.83	3.63	3.27	2.82	2.00	2.77	2.93	3.25	3.77	5.30
3.0	10.8	3.84	3.65	3.31	2.86	2.04	2.81	2.95	3.26	3.77	5.30
3.1	11.0	3.85	3.68	3.35	2.91	2.07	2.85	2.98	3.27	3.77	5.29
3.2	11.1	3.85	3.70	3.38	2.95	2.11	2.88	3.00	3.29	3.77	5.28
3.3	11.3	3.86	3.72	3.42	2.99	2.14	2.92	3.03	3.30	3.77	5.27
3.4	11.4	3.86	3.74	3.45	3.03	2.17	2.95	3.05	3.31	3.77	5.25
3.5	11.6	3.87	3.76	3.48	3.07	2.21	2.99	3.08	3.32	3.77	5.24
3.6	11.7	3.87	3.77	3.51	3.10	2.24	3.02	3.10	3.33	3.76	5.22
3.7	11.8	3.87	3.78	3.53	3.14	2.27	3.05	3.12	3.34	3.76	5.20
3.8	11.9	3.87	3.80	3.56	3.17	2.30	3.09	3.14	3.35	3.76	5.18
3.9	12.1	3.87	3.81	3.58	3.21	2.34	3.12	3.16	3.36	3.76	5.16
4.0	12.2	3.87	3.82	3.60	3.24	2.37	3.15	3.19	3.37	3.76	5.14

Notes:
n = monthly sampling frequency of the effluent concentration data.

Finally, the calculated water quality-based effluent limitations are compared with the technology-based effluent limitations for the pollutant, and the most protective of the limitations are included in the permit. Mass-based effluent limitations (in terms of pounds per day or kilograms per day) are generally calculated by multiplying the most protective of the limitations with the mean daily mean effluent flow and appropriate conversion factors (to adjust the units of the flow and the concentration- and mass-based limitations). Mass-based limits are particularly important for control of bioconcentratable pollutants. Concentration-based limits will not adequately control discharges of these pollutants if the effluent concentrations are below detection. For these pollutants, controlling mass loadings to the receiving water is critical for preventing adverse environmental impacts (U.S. EPA 1991).

The rescinded ISWP and EBEP listed a number of methods from which the permit writer could choose when developing water quality-based effluent limitations:

a. assigning of a portion of the loading capacity of the receiving water to each source of waste, point and nonpoint;

b. using a steady-state mass balance equation:

$$C_e = C_d + D\,(C_d - C_u), \qquad \text{when } C_d > C_u, \text{ and}$$
$$C_e = C_d, \qquad \text{when } C_d \leq C_u,$$

where D = the allocated dilution ratio, expressed as parts receiving water per part wastewater (Qu/Qe) based on mixing zone provisions. (The other variables have been described above. This equation is similar to the equation used in the U.S. EPA guidance);

c. applying the statistical-based approach described in the TSD, where sufficient effluent and receiving water data exist;

d. using discharge prohibitions to implement water quality criteria for a particular area; or

e. for power plant discharges, using the steady-state equation:

$$C_e = C_d\ (D_c + 1)$$

where D_c = the combined in-plant waste stream. (The other variables have been described above.)

The method described in the rescinded ISWP and EBEP has been incorporated into Alternative 3. The Ocean Plan and the San Francisco Bay Basin Plan use a steady-state mass balance equation identical to the equation used in the rescinded ISWP and EBEP for non-power plant discharges. The equations differ only in how the variables are defined. Unlike the rescinded ISWP and EBEP, however, the Ocean Plan and the San Francisco Bay Basin Plan do not offer a choice of methods for calculation of water quality-based effluent limitations. The rescinded ISWP and EBEP did not specify how mass-based effluent limitations should be calculated.

The Permitting and Compliance Issues Task Force also made recommendations on calculating water quality-based effluent limitations. The task force recommendations are very similar to the U.S. EPA recommendations. The task force suggested that derived water quality-based effluent limitations be consistent with the averaging period and exceedance frequency of the criteria. They recommended that the steady-state mass balance model, described earlier, be used for calculating water quality-based effluent limitations in most cases, but that dischargers be allowed to develop sufficient data and calculate water quality-based effluent limitations based on an acceptable dynamic model described in the TSD. The task force recommended that the procedures listed in Chapter 5 of the TSD be followed when calculating water quality-based effluent limitations, but made no specific recommendations on which percentile occurrence probability should be used. The task force recommended that daily mass limitations be calculated as the product of the maximum daily limitation and the maximum daily flow expected at the end of the permit term, and that monthly mass limitation be calculated as the product of the average monthly limitation and the maximum monthly flow expected at the end of the permit term. With the exception of specifying how mass limitations are calculated, the task force recommendations on the calculation of water quality-based effluent limitations have largely been incorporated into Alternative 2. The U.S. EPA permitting regulations generally require permit issuers to express effluent limitations in terms of mass, but do not provide guidance on how to establish mass limits (40 CFR § 122.45(f)(1)). Thus, the permit issuer can use best professional judgement to establish mass limits. However, it is the intent of the proposed Policy to set a standard method for calculating mass limits amongst the permit issuers, the standard method for calculating mass limits will be determined as part of developing the ISWP/EBEP. This approach was determined to be appropriate in light of U.S. EPA's recently published proposed revisions to the NPDES regulations and to Tier 1 of the federal anti-degradation policy. The proposed rule requires that selected dischargers offset any increase in mass loadings of a pollutant causing impairment in an amount that would result in "reasonable further progress toward attainment of water quality standards." Reasonable further progress means that the increase in mass will be offset by pollutant load reductions by a ratio of at least 1:5. The draft rule applies to large new dischargers and existing dischargers undergoing a significant expansion. A "significant expansion" is defined as 20 percent or greater increase in loadings above the current permit limits. Although this proposed rule applies to impaired water bodies, mass limits should be calculated in the same manner for both impaired and non-impaired water bodies. Until U.S. EPA describes the use of mass limits in the proposed rule, establishing a State methodology for calculating mass limits will be deferred.

III. ALTERNATIVES FOR SWRCB ACTION

Alternative 1. No action. The method of calculating water quality-based effluent limitations would be deferred to the RWQCBs. This approach would allow RWQCBs flexibility, but would reduce statewide consistency.

Alternative 2. Calculate water quality-based effluent limitations based on the U.S. EPA guidance. Under this alternative, when a RWQCB determines (using procedures described in Chapter 1.1) that water quality-based effluent limitations are necessary to control a pollutant in a discharge, these water quality-based effluent limitations must be developed using one or more of the following methods:

a. RWQCBs may assign a portion of the loading capacity of the receiving water to each source of waste, point and nonpoint (see Appendix 4);

b. RWQCBs may use the following procedure based on a steady-state model:

Step 1: Identify applicable water quality criteria for the pollutant.

Step 2: For each water quality criterion, calculate the effluent concentration allowance (ECA)[4] using the following steady-state mass balance equation:

$$ECA = C + D(C - B) \quad \text{when } C > B, \text{ and}$$
$$ECA = C \quad \text{when } C \leq B,$$

where *C* = the priority pollutant criterion/objective, adjusted, if necessary, for hardness, pH, and translators (see Chapter 1.2.1 for discussion of translators));
D = the dilution credit as determined in Chapter 1.2.2; and
B = the ambient background concentration as determined in Chapter 1.2.3.

The concentration units for *C* and *B* must be identical; both C and B shall be expressed as total recoverable, unless inappropriate. The dilution credit is unitless.

Step 3: For each *ECA*, determine the long-term average discharge condition (*LTA*). This step is divided into Part A and Part B. Part A describes how to calculate an LTA based on a human health criterion/objective; Part B describes how to calculate an LTA based on an aquatic life criterion/objective.

Part A: For an *ECA* calculated based on a human health criterion, set the *LTA* equal to the *ECA*.

LTA (human health) = ECA (human health)

[4] To avoid confusion with waste load allocations determined as part of the TMDL process, this waste load allocation (calculated in Step 2) is renamed to effluent concentration allowance (ECA). ECA is equivalent to the WLA as defined by the TSD.

Part B: For an *ECA* based on aquatic life criteria, determine the *LTA* by multiplying the *ECA* with a factor that adjusts for effluent variability. The factor can be calculated as described below, but is easier found by using Table V-4. To use Table V-4, the coefficient of variation (*CV*) (see Appendix B) for the effluent pollutant concentration data must first be calculated. If the number of effluent data points is less than ten, or at least 80 percent of the data are reported as non-detects, the *CV* shall be set equal to 0.6. When calculating *CV* in this procedure, if an effluent data point is below the detection limit for the pollutant in that sample, one-half of the reported detection limit shall be used as a value in the calculations. The factor that corresponds to the *CV* and the acute or chronic criteria can then be found in Table V-4.

<u>ECA Multipliers</u>

$$\text{ECA multiplier}_{\text{acute}_{99}} = e^{(0.5\sigma^2 - z\sigma)}$$

$$\text{ECA multiplier}_{\text{chronic}_{99}} = e^{(0.5\sigma_4^2 - z\sigma_4)}$$

Where

Where	σ	=	*standard deviation
	σ	=	$[ln(\text{CV}^2 + 1)]^{0.5}$
	σ^2	=	$ln(\text{CV}^2 + 1)$
	σ_4	=	$[ln(\text{CV}^2/4 + 1)]^{0.5}$
	σ_4^2	=	$ln(\text{CV}^2/4 + 1)$
	z	=	2.326 for 99th percentile probability basis

<u>LTA Equations</u>

$\text{LTA}_{\text{acute}} = \text{ECA}_{\text{acute}} * \text{ECA multiplier}_{\text{acute}_{99}}$ (from Table 1 or as calculated above)

$\text{LTA}_{\text{chronic}} = \text{ECA}_{\text{chronic}} * \text{ECA multiplier}_{\text{chronic}_{99}}$ (from Table 1 or as calculated above)

<u>Step 4:</u> Select the lowest (most limiting) of the *LTA*s for the pollutant.

<u>Step 5:</u> Calculate water quality-based effluent limitations by multiplying the limiting *LTA* *(as selected in Step 4)* with a multiplier that adjusts for the averaging periods and exceedance frequencies of the criteria and the water quality-based effluent limitations, and the effluent monitoring frequency. If the limiting *LTA* was based on a human health criterion, water quality-based effluent limitations are calculated as follows:

Average monthly limitation (AML) = *LTA*
Maximum daily limitation (MDL) = *LTA * MDL/AML multiplier*

If the limiting LTA was based on an aquatic life criterion, water quality-based effluent limitations are calculated as follows:

Average monthly limitation = *LTA * AML multiplier*$_{95}$
Maximum daily limitation = *LTA * MDL multiplier*$_{99}$

The MDL/AML multiplier, the AML multiplier$_{95}$, and the MDL multiplier$_{99}$ can be calculated (see equations below), but are easier found by using Table V-5. The correct multiplier can be found by using the previously calculated *CV* and the monthly sampling frequency (*n*) of the pollutant in the effluent. If the sampling frequency is four times a month or less, *n* must be set equal to 4. For this method only, maximum daily limitations must be used for POTWs in place of average weekly limitations.

<u>AML and MDL Multipliers</u>

$$\text{AML multiplier}_{95} = e^{(z\sigma_n - 0.5\sigma_n^2)}$$

Where
$\sigma_n = [ln(CV^2/n + 1)]^{0.5}$
$\sigma_n^2 = ln(CV^2/n + 1)$
$z = 1.645$ for 95th percentile probability basis

$$\text{MDL multiplier}_{99} = e^{(z\sigma - 0.5\sigma^2)}$$

Where
$\sigma = [ln(CV^2 + 1)]^{0.5}$
$\sigma^2 = ln(CV^2 + 1)$
$z = 2.326$ for 99th percentile probability basis

<u>MDL/AML Multiplier</u>

$$\text{MDL/AML multiplier} = \text{MDL multiplier}_{99} \div \text{AML multiplier}_{95}$$

c. RWQCBs may elect to apply an acceptable dynamic model, where sufficient effluent and receiving water data exist;

d. RWQCBs may use discharge prohibitions to implement water quality criteria in accordance with Water Code Section 13243; or

e. RWQCBs may establish water quality-based effluent limitations that considers intake water pollutants according to Chapter 1.2.4.

Regardless of which method is used for deriving water quality-based effluent limitations, the calculated water quality-based effluent limitations are compared to the technology-based effluent limitations for the pollutant. The most protective of the two types of limitations must be included in the permit. Mass limitations must be calculated for each of the CTR criteria limited in an NPDES permit, unless it is inappropriate to do so. Effluent limitations shall also be expressed in terms of concentration or other unit of measurement, and the discharger must comply with all limitations.

This alternative is more complicated to implement than Alternative 3, because more calculations are involved. However, this method adjusts for effluent variability, sample size, monitoring frequency, and differences between the averaging periods and exceedance frequencies of the criteria and the water quality-based effluent limitations. Therefore, water quality-based effluent limitations derived using this method would have a much lower probability of leading to excursions above the water quality criteria in the receiving water. This alternative furthermore addresses recommendations of the Permitting and Compliance Issues Task Force, and is based on methods described in the TSD, and the GNPI**.**

Alternative 3. Calculate water quality-based effluent limitations as described in the rescinded ISWP and EBEP, and the San Francisco Bay Basin Plan. Same as Alternative 2, except that method (b) would be as follows:

b. RWQCBs may use the following procedure:

Step 1: Identify applicable water quality criteria for the pollutant.

Step 2: For each water quality criteria, calculate the water quality-based effflluent limitation using the following steady-state mass balance equation:

Water quality-based effluent limitation = $C + D(C - B)$ *when* $C > B$, *and*
Water quality-based effluent limitation = C *when* $C \leq B$,

where C = the priority pollutant criterion/objective, adjusted, if necessary, for hardness, pH, and translators (see Chapter 1.2.1)~~)~~;
D = the dilution credit as determined in Chapter 1.2.2; and
B = the ambient background concentration as determined in Chapter 1.2.3.

The concentration units for *C* and *B* must be identical; both C and B shall be expressed as total recoverable, unless inappropriate. The dilution credit is unitless.

This alternative is easier for the permit writer to implement than Alternative 2, because fewer calculations are involved. However, this alternative does not adjust for effluent variability, sample size, monitoring frequency, or the differences between the averaging periods and exceedance frequencies of the criteria and the water quality-based effluent limitations. Nor does this method describe how maximum daily limitations are to be derived from a 30-day average human health criterion or how to determine which of the applicable criteria is more stringent. As a result, water quality-based effluent limitations derived using this method may be too lenient, resulting in excursions above the criteria in the receiving water, or conversely, may produce overly stringent water quality-based effluent limitations which the dischargers may have difficulty meeting.

IV. STAFF RECOMMENDATION

Adopt Alternative 2.

CHAPTER 1.2.1 -TRANSLATORS FOR METALS AND SELENIUM

I. PRESENT STATE POLICY

Currently, there is no statewide policy on the translation of metals and selenium (a metalloid) criteria that are expressed in the dissolved form into total recoverable effluent limitations (permit limits). The metals objectives in the Ocean Plan and the San Francisco Bay Basin Plan are expressed as total recoverable; therefore, a translator is not needed. The Central Valley Basin Plan expresses the metals objectives as dissolved and the selenium objectives as total recoverable; translators for these objectives are not addressed in the basin plan. The Santa Ana Basin Plan includes site-specific objectives for three metals (that apply to segments of the Santa Ana River) which are expressed as dissolved. Although not contained in their basin plan, the Santa Ana RWQCB uses the translators that were developed during the site-specific objectives study for these metals (i.e.,2.6 for cadmium and copper, and 6.1 for lead). The other basin plans either express metals objectives as total recoverable or do not contain objectives for metals.

II. ISSUE DESCRIPTION

Metals and selenium[5] can be expressed and measured in concentrations of either dissolved, acid-soluble, total recoverable, or total.[6] The federal regulation at 40 CFR 122.45(c) requires that, in

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[5] Selenium is a metalloid, or metal-like substance; the discussion of metals in this chapter also applies to selenium unless otherwise specified.

[6] The dissolved fraction of a metal is operationally defined as that portion of the metal concentration that will pass through a 0.45 micrometer (μm) or 0.40 μm membrane filter (U.S. EPA 1996).

The acid-soluble fraction of a metal is that portion of the metal concentration that will pass through a 0.45 μm membrane filter after the solution to be filtered has been adjusted to within a pH of 1.75 ± 0.1 and held for a period of 16 hours (U.S. EPA 1991).

The total recoverable fraction of a metal is that portion of the metal concentration that is recoverable for purposes of analytical measurement.

The total fraction of a metal consists of the total concentration of the metal regardless of compartment (i.e., dissolved in the water, or adsorbed to food items, suspended particles, or sediment).

In an aquatic environment, where the environment may include water, sediment, suspended particles, and food items, the chemically relevant distinction is between the forms of metal that are dissolved and particulate, whereas the toxicologically relevant distinction is between the forms of metal that are toxic and nontoxic. (Particulate metal is operationally defined as total recoverable metal minus dissolved metal.) Even at that, a part of what is measured as dissolved is particulate metal that is small enough to pass through the filter, or is adsorbed to or complexed with organic colloids and ligands. A central issue in establishing and implementing metals criteria is how to accurately determine the fraction of total metal that is biologically available.

most instances, effluent limitations for metals be expressed as total recoverable.[7] Therefore, if a water quality criterion for a metal is expressed in a form other than total recoverable, the criterion must be "translated" into a total recoverable effluent limitation that will achieve water quality standards.

With the exception of the fresh water chronic criteria for selenium, the CTR criteria for metals and selenium are expressed as the dissolved fraction.[8] The U.S. EPA previously concluded that the dissolved fraction is a better representation of the biologically active portion of the metal than is the total or total recoverable fraction (U.S. EPA 1993, 1996).[9]

Because U.S. EPA's CWA Section 304(a) aquatic life criteria for metals are expressed as total recoverable, these criteria were multiplied by a conversion factor[10] to derive dissolved criteria for

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[7] This regulation exists because chemical differences between the effluent discharge and the receiving water body are expected to result in changes in the partitioning between dissolved and adsorbed (particulate) form of metal (U.S. EPA 1996).

[8] The August 1997 draft CTR proposed dissolved acute fresh water criteria for arsenic, cadmium, chromium (III), chromium (VI), copper, lead, mercury, nickel, silver, and zinc; dissolved chronic fresh water criteria for arsenic, cadmium, chromium (III), chromium (VI), copper, lead, nickel, and zinc; dissolved acute salt water criteria for arsenic, cadmium, chromium (VI), copper, lead, mercury, nickel, selenium, silver, and zinc; and dissolved chronic salt water criteria for arsenic, cadmium, chromium (VI), copper, lead, mercury, nickel, selenium, and zinc.

[9] When the aquatic life criteria documents for metals and selenium were first released, the U.S. EPA recommended determining compliance with the criteria by measuring the acid-soluble fraction. As no approved analytical method existed to measure this fraction, compliance was determined by measuring the total recoverable metal fraction. However, on October 1, 1993, the U.S. EPA published a memorandum offering technical guidance on interpretation and implementation of aquatic life metals criteria. In that memorandum, the U.S. EPA Office of Water reversed its support of determining compliance with metals criteria by measuring the total recoverable fraction in favor of using the dissolved metal fraction. The memorandum reads, "It is now the policy of the Office of Water that the use of dissolved metal to set and measure compliance with water quality standards is the recommended approach, because dissolved metal more closely approximates the bioavailable metal in the water column than does total recoverable metal." This memorandum further states that many in the scientific community feel that total recoverable measurements in ambient water have some value, and exceedances of aquatic life water quality criteria based on total recoverable measurements are an indication that metal loadings could be a stress to the ecosystem, particularly in compartments other than the water column (e.g., sediments). Therefore, until the scientific uncertainties are better resolved, a range of different risk management decisions can be justified. Thus, U.S. EPA concluded that the fraction to be regulated is best left to the state risk manager (U.S. EPA 1993). The effect of this policy on the NTR is described in the Federal Register Vol. 60, No. 86, pp. 22228-22237 and in amendments to 40 CFR 131.36.

The Chemical-Specific Objectives Task Force discussed the appropriateness of applying dissolved versus total recoverable metals criteria. The recommendations made in this regard will be considered in Phase 2 of the ISWP/EBEP when criteria to be considered for State-adopted water quality objectives will be developed.

[10] In the original toxicity tests used by U.S. EPA to develop metals criteria for aquatic life, the metal in the test solutions was present in dissolved and particulate forms. Metal concentrations for these tests, however, were reported as total recoverable. When the U.S. EPA changed its policy to support dissolved

the CTR. The conversion factors that the U.S. EPA generated and used to derive the dissolved CTR metals criteria are presented in Table V-6.

While the *conversion factor* (described above) is used to convert a total recoverable criterion to a dissolved criterion, the *translator* (described below) is used to translate the dissolved criterion to a total recoverable effluent limitation. The "translation" of a dissolved criterion to a total recoverable effluent limitation is simply an additional calculation that is performed

TABLE V-6. Conversion Factors for Metals and Selenium

	FRESHWATER		SALTWATER
CHEMICAL	ACUTE	CHRONIC	ACUTE**
Arsenic	1.000	1.000	1.000
Cadmium*	0.944	0.909	0.944
Chromium (III)	0.316	0.860	N/A
Chromium (VI)	0.982	0.962	0.993
Copper	0.960	0.960	0.83
Lead*	0.791	0.791	0.951
Mercury	0.85	N/A	0.85
Nickel	0.998	0.997	0.990
Selenium	N/A	N/A	0.998
Silver	0.85	N/A	0.85
Zinc	0.978	0.986	0.946

Notes:

N/A = not available

* = Conversion factors for freshwater cadmium and lead are hardness-dependent. The values shown are with a hardness of 100 mg/L as calcium carbonate. The equations are as follows:

cadmium (acute): 1.136672 - [ln (hardness)(0.041838)],

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metals criteria, the agency repeated some of the original tests, and simulated test conditions for others, for the purpose of determining the percent of total recoverable metal that was present in the dissolved form. Conversion factors were then generated which allowed for the conversion of the total recoverable criteria into dissolved criteria (Table V-6). These conversion factors, which are essentially predications of how the criteria would be different if they had been based on measured dissolved concentration in the toxicity tests used to derive the criteria, result in lowering the criteria concentrations.

cadmium (chronic): 1.101672 - [ln (hardness)(0.041838)], and
lead (acute and chronic): 1.46203 - [ln (hardness)(0.145712)].

** = U.S. EPA applied the saltwater acute conversion factors for the saltwater chronic criteria because (a) saltwater chronic conversion factors are not available, and (b) it is expected that the close similarities between the freshwater acute and chronic conversion factors would also be found (if the chronic value could be calculated) for the saltwater water conversion factors.

[Sources for Table 1: U.S. EPA (1996); Federal Register, Vol. 60, No. 86, p. 22231]

to answer the question of what fraction of metal in the effluent will be dissolved in the receiving water body (as opposed to the fraction of metal that is bound to particulates and is, presumably, biologically unavailable). The chemical properties[11] of the areas of the receiving water body that are affected by the discharger's effluent will determine the fraction of the metal that is dissolved and the fraction that is in particulate form. The translator itself is the fraction of total recoverable metal in the receiving water body that is dissolved. Thus, a total recoverable metal value that is used in the calculation of effluent limitations (see Chapter 1.2) is derived by dividing the dissolved criterion by the translator.[12]

Translators can be determined in several ways. U.S. EPA guidance (U.S. EPA 1996) identifies the following approaches to developing translators for metals or selenium:

(1) A translator equal to 1;
(2) A translator equal to the conversion factor, if a conversion factor was used to derive the dissolved criterion;
(3) A translator determined directly by site-specific measurements of dissolved and total recoverable metal concentrations in water samples of well-mixed effluent and receiving water (at or below the edge of an allowed mixing zone; see Chapter 1.2.2);
(4) A translator developed by determining the partition coefficient (K_p)[13] by site-specific measurements and then calculating the dissolved metal fraction based on the relationship between the particulate and dissolved metals concentrations at equilibrium;
(5) A translator based on old data/STORET data; and
(6) Other defensible approaches.

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11 Many factors affect the dissolved to total recoverable metal ratio, including water temperature, pH, hardness, and the prevalence of binding sites such as total suspended solids, particulate and dissolved organic carbon (U.S. EPA 1996).

12 While the U.S. EPA recommends that translators be used to derive total recoverable effluent limitations for metals from dissolved criteria, the agency also notes that translators are not designed to consider bioaccumulation of metals (U.S. EPA 1996).

13 The partition coefficient (K_p) expresses the equilibrium relationship between the distribution (partitioning) of a metal between the dissolved and adsorbed (particulate) forms. The partition coefficient equals the slope of the data of particulate metal (µg/mg) against dissolved metal (µg/L) (U.S. EPA 1996).

Approach (1) would apply the dissolved criterion directly in the calculation of a total recoverable effluent limitation. In Approach (2), the dissolved criterion that was derived by multiplying the total recoverable criterion by the conversion factor (Table V-6) would then be divided by the same conversion factor (i.e., the effluent limitation would be based on the total recoverable criterion that was converted to a dissolved criterion). The use of a translator equal to the conversion factor is also conservative and can result in a very stringent permit limit. Approach (3), which is favored by the U.S. EPA, involves a study that analyzes the mixture of effluent and receiving water to determine the dissolved and total recoverable metal fractions. The ratio of these fractions would then be used to translate from the dissolved concentration in the downstream receiving water to the total recoverable concentration in the effluent (i.e., the effluent limitation) that will not exceed the dissolved criterion. If the study is properly designed and implemented, this approach will give a good estimate of the actual in-stream dissolved to solids ratio~~, though, in many cases, data are not readily~~. Approach (4), (also favored by U.S. EPA) involves a site-specific study and development of an empirically-derived partition coefficient. The partition coefficient is then used to calculate the translator. Here again, if the study is properly designed and implemented, this approach will provide a good estimate of the actual in-stream dissolved to solids ratio. Approach (5), deriving translators based on old data and/or STORET data, is problematic as there has been general recognition that using these data may not generate appropriate translators due to contaminated metals data and other factors. This approach can result in a limit that is too stringent or not stringent enough. The U.S. EPA recommends that this approach be phased out unless other data establish their validity for the sites in question. As a general rule, the U.S. EPA recommends that site-specific data be generated to develop site-specific translators (U.S. EPA 1993, 1996).

The Permitting and Compliance Issues Task Force recommended that, when developing total recoverable effluent limitations based on dissolved metal objectives, “A translator of 1:1 is to be utilized unless the discharger commits to developing a defensible translator of less than 1:1.” However, SWRCB staff believes that U.S. EPA conversion factors provide a better estimate of the fraction dissolved than a 1:1 translator. The task force further recommend that, where there are multiple discharges of a problematic metal to a water body, the dischargers should “jointly establish a defensible translator on a watershed basis”. The task force believed a “defensible translator” is one developed using any of the U.S. EPA recommended procedures. In addition, the task force recommended that the RWQCB allow up to two years (see Chapter 2.1) after the reasonable potential determination (see Chapter 1.1) to establish translators. The task force recommendations that involve the procedural aspects of developing a translator are discussed in Chapter 6.

While the Chemical-Specific Objectives Task Force focussed on the relative advantages and disadvantages of dissolved versus total recoverable metal criteria (which will be considered in Phase 2 of the ISWP/EBEP), the topic of dissolved to total recoverable translators was also addressed. Although there was disagreement over the costs of developing translators, it was agreed that the expense should be borne by dischargers, at their option.

The cost of a translator study depends in part on how much data are needed to develop a credible metals translator. The greater the variability of the receiving water, the greater the cost involved.

Depending on the complexity of the water body, a simple study using existing data and minimal additional data may suffice. In other cases where the system is complex (e.g., enclosed bays), significant additional sampling may be necessary, possibly including more expensive sampling techniques (e.g., offshore sampling) and the establishment of new monitoring stations. Costs can also vary based on the time period over which monitoring must span (e.g., 6 months, 12 months, 18 months), which may be affected by technical concerns such as adequately considering water quality variability (e.g., seasonal differences).

To minimize the cost of developing a metals translator, facilities should use as much existing data as possible and use existing monitoring stations to collect additional samples if possible. Developing several metals translators concurrently can be more efficient and result in cost savings in sample collection and data analysis. Additionally, a group of facilities discharging to the same water body may be able to collaborate in conducting a study so that costs can be shared among multiple dischargers.

SWRCB staff estimates that costs could range between $10,000 for a number of metals in a simple situation to $250,000 for a complex situation involving setting up new sample stations and collecting new data over a period of time for the entire set of basic metals.

A translator study should be designed to provide a reasonable measure of the highest fraction of metal that is dissolved in the water body so that beneficial uses are protected. Therefore, Regional Boards should preapprove translators studies to see that the fraction dissolved in the water body is properly characterized.

III. ALTERNATIVES FOR SWRCB ACTION

Alternative 1. No action. Under this alternative, the RWQCBs would decide how to translate dissolved metals criteria into total recoverable effluent limitations. This alternative would not address concerns regarding the inconsistent application of objectives among the RWQCBs.

Alternative 2. Require a translator equal to 1, unless the discharger(s) commits to developing a defensible translator through a translator study. Under this alternative, the dissolved criterion would be used directly to calculate a total recoverable effluent limitation if a translator study is not planned and completed. If the study is not done, this alternative may result in overly stringent effluent limitations because site-specific metal partitioning conditions would not be considered. The use of a 1:1 translator, combined with a provision that allows the discharger(s) to develop a defensible translator specific to the discharge location, would be simple to implement as it does not require each RWQCB to develop its own policy on translators, and it places the burden of developing translators on the discharger. This alternative reflects the recommendation of the Permitting and Compliance Issues Task Force.

Alternative 3. Require a translator equal to the conversion factor, unless the discharger(s) commit to developing a defensible translator through a translator study. Under this alternative, an effluent limitation based on a dissolved metal criterion would be equally or more stringent that an effluent limitation based on a total recoverable metal criterion if a translator study is not done.

Therefore, like Alternative 2, this alternative would be protective, but may result in overly stringent effluent limitations if the translator study is not completed. However, SWRCB staff believes that U.S. EPA conversion factors provide a better estimate of the fraction dissolved than a 1:1 translator and have revised the Policy to require use of conversion factors if the discharger does not develop a defensible site-specific translator.

IV. STAFF RECOMMENDATION

Adopt Alternative 3.

CHAPTER 1.2.2 MIXING ZONES AND DILUTION CREDITS

I. PRESENT STATE POLICY

Currently, there is no statewide policy on mixing zones or dilution credits for discharges to the inland surface waters, enclosed bays, or estuaries of California. The Ocean Plan includes a provision for allowing a dilution credit for discharges to ocean waters. Four of the nine RWQCBs have provisions for mixing zones in their basin plans. These provisions are briefly described below.

II. ISSUE DESCRIPTION

Complying with water quality standards, and effluent limitations based on such standards, may be difficult for some dischargers. Regulatory relief for discharges may be provided, under certain conditions, by allowing limited dilution of the discharged effluent with the receiving water to occur before attainment with water quality criteria/objectives is required. The defined, physical area in the receiving water that is allocated for mixing and dilution of the discharged effluent is called a mixing zone.[14] Water quality criteria/objectives must be met throughout a water body except within any allowed mixing zone.[15]

Mixing zones are expressed in dimensions of size and shape, such as the zone of initial dilution (defined in Appendix B), distance from outfall, or percent of volume, width, length, or surface or cross-sectional area of the receiving water. Mixing zones that are allocated to a discharge are considered both in calculating water quality-based effluent limitations and in determining compliance with water quality standards in the receiving water body. If a mixing zone is allowed, a water quality-based effluent limitation greater than the criterion/objective may be established. If a mixing zone is not allowed, the effluent limitation is set equal to the criterion/objective.

Logically, mixing zones can be applied only where an identifiable, discrete point of discharge exists and where the discharge is regulated through NPDES permits and other waste discharge requirements (WDR) issued by the SWRCB and RWQCBs. In all cases, mixing zones must be applied or denied as necessary to protect the beneficial uses and integrity of the receiving water body.

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[14] Under CWA regulations (40 CFR 131.13), states can adopt policies, such as those for mixing zones, that generally affect the application and implementation of water quality standards. Such policies are subject to U.S. EPA review and approval. If an appropriate authorizing policy is included in the state's water quality standards, the state may designate a mixing zone.

[15] Occasionally, the phrase "point of application" is used when referring to mixing zones. "Point of application" refers to the place where water quality standards (i.e., criteria or objectives) apply for purposes of determining compliance. If a mixing zone is allowed, the "point of application" of criteria/objectives is at the edge of an allowed mixing zone; if a mixing zone is not allowed, the "point of application" is at the "end-of-pipe".

A mixing zone corresponds to a dilution credit, D, that may be used to calculate effluent limitations (described in Chapter 1.2) for a discharge (i.e., the mixing zone granted to a discharge determines the dilution credit, and vice versa).[16] Before establishing a mixing zone and dilution credit for a discharge, it must first be determined if, and how much (if any), receiving water is available to dilute the discharge. For a discharge that mixes rapidly and completely[17] in the receiving water, this is accomplished by calculating a dilution ratio (i.e., the upstream receiving water flow, $Q_{u,}$ divided by the discharged effluent flow, Q_e) from which the dilution credit is derived. Thus, the dilution ratio is expressed as Q_u/Q_e. This value represents the maximum dilution credit that is physically available and that may be granted. The dilution ratio flows may be determined as follows:

- The receiving water flow (Q_u) should be based on the critical low flow of the receiving water because the priority pollutant criteria are established to protect uses at or above critical low flow conditions (i.e., these flows approximate a worst case condition) (U.S. EPA 1991). The U.S EPA (1991, 1994) identifies two methods for calculating acceptable critical low flows: (1) the hydrologically-based method developed by the U.S. Geological Survey; and (2) the biologically-based method developed by the U.S. EPA. The hydrologically-based method (which has been used traditionally) establishes critical low flows of 1Q10, 7Q10, 30Q5, and harmonic mean (each defined in Appendix B) that correspond to acute aquatic life criteria, chronic aquatic life criteria, human health criteria for carcinogens, and human health criteria for noncarcinogens, respectively. The biologically-based critical flow method (which is calculated using U.S. EPA's DFLOW computer model) requires more data than the hydrologic method but considers specific toxicological effects of a pollutant and biological recovery times in determining the flow.[18]

- The effluent flow (Q_e) could be based on the facility's design flow, or the facility's maximum or mean flows over a specified period of time (e.g., maximum daily mean flow, mean daily mean flow). The selection of the effluent flow is based on a consideration of worst case conditions and the type of criterion.

Depending on the conditions and characteristics of the receiving water and the effluent, the appropriate dilution credit will be less than or equal to the dilution ratio. Therefore, factors in addition to the dilution ratio need to be considered in determining the portion of the critical low flow to provide as dilution, if any.

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16 Detailed information on the application of mixing zones and dilution credits in the calculation of effluent limitations is presented in the TSD (U.S. EPA 1991) and the Water Quality Standards Handbook (U.S. EPA 1994).

17 The U.S. EPA (1991) defines a completely mixed condition as no measurable difference in the concentration of a pollutant across a transect of the water body (e.g., does not vary by 5 percent).

18 The biologically-based flow method considers the durations and frequencies of the criteria; therefore, it provides that criteria excursions do not exceed the maximum allowed (i.e., once every 3 years). In contrast, the use of 1Q10 and 7Q10, which do not consider the duration and frequency of a criterion, may result in more or fewer excursions that once in 3 years (U.S. EPA 1991).

The U.S. EPA (1991, 1994) has identified physical, chemical, and biological factors that may constitute a basis for limiting or denying a mixing zone (based on a calculated dilution credit). These factors include, but are not limited to: size, depth, configuration, and flow/current patterns of the receiving water; size, depth, and configuration of the discharge outfall; relative densities of the effluent and receiving water; mixing areas that restrict passage of, or that are attractive to (e.g., elevated temperatures), aquatic life; the presence of bioaccumulative, persistent, carcinogenic, mutagenic, or teratogenic pollutants (each defined in Appendix A) in the effluent; the presence of drinking water intakes, recreational areas, biologically important areas, or sensitive habitats; and the potential for multiple or overlapping mixing zones. In addition, the U.S. EPA (1991, 1994) recommends that mixing zones be free from the following:

- Materials in concentrations that will cause acutely toxic conditions to aquatic life;
- Materials in concentrations that settle to form objectionable deposits;
- Floating debris, oil, scum, and other matter in concentrations that form nuisances;
- Substances in concentrations that produce objectionable color, odor, taste, and turbidity; and
- Substances in concentrations that produce undesirable aquatic life or result in a dominance of nuisance species.

Based on these considerations, mixing zones and dilution credits may be limited or denied for an entire discharge, or on a pollutant-by-pollutant basis.

The U.S. EPA (1991) recommends that, for incompletely-mixed discharges, a mixing zone analysis would be needed to determine if dilution is available, and if a mixing zone and dilution credit are appropriate. Such mixing zone studies include, but are not limited to: tracer studies, dye studies, modelling studies, and monitoring upstream and downstream of the discharge that characterizes the extent of actual dilution. (The procedures outlined in Section VI of this FED are relevant to the process that may be followed in conducting a mixing zone study.) It is important to do mixing zone studies for discharges that do not mix rapidly and completely because they have the potential to create conditions (e.g., shore-hugging plumes) that result in prolonged exposures of aquatic life and, to a lesser extent, humans to levels of pollutants that do not meet water quality standards.

The rescinded ISWP/EBEP included narrative restrictions and requirements for granting mixing zones, described general mixing zone conditions, maximum spatial mixing zone dimensions for lakes, reservoirs, rivers, and streams, and requirements that either a zone of initial dilution or maximum dilution credit be established for enclosed bays.

Four of the nine RWQCBs currently have mixing zone provisions in their basin plans. The basin plans for three of those RWQCBs (Central Valley, Los Angeles, and San Diego) have general provisions for allowing mixing zones on a case-by-case basis. The San Francisco Bay Basin Plan allows a dilution ratio of 10:1 for deepwater outfalls and zero for shallow water outfalls, and allows for exceptions to the mixing zone provisions under certain conditions.

The Los Angeles Basin Plan states that the RWQCB can allow a mixing zone for compliance with receiving water objectives on a case-by-case basis. The basin plan further states that an approved mixing zones for rivers and streams can not extend more than 250 feet from the point of discharge or be located less than 500 feet from an adjacent mixing zone (however, the basin plan notes that mixing zones are not appropriate for many of the streams in the region due to minimal upstream flows. For lakes and reservoirs, the basin plan states that a mixing zone may not extend 25 feet in any direction from the discharge point, and the sum of mixing zones in these waters may not be more that 5 percent of the volume of the water body. These spatial mixing zone dimensions are consistent with those of the rescinded ISWP/EBEP.

The Central Valley Basin Plan states that the RWQCB may designate mixing zones in permits provided the discharger has demonstrated to the satisfaction of the RWQCB that the mixing zone will not adversely impact beneficial uses. The basin plan further states that the RWQCB, in determining the size of mixing zones, will consider the applicable procedures and guidelines in U.S. EPA guidance (i.e., U.S. EPA 1991, 1994). The basin plan also states that mixing zones for acute aquatic life criteria will generally be limited to a small zone of initial dilution[19], pursuant to U.S. EPA guidelines.

The San Diego Basin Plan states that the RWQCB will consider the establishment of mixing zones for inland surface waters, enclosed bays, and estuaries on a case-by-case basis, and that the criteria to be established for mixing zones will be specified in the WDR for the discharge.

The Ocean Plan provides that a minimum probable initial dilution[20] (expressed as parts seawater to part wastewater) be used in the calculation of an effluent limitation, based on observed waste flow characteristics, observed receiving water density structure, and the assumption that no currents (of sufficient strength to influence the initial dilution process) flow across the discharge structure.

The Permitting and Compliance Issues Task Force discussed the issue of mixing zones and concluded that a statewide policy on mixing zones was needed. Specifically, the task force recommended that the SWRCB: (1) establish the situations in which mixing zones may be authorized or denied: (2) establish the specific methods, guidelines, and technically-defensible approaches to be followed in determining mixing zone boundaries and restrictions, and the actual dilution that is received within a designated mixing zone, based on mathematical predictions and

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[19] U.S. EPA (1991) describes initial dilution as the first stage of mixing that is determined by the initial momentum and buoyancy of the discharge. This initial contact with the water is where the concentration of effluent is greatest in the receiving water. The second stage of mixing covers a more extensive area in which the effect of initial momentum and buoyancy is diminished and the waste is mixed primarily by ambient turbulence.

[20] The Ocean Plan defines initial dilution as the process, which results in the rapid and irreversible turbulent mixing of wastewater with ocean water around the point of discharge. The plan further describes initial dilution specific to submerged buoyant discharges (characteristic of most municipal and industrial waste) and to shallow water, surface, and non-buoyant discharges (characteristic of cooling water wastes and some individual discharges) (SWRCB 1997).

scientifically-defensible field studies; (3) to the extent appropriate, specify a particular mixing zone approach to promote consistency; (4) clearly set forth the considerations, guidelines, and default assumptions to be used in making case-by-case decisions (e.g., critical design periods for effluent discharges and receiving water bodies); (5) be sufficiently detailed to ensure consistency in the derivation of water quality-based effluent limitations in point source discharge permits; (6) establish mixing zone characteristics or "in-zone" quality requirements; (7) consider how the mixing zone policy might apply to nonpoint source and storm water discharges; (8) require dischargers to coordinate with the RWQCB in the design and implementation of mixing zone studies; (9) allow mixing zones for acute and chronic chemical-specific criteria/objectives, and for chronic toxicity objectives; and (10) specify whether a mixing zone is or is not allowed for acute toxicity. The Toxicity Task Force also addressed the issue of mixing zones for acute toxicity objectives. While both task forces agreed that mixing zones should be allowed for acute and chronic chemical-specific criteria/objectives, and for chronic toxicity, they were divided on whether mixing zones should be allowed for acute toxicity.

The alternatives presented below were developed with a consideration of current mixing zone provisions in basin plans and the Ocean Plan, and the recommendations of the task forces. These alternatives address mixing zone issues in a fairly general manner. The SWRCB will consider developing specific technical guidance on mixing zones at a later date.

III. ALTERNATIVES FOR SWRCB ACTION

Alternative 1. <u>No action</u>. Under this alternative, the RWQCBs that have provisions for mixing zones or dilution credits in their basin plans would continue to implement them accordingly. The RWQCBs that do not have provisions for mixing zones could not allow dilution credits unless a mixing zone policy were adopted in their basin plans. The statewide inconsistency in addressing mixing zones would persist.

Alternative 2. <u>Establish a policy to prohibit mixing zones for priority pollutant criteria/objectives and the proposed statewide chronic toxicity objective</u>. Under this alternative, the applicable priority pollutant criteria/objectives and statewide chronic toxicity objective would have to be met at the end-of-pipe. This approach would be most protective of water quality and beneficial uses because limited impact areas where water quality standards are not met would be prohibited; however, this alternative would eliminate RWQCB flexibility to determine if a mixing zone is appropriate for a given situation.

Alternative 3. <u>Establish a general statewide policy to allow mixing zones for priority pollutant criteria/objectives and the proposed statewide chronic toxicity objective under certain conditions</u>. Under this alternative, all of the RWQCBs, including those that currently do not have mixing zone provisions in their basin plans, would have the option of considering whether to grant or deny a mixing zone for priority pollutants and chronic toxicity case-by-case. Thus, the RWQCBs would consider whether it is appropriate to allow a mixing zone, which would assist dischargers in meeting water quality-based effluent limitations. Although granting a mixing zone creates a limited impact area where water quality standards need not be met, provisions for when to deny mixing zones and appropriate restrictions for granting mixing zones, ensure that beneficial uses are protected and the overall integrity of the water body is not compromised. Therefore, under this alternative, the general physical, chemical, and biological characteristics to be provided, and conditions to be prevented, in considering the allowance of mixing zones would be described. These factors would be considered by the RWQCB, in addition to calculation of dilution credits.

Alternative 4. Establish detailed technical mixing zone guidance. Under this alternative, explicit guidance on establishing mixing zones, deriving dilution credits, and conducting mixing zone studies would be developed for use by dischargers and the RWQCBs in issuing permit requirements. Due to the variability of discharge and receiving water situations in the State, extensive resources and expertise would be required to develop meaningful mixing zone guidance; therefore, this alternative is most appropriately deferred at this time.

IV. STAFF RECOMMENDATION

Adopt Alternative 3.

CHAPTER 1.2.3 - AMBIENT BACKGROUND CONCENTRATIONS

I. PRESENT STATE POLICY

Currently, there is no statewide law or policy applicable to inland surface waters, enclosed bays, or estuaries that defines ambient background concentration of pollutants or specifies how it should be determined. The definition and determination of ambient background concentrations for these waters are currently deferred to the RWQCBs. The San Francisco Bay RWQCB has estimated salt water and fresh water background concentrations for seven metals. These background concentrations, listed in the San Francisco Bay Basin Plan, were calculated as averages of observed concentrations. The remaining eight RWQCBs do not specify in their basin plans background concentrations or how they are to be estimated. The Ocean Plan has established numeric values for background seawater concentrations for five metals; background concentrations for all other parameters have been set equal to zero.

II. ISSUE DESCRIPTION

The ambient background concentration of pollutants is considered in determining priority pollutants requiring water quality-based effluent limitations (see Chapter 1.1) and is a variable in the mass balance equation often used when calculating effluent limitations (see Chapter 1.2). An estimate of the background concentration is necessary when mixing zones are allowed, in order to ensure that water quality criteria or objectives are met outside the mixing zone. The ambient background concentration can be characterized as the water column concentration of a substance in the receiving water at the outfall point, had the discharge not been present. Ambient water quality measurements are often taken immediately upstream or near the discharge, but not within an allowed mixing zone for the discharge. The background concentration assists in determining how much dilution of the pollutant is possible in the receiving water without causing an excursion (defined in Appendix B) above applicable water quality criteria or objectives. The higher the background concentration, the less dilution is possible.

The mass balance equation may be used as a simple, steady-state equation or as part of a dynamic model. If an effluent limitation is derived using a steady-state equation, a single background concentration that represents the available receiving water data must be determined. If a dynamic model is used to derive an effluent limitation, receiving water data can often be used directly. Receiving water data generally consist of measurements of ambient water column concentrations; however, ambient concentrations can also be modeled based on loading and flow information or fish tissue data. Receiving water data are often variable. Pollutant concentrations in the receiving water body may fluctuate seasonally, or in response to storms, human activity, and other factors such as water body stratification, tides, and wind. Estimating the background concentration can be further complicated by limited data, difficulty with analyzing data below detection or quantification limits, and differing results between various analytical methods. Background concentrations can be calculated for each pollutant on a discharge-by-discharge or water body-by-water body basis.

To ensure that the water quality criterion or objective is met in the receiving water body, the units of the individual segments of the mass balance equation, ideally, should be identical. The averaging periods of the background concentration, the water quality criterion/objective, and the effluent limitation should, thus, be identical; in reality, however, they are often different. Measured ambient water concentrations, used for calculating the background concentration, are often instantaneous "grab" samples. The CTR criteria are expressed as 1-hour averages and/or 4-day averages for protection of aquatic life. For protection of human health, the CTR criteria for carcinogens are correlated to the risk of effects over lifetime exposure; the CTR criteria for non-carcinogens are correlated to daily exposures that are likely to be without appreciable effects during a lifetime. Federal regulations (40 CFR 122.45(d)) generally require that water quality-based effluent limitations be expressed as maximum daily, average weekly, or average monthly limitations (defined in Appendix B).

The method and accuracy with which the ambient background concentration is characterized are important because the background concentration influences whether an effluent limitation is needed for a discharge (see Chapter 1.1), the value of the effluent limitation (see Chapter 1.2), special provisions for intake water pollutants (see Chapter 1.2.4), and other permitting decisions. Various regulatory approaches for defining and estimating ambient background concentrations exist. The rescinded ISWP/EBEP defined the background concentration as ". . . the median concentration of a substance, in the vicinity of the discharge, which is not influenced by the discharge. Ambient concentrations shall be determined using analytical methods at least as sensitive as those used to determine compliance with effluent limitations". The numerical background concentrations listed in the Ocean Plan apply to all ocean discharges. The San Francisco Bay Basin Plan contains different numerical background concentrations for salt water and fresh water. The Ocean Plan and the San Francisco Bay Basin Plan, thus, allow background concentrations to be applied on a water body-by-water body basis. Using a water body-by-water body approach is less accurate than using a discharge-by-discharge approach, but the RWQCB need only estimate a background concentration once for all the discharges to the water body.

The Great Lakes Initiative (GLI) (U.S. EPA 1995) defines "background" as ". . . all loadings that (1) flow from upstream waters into the specified watershed, water body or water body segment. . .; (2) enter the specified watershed, water body or water body segment through atmospheric deposition or sediment release or resuspension; or (3) occur within the watershed, water body or water body segment as a result of chemical reactions." The GLI specifies that the background concentration be established "on a case-by-case basis as the geometric mean [defined in Appendix B] of (i) acceptable available water column data; or (ii) water column concentrations estimated through the use of acceptable available caged or resident fish tissue data; or (iii) water column concentrations estimated through use of acceptable available or projected pollutant loading data." The GLI further recommends that best professional judgement[21] be used for selecting data to characterize the background concentration and for evaluating data with values above and below the detection level. If all available and acceptable data are below the detection level, then the GLI stipulates that the data be assumed to be zero when calculating the background concentration (U.S. EPA 1995).

The Technical Support Document for Water Quality-Based Toxics Control (TSD) (U.S. EPA 1991) recommends using worst-case conditions of flow and pollutants if a steady-state equation is used for establishing effluent limitations. This document does not specify how background concentration is to be determined.

The Permitting and Compliance Issues Task Force addressed the issue of background concentration but did not suggest a method to use when calculating the background concentration. Rather, the task force recommended that the background concentration reflect the allowable frequency of exceedance (defined in Appendix B) and the averaging period of the criterion or objective. The task force also recommended that acceptable statistical techniques be utilized to estimate ambient background levels when a portion of the measured levels are below the practical quantitation limit (see Chapter 2.4).

The following alternatives and the supplemental option have been developed partly based on the regulatory approaches described above. The emphasis is on alternative methods for calculating ambient background concentration, rather than on alternative definitions of background concentration or on alternative ways of analyzing data below detection. The main features of the alternatives are shown in Table V-7.

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[21] Best professional judgement means the highest quality technical opinion developed by a permit writer after consideration of all reasonably available and pertinent data and information that forms the basis for the terms and conditions of an NPDES permit (U.S. EPA 1993). Best professional judgement, as used in this context, should be distinguished from the use of best professional judgement to develop technology-based effluent limitations in cases where an applicable effluent guideline has not yet been promulgated for an industry (see 40 CFR 125.3).

Table V-7. Main Features of the Alternatives and Options for Calculating Ambient Background Concentrations.

Alternative	Description	Relative to Data Distribution	Could Combine with Option A	Adjusts for Uncertainty Related to:	Relative Difficulty	Potential for Overly Lenient Effluent Limitations	Potential for Overly Stringent Effluent Limitations
1	no action						
2	arithmetic mean	central value	yes		very low	high	low
3	median	central value	yes	outliers	low	high	low
4	geometric mean	central value	yes	outliers and skewness	low	high	low
5	maximum	upper-bound value	yes		very low	low	medium
6	99%	upper-bound value	yes	outliers	low	low	medium
7	99% with 99^{th} percentile	factored above upper-bound value	yes	sample variability	medium	very low	very high
8	95% with 95^{th} percentile	factored above upper-bound value	yes	sample variability	medium	very low	very high

For all of the following alternatives, a maximum value was selected for samples below detection because the TSD recommends assuming worst-case conditions when using a steady-state equation to establish effluent limitations. If a substance was not detected in a sample, the value for that sample would, therefore, be set equal to the detection limit for the pollutant in that sample before calculating the background concentration. When all samples of the data set were reported with the substance as not detected, the lowest detection limit was selected to analyze the alternative. All available applicable data (as decided by the RWQCBs) should be included when calculating a background concentration. Further discussion of the use of data below detection can be found in Chapter 2.3. All of the methods could be used on a pollutant-by-pollutant and discharge-by-discharge basis or on a water body-by-water body basis.

III. ALTERNATIVES FOR SWRCB ACTION

Alternative 1. No action. The RWQCBs would decide how background concentrations are to be determined. This would allow RWQCBs the flexibility to tailor a method to a specific region; however, this approach would not foster statewide consistency.

Alternative 2. Calculate the background concentration as the arithmetic mean of observed ambient water concentrations. The definition and calculation of the arithmetic mean is described in detail in Appendix B. Briefly stated, the measured ambient water concentrations are first added, then divided by the number of samples. Calculators and software programs will readily calculate the arithmetic mean.

This alternative, which is the approach taken by the San Francisco Bay RWQCB, would be easy for permit writers to use when estimating background concentrations and can be used with very little data. The arithmetic mean is a good measure of the central point of the data when the data are normally distributed (i.e., evenly spread around the central point), but not if the data are skewed (unevenly spread) as most ambient water measurements tend to be (U.S. EPA 1991). Water quality measurements often exhibit a noticeable skewness to the right when graphed (i.e., lognormal distribution), partially due to concentrations being restrained at some lower limit and theoretically unrestrained at the upper range. The arithmetic mean is, therefore, likely to overestimate the central location of the data, even for large data sets. However, it is most appropriate to use the arithmetic mean to estimate lifetime intake dosage for human consumption. Due to statistical laws, arithmetic means themselves tend to be normally distributed. Therefore, if weekly (or monthly) averages of measurements are calculated and graphed, they will tend to be evenly spread. The arithmetic mean of these weekly (or monthly) averages is likely to be a good measure of the central location of the measured values. Calculating averages of averages requires a large data set and the use of this particular technique is, therefore, limited.

Additionally, the arithmetic mean does not compensate for the variability of the data, so a few outliers may greatly affect the arithmetic mean (although this problem decreases as sample size increases). This alternative also does not account for uncertainty related to a limited number of samples. As the sample size decreases, the probability increases that the calculated average background concentration will not represent the actual average background concentration in the receiving water. Therefore, as the sample size decreases, it becomes less likely that the effluent limitations are set appropriately. Another drawback to using the arithmetic mean to calculate background concentration is that the arithmetic mean estimates a central value rather than a worst-case value, as is recommended by the TSD (U.S. EPA 1991) when using a steady-state equation to estimate effluent limitations. By definition, since approximately half of the measured ambient background concentrations would be *higher* than the arithmetic mean, the water quality criteria/objectives in the receiving water would be exceeded half the time if the arithmetic mean was used as the background concentration to set effluent limitations whenever other values of the steady-state equation (see Chapter 1.2) approach critical conditions. This may be acceptable when complying with weekly or monthly average effluent limitations if daily samples are available to calculate the weekly or monthly averages. Even so, it is very likely that excursions above the criteria or objectives would occur due to seasonal or other variability in the ambient water quality. When complying with daily maximum effluent limitations derived under this alternative, it is almost certain that excursions above the criteria or objectives would occur if effluent and flow conditions were at critical levels.

Note also that both the criterion/objective and the effluent limitation are maximum limits for averages or maxima of measured data. If consistency between the criterion/objective and the effluent limitation is desired, a maximum value would be a better choice than a mean value for calculation of background concentration.

In conclusion, this method would be extremely simple to apply, but the likelihood of excursions above the water quality criterion or objective in the receiving water would be high as a result of too lenient effluent limitations. With small sample sizes, the potential for overly stringent effluent limitations would be low because the arithmetic mean (as a central value) of a small data set will not likely be near critical levels for application in the steady-state equation.

Alternative 3. Calculate background concentration as the median of observed ambient water concentrations. The definition and calculation of the median is described in Appendix B. Simply put, if the measured ambient water concentrations are arranged in numerical order, the median is the middle number. Half of all measurements are below the median and half are above the median. Many calculators and software programs will readily calculate the median. This alternative, which is the approach adopted in the rescinded ISWP/EBEP, would be easy for permit writers to use when estimating background concentration.

The median is a better method for calculating the central location of the data than the arithmetic mean (Alternative 2), because a few outlying data points have little effect. It is almost as easy to compute as the arithmetic mean, but also has many of the same serious disadvantages. Like the arithmetic mean, the median does not account for the uncertainty related to the number of samples. As the sample size decreases, it becomes more likely that the background concentration is not adequately characterized and the effluent limitation based on the background concentration is not set appropriately. Nor does the median match the averaging period of the criterion/objective or the effluent limitation. Half the ambient measurements would, by definition, be higher than the median, so the water quality criteria/objectives would be exceeded in the receiving water half the time whenever other values of the steady-state equation approach critical conditions. As such, there is a high probability of excursions above the criteria or objectives.

In summary, this method would be simple to apply, but would have a high probability of excursions above the water quality criteria or objectives occurring in the receiving water. With small sample sizes, the potential for overly stringent effluent limitations would be low because the median (as a central value) of a small data set will not likely be near critical levels for application in the steady-state equation.

Alternative 4. Calculate background concentration as the geometric mean of observed ambient water concentrations. As discussed earlier, water quality measurements often exhibit a noticeable skewness to the right (toward higher values). Fortunately, the natural logarithms of these measurements are often normally distributed in a bell-shaped curve. The geometric mean is the exponential of the arithmetic mean value of the measured concentrations' natural logarithms. It can be calculated as described in Appendix B. Many calculators and software programs will readily calculate the geometric mean.

This alternative, which is consistent with the GLI approach, would be easy for permit writers to use when estimating background concentration. The geometric mean is a better method for calculating the central location of log-normally distributed data than the arithmetic mean, because skewness of the data is considered (for data skewed to the right, the geometric mean is lower than the arithmetic mean). It is almost as easy to compute as the arithmetic mean. However, like the arithmetic mean and the median, the geometric mean does not account for the uncertainty related to the number of samples. Therefore, if only a few data points exist, it is likely that the calculated geometric mean of the samples would either underestimate or overestimate the actual geometric mean concentration in the receiving water. The geometric mean also does not match the averaging periods of the criteria/objectives or the effluent limitations. Furthermore, the geometric mean is a measure of central tendency rather than an estimate of worst case conditions, thus, carrying with it a high probability of excursions above the water quality criteria or objectives.

In conclusion, this method would be simple to apply, but the likelihood of excursions above the water quality criterion or objective in the receiving water would be high. With small sample sizes, the potential for overly stringent effluent limitations would be low because the geometric mean (as a central value) of a small data set will not likely be near critical levels for application in the steady-state equation.

Alternative 5. Set the background concentration equal to the maximum observed ambient water concentration. Under this alternative, the maximum value of measured ambient water concentrations would be chosen as the background concentration. Many software programs will automatically locate the maximum concentration in a database.

This method would be very easy for permit writers to use when estimating background concentrations. The TSD (U.S. EPA 1991) recommends using worst-case conditions of flow and pollutants when using a steady-state equation to establish effluent limitations in order to ensure that water quality criteria or objectives are met in the receiving water. The maximum observed background concentration arguably represents a worst-case condition, and is more protective of water quality than the arithmetic mean, the median, and the geometric mean because the probability of excursions above the water quality criterion or objective is much less. However, the maximum observed concentration also does not account for the uncertainty related to the number of samples. With a small data set it is likely that the background concentration is underestimated, possibly leading to overly lenient effluent limitations and excursions above water quality criteria/objectives. The potential for overly stringent effluent limitations exists because the maximum observed background concentration may not occur at the same time that other critical values of the steady-state equation occur. High outliers may have to be reviewed to determine if they are representative of the ambient receiving water that will mix with the discharge.

In conclusion, this method would be simple to apply, but may lead to overly stringent effluent limitations. With small sample sizes, excursions above water quality criteria or objectives would also be a possibility.

Alternative 6. Calculate the background concentration as the 99th percentile of observed ambient water concentrations. The 99th percentile is the concentration that 99 percent of the measured concentrations would fall below. Like the maximum observed background concentration, it is an upper-bound value of the data distribution. It can be found by ranking the measured concentrations or can be estimated as described in Appendix B. Most spreadsheet programs will directly estimate the 99th percentile and calculators could also be used, although they are more cumbersome. This method can be used with little data. The potential for overly stringent effluent limitations exists for the same reason as described in Alternative 5.

This method has all the advantages of Alternative 5, and is reliable at estimating the background concentration because high outliers would not have as much of an effect. Like the previous alternatives, this method does not account for uncertainty related to sample size. The smaller the sample size, the greater the probability of either underestimating or overestimating the background concentration. This alternative arguably represents a worst-case condition, as recommended by the TSD (U.S. EPA 1991). A 95th percentile, or other percentile, could be used instead of the 99th percentile.

Alternative 7. Calculate the background concentration as the upper 99 percent confidence level of the 99th percentile of observed ambient water concentrations. This method is similar to Alternative 6, except this alternative employs a statistical procedure to compensate for uncertainty related to sample size and the coefficient of variation of the data set. This method applies an uncertainty factor corresponding to a 99 percent confidence level (defined in Appendix B) for the 99^{th} percentile of the lognormal data distribution. The following method is based on statistical procedures that are described in detail in the TSD (U.S. EPA 1991):

1. The coefficient of variation (*CV*) is found for the ambient water data. For less than ten samples, *CV* may be set equal to 0.6, or a larger calculated number may be used.[22] For ten or more samples, *CV* should be calculated as the standard deviation (see Appendix

[22] Typical values for CV range from 0.2 to 1.2. A value of 0.6 is a relatively conservative estimate that may be used for CV when available data sets are small, and the uncertainty on the calculated standard deviation and arithmetic mean are therefore high (U.S. EPA 1991).

B) divided by the arithmetic mean (see Appendix B) of the measured values. Most calculators and software programs will readily locate the mean and the estimated standard deviation.

2. The uncertainty factor, associated with the computed *CV* and the number of data points, is found in Table V-8 (or may be calculated as described in Chapter 1.1).

3. The uncertainty factor is then multiplied by the maximum of the observed ambient water concentrations. The result is the projected background concentration.

Table V-8. Uncertainty Factors: 99% Confidence Level and 99th Percentile

Coefficient of Variation (CV)	Number of Samples (n)													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
0.1	1.6	1.4	1.4	1.3	1.3	1.3	1.3	1.2	1.2	1.2	1.2	1.2	1.2	1.2
0.2	2.5	2.0	1.9	1.7	1.7	1.6	1.6	1.5	1.5	1.5	1.5	1.4	1.4	1.4
0.3	3.9	2.9	2.5	2.3	2.1	2.0	2.0	1.9	1.8	1.8	1.8	1.7	1.7	1.7
0.4	6.0	4.0	3.3	2.9	2.7	2.5	2.4	2.3	2.2	2.2	2.1	2.0	2.0	2.0
0.5	9.0	5.5	4.4	3.8	3.4	3.1	2.9	2.8	2.7	2.6	2.5	2.4	2.3	2.3
0.6	13	7.4	5.6	4.7	4.2	3.8	3.5	3.3	3.2	3.0	2.9	2.8	2.7	2.6
0.7	19	9.8	7.1	5.9	5.1	4.6	4.2	3.9	3.7	3.5	3.4	3.2	3.1	3.0
0.8	26	13	8.9	7.2	6.2	5.5	5.0	4.6	4.3	4.1	3.9	3.7	3.5	3.4
0.9	36	16	11	8.7	7.3	6.4	5.8	5.3	4.9	4.6	4.4	4.2	4.0	3.8
1.0	48	20	13	10	8.6	7.5	6.7	6.1	5.6	5.3	4.9	4.7	4.5	4.3
1.1	63	25	16	12	10	8.6	7.6	6.9	6.3	5.9	5.5	5.2	5.0	4.7
1.2	81	30	19	14	11	9.8	8.6	7.8	7.1	6.6	6.1	5.8	5.5	5.2
1.3	102	36	22	16	13	11	9.7	8.7	7.9	7.3	6.8	6.3	6.0	5.7
1.4	127	43	26	19	15	12	11	9.6	8.7	8.0	7.4	6.9	6.5	6.2
1.5	156	50	29	21	17	14	12	11	9.5	8.7	8.0	7.5	7.0	6.6
1.6	189	58	33	24	18	15	13	12	10	9.4	8.7	8.1	7.6	7.1
1.7	226	67	38	26	20	17	14	13	11	10	9.4	8.7	8.1	7.6
1.8	268	76	42	29	22	18	16	14	12	11	10	9.3	8.7	8.1
1.9	314	87	47	32	24	20	17	15	13	12	11	9.9	9.2	8.6
2.0	366	97	52	35	27	21	18	16	14	13	11	11	9.8	9.1
2.1	422	109	57	38	29	23	19	17	15	13	12	11	10	9.6
2.2	483	121	63	42	31	25	21	18	16	14	13	12	11	10
2.3	549	133	68	45	33	26	22	19	17	15	14	12	11	11
2.4	621	147	74	48	36	28	23	20	18	16	14	13	12	11
2.5	698	160	80	52	38	30	25	21	19	17	15	14	13	12
2.6	780	175	86	55	40	32	26	22	19	17	16	14	13	12
2.7	867	190	93	59	43	34	28	23	20	18	16	15	14	13
2.8	961	206	99	63	45	35	29	25	21	19	17	15	14	13
2.9	1059	222	106	67	48	37	30	26	22	20	18	16	15	14
3.0	1163	239	113	71	51	39	32	27	23	21	18	17	15	14
3.1	1273	256	120	74	53	41	33	28	24	21	19	17	16	15
3.2	1389	274	127	78	56	43	35	29	25	22	20	18	16	15
3.3	1510	292	134	83	58	45	36	30	26	23	21	19	17	16
3.4	1636	311	142	87	61	47	38	32	27	24	21	19	17	16
3.5	1769	330	149	91	64	49	39	33	28	25	22	20	18	17
3.6	1907	350	157	95	66	51	41	34	29	25	23	20	18	17
3.7	2050	370	165	99	69	52	42	35	30	26	23	21	19	17
3.8	2200	391	173	104	72	54	44	36	31	27	24	22	20	18
3.9	2355	412	181	108	75	56	45	37	32	28	25	22	20	18
4.0	2516	434	189	112	78	58	46	39	33	29	25	23	21	19

Table V-8 continued.

Coefficient of Variation (CV)	Number of Samples (n)													
	15	16	17	18	19	20	30	40	50	60	70	80	90	100
0.1	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
0.2	1.4	1.4	1.4	1.4	1.4	1.3	1.3	1.2	1.2	1.2	1.2	1.2	1.1	1.1
0.3	1.6	1.6	1.6	1.6	1.6	1.6	1.4	1.4	1.3	1.3	1.3	1.2	1.2	1.2
0.4	1.9	1.9	1.9	1.8	1.8	1.8	1.6	1.5	1.5	1.4	1.4	1.3	1.3	1.3
0.5	2.2	2.2	2.1	2.1	2.1	2.0	1.8	1.7	1.6	1.5	1.5	1.4	1.4	1.3
0.6	2.6	2.5	2.4	2.4	2.3	2.3	2.0	1.8	1.7	1.6	1.6	1.5	1.5	1.4
0.7	2.9	2.8	2.8	2.7	2.6	2.6	2.2	2.0	1.8	1.7	1.7	1.6	1.5	1.5
0.8	3.3	3.2	3.1	3.0	2.9	2.9	2.4	2.2	2.0	1.9	1.8	1.7	1.6	1.6
0.9	3.7	3.6	3.5	3.4	3.3	3.2	2.6	2.3	2.1	2.0	1.9	1.8	1.7	1.6
1.0	4.1	4.0	3.8	3.7	3.6	3.5	2.8	2.5	2.2	2.1	1.9	1.8	1.8	1.7
1.1	4.5	4.4	4.2	4.1	3.9	3.8	3.1	2.6	2.4	2.2	2.0	1.9	1.8	1.8
1.2	5.0	4.8	4.6	4.4	4.3	4.1	3.3	2.8	2.5	2.3	2.1	2.0	1.9	1.8
1.3	5.4	5.2	5.0	4.8	4.6	4.5	3.5	3.0	2.6	2.4	2.2	2.1	2.0	1.9
1.4	5.9	5.6	5.4	5.2	5.0	4.8	3.7	3.1	2.8	2.5	2.3	2.2	2.0	1.9
1.5	6.3	6.0	5.7	5.5	5.3	5.1	3.9	3.3	2.9	2.6	2.4	2.2	2.1	2.0
1.6	6.8	6.4	6.1	5.9	5.7	5.5	4.1	3.4	3.0	2.7	2.5	2.3	2.2	2.0
1.7	7.2	6.9	6.5	6.3	6.0	5.8	4.3	3.6	3.1	2.8	2.5	2.4	2.2	2.1
1.8	7.7	7.3	6.9	6.6	6.4	6.1	4.5	3.7	3.2	2.9	2.6	2.4	2.3	2.1
1.9	8.1	7.7	7.3	7.0	6.7	6.4	4.7	3.9	3.3	3.0	2.7	2.5	2.3	2.2
2.0	8.6	8.1	7.7	7.4	7.0	6.7	4.9	4.0	3.4	3.0	2.8	2.5	2.4	2.2
2.1	9.1	8.6	8.1	7.7	7.4	7.1	5.1	4.1	3.5	3.1	2.8	2.6	2.4	2.3
2.2	9.5	9.0	8.5	8.1	7.7	7.4	5.3	4.3	3.6	3.2	2.9	2.7	2.5	2.3
2.3	10	9.4	8.9	8.4	8.0	7.7	5.5	4.4	3.7	3.3	3.0	2.7	2.5	2.4
2.4	10	9.8	9.3	8.8	8.4	8.0	5.7	4.5	3.8	3.4	3.0	2.8	2.6	2.4
2.5	11	10	9.7	9.2	8.7	8.3	5.9	4.7	3.9	3.4	3.1	2.8	2.6	2.4
2.6	11	11	10	9.5	9.0	8.6	6.0	4.8	4.0	3.5	3.1	2.9	2.6	2.5
2.7	12	11	10	9.9	9.4	8.9	6.2	4.9	4.1	3.6	3.2	2.9	2.7	2.5
2.8	12	11	11	10	9.7	9.2	6.4	5.0	4.2	3.7	3.3	3.0	2.7	2.5
2.9	13	12	11	11	10	9.5	6.6	5.1	4.3	3.7	3.3	3.0	2.8	2.6
3.0	13	12	12	11	10	9.8	6.7	5.3	4.4	3.8	3.4	3.1	2.8	2.6
3.1	14	13	12	11	11	10	6.9	5.4	4.5	3.9	3.4	3.1	2.8	2.6
3.2	14	13	12	12	11	10	7.1	5.5	4.5	3.9	3.5	3.1	2.9	2.7
3.3	14	13	13	12	11	11	7.2	5.6	4.6	4.0	3.5	3.2	2.9	2.7
3.4	15	14	13	12	12	11	7.4	5.7	4.7	4.0	3.6	3.2	2.9	2.7
3.5	15	14	13	13	12	11	7.5	5.8	4.8	4.1	3.6	3.3	3.0	2.8
3.6	16	15	14	13	12	12	7.7	5.9	4.9	4.2	3.7	3.3	3.0	2.8
3.7	16	15	14	13	12	12	7.8	6.0	4.9	4.2	3.7	3.3	3.0	2.8
3.8	17	15	14	14	13	12	8.0	6.1	5.0	4.3	3.8	3.4	3.1	2.8
3.9	17	16	15	14	13	12	8.1	6.2	5.1	4.3	3.8	3.4	3.1	2.9
4.0	17	16	15	14	13	13	8.3	6.3	5.1	4.4	3.9	3.5	3.1	2.9

This alternative requires more effort than Alternative 6, has the same advantages, and, furthermore, has a much lower probability of under-estimating the actual, worst-case background concentration. However, as with the previous alternatives, the background concentration would not completely reflect the allowable frequency of exceedance and the averaging period of the criterion or objective. This alternative is more conservative than Alternative 8. The potential for overly stringent effluent limitations is much greater than Alternatives 5 and 6 because the uncertainty factor can be very large, particularly for small data sets. The resulting background may be far greater than any sample concentration from observed data.

Alternative 8. Calculate the background concentration as the upper 95 percent confidence level of the 95th percentile of observed ambient water concentrations. This method is the same as Alternative 7, except for the percentages used. The uncertainty factor, associated with the computed *CV* and the number of data points, is found in Table V-9 (or may be calculated as described in Chapter 1.1). This alternative is less conservative than Alternative 7 and will result in lower ambient background concentrations.

Option to Supplement Alternatives 2-8:

Option A. Calculate the background concentration to reflect the allowable exceedance frequency and averaging periods of the criteria or objectives. The Permitting and Compliance Issues Task Force recommended that the background concentration reflect the allowable frequency of exceedance and the averaging period of the applicable criterion or objective. The task force also recommended that the criteria or objectives be expressed as daily maxima, and monthly and weekly averages, to simplify the process of deriving effluent limitations. Background concentrations should then similarly be expressed as daily maxima and monthly and weekly averages. This could be partly accomplished by appropriately averaging the ambient water measurements before calculating the background concentration. For example, if the applicable criterion or objective is a 30-day average for protection of human health, the monthly averages (i.e., arithmetic mean is defined in Appendix B) of the measurements would be found first. The background concentration would then be calculated based on the computed monthly averages. If the applicable criterion or objective was a 4-day average criterion/objective for protection of aquatic life, weekly averages of the measurements would be found first. The background concentration would then be calculated based on the computed weekly averages. If the applicable criterion or objective was a 1-hour average criterion/objective for protection of aquatic life, the maximum daily value of the measurements would be found first. The background concentration would then be calculated based on the maximum daily values. This option is simple to implement, but adds an extra layer of calculation and may be confusing as more than one background concentration is calculated. It also requires that sufficient ambient data exist to calculate weekly or monthly averages, or daily maxima.

Table V-9. Uncertainty Factors: 95% Confidence Level and 95th Percentile

Coefficient of Variation (CV)	Number of Samples (n)													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
0.1	1.4	1.3	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
0.2	1.9	1.6	1.5	1.4	1.4	1.3	1.3	1.3	1.2	1.2	1.2	1.2	1.2	1.2
0.3	2.6	2.0	1.8	1.7	1.6	1.5	1.4	1.4	1.4	1.3	1.3	1.3	1.3	1.3
0.4	3.6	2.5	2.1	1.9	1.8	1.7	1.6	1.6	1.5	1.5	1.4	1.4	1.4	1.3
0.5	4.7	3.1	2.5	2.2	2.1	1.9	1.8	1.7	1.7	1.6	1.6	1.5	1.5	1.4
0.6	6.2	3.8	3.0	2.6	2.3	2.1	2.0	1.9	1.8	1.7	1.7	1.6	1.6	1.5
0.7	8.0	4.6	3.5	3.0	2.6	2.4	2.2	2.1	2.0	1.9	1.8	1.7	1.7	1.6
0.8	10	5.4	4.0	3.3	2.9	2.6	2.4	2.3	2.1	2.0	1.9	1.9	1.8	1.7
0.9	13	6.4	4.6	3.7	3.2	2.9	2.6	2.4	2.3	2.2	2.1	2.0	1.9	1.8
1.0	15	7.4	5.2	4.2	3.6	3.1	2.8	2.6	2.4	2.3	2.2	2.1	2.0	1.9
1.1	19	8.5	5.8	4.6	3.9	3.4	3.1	2.8	2.6	2.4	2.3	2.2	2.1	2.0
1.2	22	10	6.5	5.0	4.2	3.7	3.3	3.0	2.8	2.6	2.4	2.3	2.2	2.1
1.3	26	11	7.2	5.5	4.5	3.9	3.5	3.2	2.9	2.7	2.5	2.4	2.3	2.2
1.4	31	12	7.9	6.0	4.9	4.2	3.7	3.3	3.1	2.8	2.6	2.5	2.4	2.2
1.5	36	14	8.6	6.4	5.2	4.4	3.9	3.5	3.2	3.0	2.8	2.6	2.4	2.3
1.6	41	15	9.3	6.9	5.6	4.7	4.1	3.7	3.3	3.1	2.9	2.7	2.5	2.4
1.7	46	17	10	7.4	5.9	5.0	4.3	3.8	3.5	3.2	3.0	2.8	2.6	2.5
1.8	52	18	11	7.8	6.2	5.2	4.5	4.0	3.6	3.3	3.1	2.9	2.7	2.5
1.9	58	20	12	8.3	6.6	5.5	4.7	4.2	3.8	3.4	3.2	3.0	2.8	2.6
2.0	65	21	12	8.8	6.9	5.7	4.9	4.3	3.9	3.5	3.3	3.0	2.8	2.7
2.1	72	23	13	9.3	7.2	6.0	5.1	4.5	4.0	3.7	3.4	3.1	2.9	2.7
2.2	79	24	14	10	7.6	6.2	5.3	4.6	4.2	3.8	3.5	3.2	3.0	2.8
2.3	87	26	15	10	7.9	6.4	5.5	4.8	4.3	3.9	3.5	3.3	3.1	2.9
2.4	94	28	15	11	8.2	6.7	5.7	4.9	4.4	4.0	3.6	3.4	3.1	2.9
2.5	103	30	16	11	8.5	6.9	5.8	5.1	4.5	4.1	3.7	3.4	3.2	3.0
2.6	111	31	17	12	8.8	7.1	6.0	5.2	4.6	4.2	3.8	3.5	3.3	3.0
2.7	120	33	18	12	9.1	7.4	6.2	5.4	4.8	4.3	3.9	3.6	3.3	3.1
2.8	129	35	19	13	9.5	7.6	6.4	5.5	4.9	4.4	4.0	3.6	3.4	3.1
2.9	138	37	19	13	10	7.8	6.5	5.6	5.0	4.5	4.0	3.7	3.4	3.2
3.0	147	38	20	13	10	8.0	6.7	5.8	5.1	4.6	4.1	3.8	3.5	3.3
3.1	157	40	21	14	10	8.3	6.9	5.9	5.2	4.6	4.2	3.8	3.5	3.3
3.2	167	42	22	14	11	8.5	7.0	6.0	5.3	4.7	4.3	3.9	3.6	3.3
3.3	177	44	23	15	11	8.7	7.2	6.2	5.4	4.8	4.3	4.0	3.7	3.4
3.4	187	46	23	15	11	8.9	7.4	6.3	5.5	4.9	4.4	4.0	3.7	3.4
3.5	198	48	24	16	12	9.1	7.5	6.4	5.6	5.0	4.5	4.1	3.8	3.5
3.6	209	50	25	16	12	9.3	7.7	6.5	5.7	5.1	4.6	4.1	3.8	3.5
3.7	220	52	26	17	12	10	7.8	6.7	5.8	5.1	4.6	4.2	3.9	3.6
3.8	231	53	27	17	12	10	8.0	6.8	5.9	5.2	4.7	4.3	3.9	3.6
3.9	243	55	27	17	13	10	8.1	6.9	6.0	5.3	4.8	4.3	4.0	3.7
4.0	254	57	28	18	13	10	8.3	7.0	6.1	5.4	4.8	4.4	4.0	3.7

Table V-9 continued.

Coefficient of Variation (CV)	Number of Samples (n)													
	15	16	17	18	19	20	30	40	50	60	70	80	90	100
0.1	1.1	1.1	1.1	1.1	1.1	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
0.2	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0
0.3	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.0	1.0	1.0	1.0	0.9	0.9
0.4	1.3	1.3	1.3	1.3	1.3	1.2	1.1	1.1	1.0	1.0	1.0	0.9	0.9	0.9
0.5	1.4	1.4	1.4	1.3	1.3	1.3	1.2	1.1	1.0	1.0	1.0	0.9	0.9	0.9
0.6	1.5	1.5	1.4	1.4	1.4	1.4	1.2	1.1	1.0	1.0	1.0	0.9	0.9	0.9
0.7	1.6	1.5	1.5	1.5	1.5	1.4	1.2	1.1	1.0	1.0	0.9	0.9	0.9	0.9
0.8	1.7	1.6	1.6	1.5	1.5	1.5	1.3	1.1	1.1	1.0	0.9	0.9	0.9	0.8
0.9	1.8	1.7	1.7	1.6	1.6	1.5	1.3	1.2	1.1	1.0	0.9	0.9	0.9	0.8
1.0	1.8	1.8	1.7	1.7	1.6	1.6	1.3	1.2	1.1	1.0	0.9	0.9	0.8	0.8
1.1	1.9	1.9	1.8	1.7	1.7	1.6	1.3	1.2	1.1	1.0	0.9	0.9	0.8	0.8
1.2	2.0	1.9	1.9	1.8	1.7	1.7	1.4	1.2	1.1	1.0	0.9	0.9	0.8	0.8
1.3	2.1	2.0	1.9	1.9	1.8	1.7	1.4	1.2	1.1	1.0	0.9	0.9	0.8	0.8
1.4	2.1	2.1	2.0	1.9	1.9	1.8	1.4	1.2	1.1	1.0	0.9	0.9	0.8	0.8
1.5	2.2	2.1	2.0	2.0	1.9	1.8	1.4	1.2	1.1	1.0	0.9	0.9	0.8	0.8
1.6	2.3	2.2	2.1	2.0	1.9	1.9	1.5	1.2	1.1	1.0	0.9	0.8	0.8	0.8
1.7	2.4	2.2	2.2	2.1	2.0	1.9	1.5	1.2	1.1	1.0	0.9	0.8	0.8	0.8
1.8	2.4	2.3	2.2	2.1	2.0	2.0	1.5	1.2	1.1	1.0	0.9	0.8	0.8	0.7
1.9	2.5	2.4	2.3	2.2	2.1	2.0	1.5	1.3	1.1	1.0	0.9	0.8	0.8	0.7
2.0	2.5	2.4	2.3	2.2	2.1	2.0	1.5	1.3	1.1	1.0	0.9	0.8	0.8	0.7
2.1	2.6	2.5	2.3	2.2	2.2	2.1	1.5	1.3	1.1	1.0	0.9	0.8	0.8	0.7
2.2	2.7	2.5	2.4	2.3	2.2	2.1	1.6	1.3	1.1	1.0	0.9	0.8	0.8	0.7
2.3	2.7	2.6	2.4	2.3	2.2	2.1	1.6	1.3	1.1	1.0	0.9	0.8	0.8	0.7
2.4	2.8	2.6	2.5	2.4	2.3	2.2	1.6	1.3	1.1	1.0	0.9	0.8	0.8	0.7
2.5	2.8	2.7	2.5	2.4	2.3	2.2	1.6	1.3	1.1	1.0	0.9	0.8	0.8	0.7
2.6	2.9	2.7	2.6	2.4	2.3	2.2	1.6	1.3	1.1	1.0	0.9	0.8	0.8	0.7
2.7	2.9	2.7	2.6	2.5	2.4	2.3	1.6	1.3	1.1	1.0	0.9	0.8	0.8	0.7
2.8	3.0	2.8	2.6	2.5	2.4	2.3	1.6	1.3	1.1	1.0	0.9	0.8	0.7	0.7
2.9	3.0	2.8	2.7	2.5	2.4	2.3	1.7	1.3	1.1	1.0	0.9	0.8	0.7	0.7
3.0	3.0	2.9	2.7	2.6	2.5	2.3	1.7	1.3	1.1	1.0	0.9	0.8	0.7	0.7
3.1	3.1	2.9	2.7	2.6	2.5	2.4	1.7	1.3	1.1	1.0	0.9	0.8	0.7	0.7
3.2	3.1	2.9	2.8	2.6	2.5	2.4	1.7	1.3	1.1	1.0	0.9	0.8	0.7	0.7
3.3	3.2	3.0	2.8	2.7	2.5	2.4	1.7	1.3	1.1	1.0	0.9	0.8	0.7	0.7
3.4	3.2	3.0	2.8	2.7	2.6	2.4	1.7	1.3	1.1	1.0	0.9	0.8	0.7	0.7
3.5	3.3	3.1	2.9	2.7	2.6	2.5	1.7	1.3	1.1	1.0	0.9	0.8	0.7	0.7
3.6	3.3	3.1	2.9	2.7	2.6	2.5	1.7	1.4	1.1	1.0	0.9	0.8	0.7	0.7
3.7	3.3	3.1	2.9	2.8	2.6	2.5	1.7	1.4	1.1	1.0	0.9	0.8	0.7	0.7
3.8	3.4	3.2	3.0	2.8	2.7	2.5	1.7	1.4	1.1	1.0	0.9	0.8	0.7	0.7
3.9	3.4	3.2	3.0	2.8	2.7	2.6	1.7	1.4	1.1	1.0	0.9	0.8	0.7	0.7
4.0	3.4	3.2	3.0	2.9	2.7	2.6	1.8	1.4	1.1	1.0	0.9	0.8	0.7	0.7

IV. STAFF RECOMMENDATION

Adopt Alternative 5, with an exception that effluent limitations that are derived from human health criteria/objectives for carcinogens (which are based upon lifetime dosage) should be based on Alternative 2.

CHAPTER 1.2.4 INTAKE WATER CREDITS

I. PRESENT STATE POLICY

Currently, no statewide law or policy exists that directly addresses credit for intake water pollutants when establishing water quality-based effluent limitations for discharges to inland surface waters, enclosed bays, or estuaries. The basin plans do not contain any special provisions for intake water pollutants. The Ocean Plan specifies that water quality-based effluent limitations will be calculated for the gross discharge, rather than the net discharge. For most ocean dischargers, effluent limitations consisting of concentration and mass emission limits are calculated using a steady-state mass balance equation which considers the criterion/objective, the initial dilution, and the background concentration. Within these restrictions, no allowance for intake water pollutants can be made (generally, so much dilution is available in the ocean that pollutants in the intake water are not a concern). However, the Ocean Plan also allows special procedures to be applied when calculating effluent limitations for power plant discharges, which allow credit for some intake water pollutants.

II. ISSUE DESCRIPTION

The only or primary source of a pollutant in a discharge may be the intake water for a facility. If a pollutant in the intake water exceeds (defined in Appendix B) water quality criteria/objectives and mixing of the discharge with the receiving water does not provide adequate dilution, the facility may need to undertake expensive removal processes, unless intake water pollutants are specifically considered when effluent limitations are established. Intake water pollutants are a concern in impaired water bodies for industries that use large amounts of water for once-through cooling water flows, because of the difficulty of treating large volumes of water.

Federal regulations (40 CFR 122.45(g)) currently allow *technology-based* effluent limitations to be adjusted to reflect credit for pollutants in the discharger's intake water if certain conditions are met. The credit does not apply to all pollutants. The discharger must demonstrate that technology-based effluent limitations cannot be met due to the presence of intake water pollutants, despite properly installed and operated treatment systems. Generally, credit is granted only if the intake water is drawn from the same water body into which the discharge is made, but this requirement may be waived if no environmental degradation will result. Intake water credit may be granted only to the extent necessary to meet the applicable technology-based limitation, up to a maximum amount equal to the influent amount.

A similar federal regulation does not exist for *water quality-based* effluent limitations (with the exception of the Great Lakes Initiative (GLI) described below (U.S. EPA 1995). The U.S. EPA (1995) has stated "that '[the] Clean Water Act's requirement to protect and enhance water quality is not conditioned on factors such as intake water quality and it would be inappropriate for EPA to impose such a condition. Eligibility for a net credit under [the technology-based] regulations does not imply any right to violate water quality standards.' (49 FR 37998, 38027, September 26, 1984)." The U.S. EPA also indicated, however, that permit writers may take the presence of intake water pollutants into account, as appropriate, in individual permitting decisions as long as "permit limits >...[are] adequate to meet the water quality objectives of the Clean Water Act when considered along with control requirements for other discharges to the stream.' (49 FR 38027, September 26, 1984)."

Regulatory mechanisms exist that directly or indirectly allow for consideration of intake water pollutants, but these mechanisms are not permit-based. These mechanisms include temporary variances or exceptions (see Chapter 5.6), site-specific objectives (see Chapter 5.4), Total Maximum Daily Loads (TMDLs) and watershed management (see Chapter 5.5), and removal of non-existing uses. TMDLs are U.S. EPA's preferred mechanism for bringing impaired waters into compliance with water quality criteria/objectives. For discharges to non-attained waters, where water quality criteria/objectives are not met and TMDLs have not yet been established to control pollutants, the U.S. EPA generally requires that effluent limitations be established to meet the criteria/objectives at the end-of-pipe (U.S. EPA 1995).

In the GLI (U.S. EPA 1995), the U.S. EPA authorized the Great Lakes States and Tribes to consider intake water pollutants on a pollutant-by-pollutant and discharge-by-discharge basis, both when determining if a discharge has the reasonable potential to cause or contribute to an excursion (defined in Appendix B) above a water quality criterion or objective (see Chapter 1.1) and when establishing effluent limitations. The GLI states that the permitting authority may find that water quality-based effluent limitations are not necessary for an intake water pollutant (see Chapter 1.1 for further discussion) if the permittee demonstrates that the following conditions are met: (1) the facility withdraws 100 percent of the intake water from the same body of water[23] into which the discharge is made, (2) the facility does not contribute any additional mass of the intake water pollutant to its wastewater, (3) the facility does not alter the intake pollutant chemically or physically in a manner that would cause adverse water quality impacts to occur that would not occur if the pollutants were left in-stream, (4) the facility does not increase the intake water pollutant concentration at the edge of a mixing zone or at the discharge point as compared to the pollutant concentration in the intake water, unless the increased concentration does not cause or contribute to an excursion above an applicable water quality standard, and (5) the timing and location of the discharge would not cause adverse water quality impacts to occur that would not occur if the intake water pollutant were left in-stream. If the above requirements are not met, the permittee may further request that intake water pollutants be considered when effluent limitations are established.

According to the GLI, intake water pollutants may also be considered when establishing effluent limitations if the concentration of the problem pollutant upstream of the discharge exceeds the most stringent applicable water quality criterion/objective, and no TMDL or assessment and remediation plans have been approved. The permitting authority may allow the facility to discharge a mass and concentration of the problem pollutant that are no greater than the mass and

[23] The GLI considers an intake water pollutant to be from the same body of water as the discharge if the intake water pollutant would have reached the discharge point in the receiving water within a reasonable period had it not been withdrawn. The permittee must demonstrate that the receiving water quality is similar to the intake water quality, especially with respect to the problem pollutant, and that the intake and the discharge points are directly hydrologically connected.

concentration of the problem pollutant in the intake water ("no net addition limitations"). Under "no net addition limitations", a discharger may add and remove the problem pollutant, as long as the discharge contains no more mass and/or concentration of the pollutant than the intake water contained. Where proper operation and maintenance of a facility's treatment system results in the removal of a problem pollutant, the permitting authorities may establish limitations that reflect the lower mass and/or concentration of the pollutant achieved by the treatment system.

The GLI also allows the permitting authority to consider multiple sources of intake water when establishing "no net addition limitations". For multiple sources of intake water, a flow-weighted average of each source of the pollutant may be used to derive an effluent limitation, provided that adequate monitoring to determine compliance can be established and is included in the permit. Where a facility's intake water stems from a water supply system, the concentration of the intake pollutant concentration is generally determined at the point where the raw water is removed from the water body. However, if the water supply system removes any of the problem pollutant, the intake pollutant concentration is determined at the point where the water enters the distribution system. If the intake water is ground water in direct hydrological connection with the receiving water, and the pollutant would have naturally reached the vicinity of the outfall in approximately the same time period, credit for intake water pollutants may apply. Intake water credits do not apply if intake water pollutants are from a different body of water than the receiving water.

To address the concern that providing credit for intake water pollutants would discourage development of TMDLs, the GLI placed a 12-year time limit on "no net addition limitations" (these limitations are only effective until March 23, 2007). The goal of TMDLs is to ensure attainment of water quality standards, which would eliminate the need for special permitting provisions for intake water pollutants. Permitting authorities may, however, consider intake water pollutants when establishing waste load allocations to meet TMDLs.

The rescinded ISWP and EBEP did not directly address intake water pollutants, but in effect allowed permit writers to consider intake water credit for power plant discharges by allowing dilution (based on the ratio of the cooling water flow to the combined in-plant waste stream) (see Chapter 1.2.2), and assuming that ambient background concentrations (see Chapter 1.2.3) for pollutants were zero (even when they are not) when effluent limitations were calculated (see Chapter 1.2). The point of compliance was also changed from the end-of-pipe to the point where the combined in-plant waste streams are discharged into the cooling water. For power plant discharges, effluent limitations were established for the combined in-plant waste streams, not for the total discharge (i.e., the combined in-plant waste stream and the cooling water flow). The following steady-state equation was used for calculating effluent limitations for the combined in-plant waste:

$Ce = Co\,(Dc + 1)$ º *which can be rearranged as*
$Ce = Co + Co * Dc$

where Ce = the limitation for the combined in-plant waste stream;
Co = the objective; and
Dc = the ratio of the cooling water flow to the combined in-plant waste stream.

Although simple to implement, the above approach has several disadvantages. First, it is limited to power plant discharges, which may be unfair to other dischargers. Secondly, the above equation allows a power plant to add a significant amount of a pollutant to the discharge, even if the concentration of that pollutant is already higher than the criterion or objective in the intake water and the receiving water. The greater the cooling water flow, the greater the amount of the pollutant that could be discharged. Power plants could be allowed to discharge pollutant concentrations that are more than twice the criteria or objectives. Thirdly, the equation can apply to all pollutants in a power plant discharge, not just those that exceed the criterion or objective in the intake water or receiving water. Because the above equation allows dilution, but does not ensure that criteria or objectives are met in the receiving water, effluent limitations may be set too leniently for all pollutants, possibly leading to excursions above the criteria or objectives. The rescinded ISWP and EBEP stated that RWQCBs should impose more restrictive limitations on power plant discharges where necessary for the protection of beneficial uses. However, because the above equation does not consider concentrations or flows of the receiving water, it could be unclear to the permit writer whether beneficial uses were protected.

The Ocean Plan also allows special permitting provisions for power plant discharges. The following equation is used to calculate effluent limitations:

$Ce = Co + Dm\,(Co - Cs)$ º *which can be rearranged as*
$Ce = Co + Co^{*} Dm - Cs^{*} Dm$

where *Dm* = the minimal probable initial dilution expressed as parts seawater per part waste water; and
Cs = the background seawater concentration as listed in the Ocean Plan.
Ce and *Co* have been defined earlier.

Effluent limitations are calculated for all listed pollutants. The effluent limitations are then converted to mass limitations (either daily maximum or six-month median mass limitations) by multiplying by a conversion factor and the effluent flow. These mass limitations apply to the combined in-plant waste streams with certain exceptions. The excepted pollutants and parameters include total chlorine residual, chronic toxicity, and pollutants for which instantaneous maximum effluent limitations have been calculated to protect aquatic life. The instantaneous maximum effluent limitations for the excepted pollutants and parameters are applied to the final effluent after mixing with the ocean water. Limitations on radioactivity apply to the undiluted effluent.

Compared to the rescinded ISWP and the EBEP, the Ocean Plan is more restrictive and protective of beneficial uses. The Ocean Plan requires all effluent limitations to be calculated so that water quality objectives are met at the edge of the mixing zone. Compliance with instantaneous maximum criteria/objectives and chronic toxicity are assessed at the edge of the mixing zone, which in most cases should protect aquatic life against acute and chronic adverse impacts due to pollutant concentrations in the water column. However, for most pollutants, compliance with daily maximum and six-month median mass limitations are determined for the combined in-plant waste stream only, not for the total discharge. Moving the point of compliance allows the power plant to discharge more mass of the pollutants. If the intake water is salt water and background concentrations are low, the additional mass that could be discharged would probably be insignificant. If the intake water was fresh water with high background concentrations of the pollutant, the additional amount of mass allowed to be discharged could be large.

The Permitting and Compliance Issues Task Force also addressed pollutants in the intake water. The task force recommended that methods be included for making a reasonable potential determination when the water quality criterion/objective is exceeded upstream from the discharge and that policies be developed that address intake water pollutants. A method for addressing intake water pollutants when determining reasonable potential has been described in Chapter 1.1. The task force also recommended that "in certain situations, dischargers that discharge water back into the same water body from which it was taken, shall be responsible for only the increment of constituents that they add to the water, in cases where the intake water is of same quality as the receiving water". The task force recommended that the equation used in the rescinded ISWP and EBEP for power plant discharges be extended to other once-through cooling water discharges as well. The task force also stated that, in general, a TMDL (see Chapter 5.5) should be developed where intake water is of concern.

The five alternatives and twelve options described below have been developed partly based on the GLI, the rescinded plans, and the task force recommendations. The alternatives consider if credit should be extended to pollutants in the intake water when establishing effluent limitations and how much credit to possibly extend. The options address the circumstances under which intake water credit could be allowed, and are intended to be combined with Alternatives 4 or 5, which allow intake water pollutants to be considered when establishing effluent limitations. The alternatives focus on the quality of the receiving water rather than on the quality of the intake water because the purpose of water quality-based effluent limitations is to ensure that beneficial uses of the receiving water body are protected. The U.S. EPA stated in the GLI that "special consideration for intake water pollutants is reasonable when other sources are the primary cause of the impaired water body to which the point source is discharging and the discharge in itself effectively has no further adverse impact on the receiving water than that which already existed". The U.S. EPA further found that applying the procedures for considering intake water pollutants to attainment waters would result in more stringent effluent limitations than when following regular procedures described in U.S. EPA guidance documents (U.S. EPA 1991).

III. ALTERNATIVES AND OPTIONS FOR SWRCB ACTION

A. Alternatives describing various permitting provisions to apply to pollutants in the intake water:

Alternative 1: No action. Under this alternative, the RWQCBs would retain the flexibility of deciding whether and under what circumstances credit for intake water pollutants could be granted, consistent with applicable law. This alternative would not promote statewide consistency.

Alternative 2: If the receiving water does not meet an applicable criterion or objective for a pollutant, the discharge may not contain any amount of that pollutant. This alternative does not allow any amount of a pollutant to be discharged if that pollutant in the receiving water does not meet applicable criteria or objectives. This approach was included in the draft GLI, but not in the final GLI, because the U.S. EPA concluded that it may not be appropriate in many situations. Commenters on the GLI argued that this approach would force all point sources to achieve a zero discharge of pollutants to non-attained waters, without the assurance that water quality criteria or objectives would ultimately be attained in the receiving water (often waters are impaired due mostly to non-point source pollution). This alternative would likely lower the mass of the pollutant in the receiving water, which could improve the overall condition of the water body. However, this alternative may also result in higher concentrations of the pollutant in the receiving water. This situation could occur if the effluent of a point source discharge was more dilute than the receiving water (for example, because of other intake sources or because the discharger was treating the effluent) and the discharger decides to cease discharging completely rather than try to eliminate the pollutant totally from the discharge. Adverse impacts due to higher concentrations in the water column is therefore a possibility under this approach.

Alternative 3. If the receiving water does not meet an applicable criterion or objective for a pollutant, the discharge may contain that pollutant at levels no greater than the concentration of the criterion or objective. The U.S. EPA believes that this approach is a permissible and reasonable approach to address adverse environmental and health effects due to the pollutant concentration in non-attained waters, because this alternative complies with the goals of the CWA and is likely to cause a general decrease in the pollutant concentration in the receiving water (U.S. EPA 1995). This alternative may result in additional mass being added to the water body. Where additional mass is of concern, for example due to pollutants in the sediments, more stringent effluent limitations would be required. This approach is not a substitute for developing TMDLs or watershed management strategies, because it does not address contributions from nonpoint sources, and is, therefore, not likely to achieve attainment of water quality criteria or objectives in the receiving water. This approach essentially allows no special provisions for intake water pollutants.

Alternative 4. If the receiving water does not meet an applicable criterion or objective for a pollutant, the discharge may contain that pollutant at levels no greater than the concentration of the receiving water, if no net addition of the pollutant occurs. The amount and concentration of pollutant that is allowed to be discharged would depend on various factors, such as site-specific conditions and the options presented below. The U.S. EPA allows this approach to be considered for intake water pollutants on a pollutant-by-pollutant and discharge-by-discharge basis, if it can be demonstrated that the discharge has no greater effect on the receiving water than if the discharger had not diverted and returned the intake water pollutants to the same body of water. This approach, with the restrictions discussed earlier, was adopted for the GLI (U.S. EPA 1995). This alternative maintains status quo, as the mass and the concentration of the pollutant in the receiving water is neither likely to increase nor decrease.

Alternative 5. If the receiving water does not meet an applicable criterion or objective for a pollutant, the discharge may contain a pollutant concentration somewhat above that of the receiving water. The amount and concentration of pollutant that may be discharged would depend on various factors, such as site-specific conditions and the options presented below. The rescinded ISWP and EBEP allowed this approach to be considered for power plant discharges. The U.S. EPA considered and rejected this option when developing the GLI because this approach would cause the water quality of a non-attainment water to get worse both in mass loading and concentration, which conflicts with the goals of the CWA.

B. Options describing various circumstances under which intake water credit could be allowed (these options may be combined with Alternatives 4 and 5):

Option A: Allow intake water credit on a pollutant-by-pollutant and discharge-by-discharge basis only. The U.S. EPA stipulated in the GLI that intake water credit would only be considered on a pollutant-by-pollutant and discharge-by-discharge basis, but initially considered allowing a general credit that could apply to an entire water body. The rationale for not allowing a general intake water credit was that this approach could cause further degradation of an already impaired water body and would, therefore, not be in compliance with the CWA. Determining if an intake water credit will cause an adverse impact on water quality can only be done on a pollutant-by-pollutant and outfall-by outfall basis because of site-specific factors such as the location of the intake and discharge points, receiving water characteristics, time interval between intake and discharge, possible alterations of the pollutant, possible pollutant additions, or treatment. The rescinded ISWP and EBEP did not specify that intake water credit be established on a pollutant-by-pollutant and discharge-by-discharge basis, but stated that RWQCBs should establish more restrictive limitations where necessary to protect beneficial uses; this could be interpreted to require that intake water credits, if allowed, be established on a pollutant-by-pollutant and discharge-by-discharge basis.

Option B: Allow intake water credit only where the pollutant concentration in the intake water is greater than the criterion or objective. If the intake water concentration is less than the criterion or objective, the need for an intake water credit is nonexistent because the facility should be able to meet the criterion or objective at the end-of-pipe or at the edge of a mixing zone with a regular effluent limitation, unless additional pollutant has been added to the effluent. The GLI requires that for intake water credit to apply, the concentration of pollutant in the intake must be similar to the concentration in the receiving water, which must be above the criterion or objective. In other words, the intake water must be above the criterion/objective as well. However, the rescinded ISWP and EBEP allowed intake water credits for power plant discharges in situations where the pollutant concentration in the intake water and the receiving water was less than the criterion or objective.

Option C: Allow intake water credit only where the intake water is from the same water body as the receiving water body. This condition is satisfied by a demonstration that: (1) the ambient background concentration (see Chapter 1.2.3) of the intake water pollutant in the receiving water is similar to that in the intake water; (2) there is a direct hydrological connection between the intake and discharge points; and (3) water quality characteristics are similar in the intake water and the receiving water. The rescinded ISWP and EBEP did not specify that the intake water be from the same water body as the receiving water, only that the beneficial uses of the receiving water body be protected. However, the GLI initiative requires that the intake water be from the same water body as the receiving water, because the U.S. EPA "believes that direct adjustment of limits to account for pollutants in the intake water should be restricted to those pollutants that would be in the receiving water with the same effect even if the discharger had not withdrawn and subsequently discharged those pollutants. The U.S. EPA recognizes that in some instances discharges from other bodies of water that exceed applicable water quality criteria/objectives for the receiving water but have a lower concentration than the receiving water could theoretically improve the overall water quality from the standpoint of water column concentrations in the receiving water. .... Although the resulting ambient concentration could be lower, the mass of a pollutant would increase by the transfer of pollutants to a different body of water. ... In particular, the additional mass of a persistent pollutant may offset the environmental benefits of lowering water column concentrations because the additional mass, if cycled through sediments by deposition and resuspension or through the food chain, could negatively impact the water body so as to ultimately prolong the non-attainment status of the water body." (U.S. EPA 1995). In the draft GLI, other options were considered for intake water from different water bodies, such as allowing credit based on the amount of pollutant in all sources of intake water, allowing credit based on the concentration of the pollutant in the receiving water, or allowing credit based on a combination of the amount of pollutant in all sources of intake water and the concentration of the pollutant in the receiving water. However, these options were not adopted.

Option D: Allow intake water credit only where the pollutant is chemically or physically unaltered by the facility, unless it can be demonstrated that water quality and beneficial uses are not adversely affected. The basic premise in the GLI for allowing intake water credit is that a discharge has no greater impact on the receiving water than if the discharger had not removed and returned the intake water pollutants to the same body of water. This option is one method for determining whether the discharge of intake water pollutants would adversely impact the receiving water body.

Option E: Allow intake water credit only where the intake water pollutant reaches the vicinity of the outfall within the same time period and with the same effect as it would if not removed by the facility, unless it can be demonstrated that water quality and beneficial uses are not adversely affected. This option, like Option D, is a method for determining whether the discharge of intake water pollutants would adversely impact the receiving water body.

Option F: Allow intake water credit only where the intake water pollutant is neither added, nor removed by the facility. This approach is consistent with the basic premise in the GLI that a discharge must have no greater impact on the receiving water than if the discharger had not removed and returned the intake water pollutants to the same body of water. This option may be unnecessarily strict, however. For example, many facilities remove some amount of the pollutants in their intake water when they treat their effluent for other pollutants, yet may not be able to remove an amount sufficient to meet criteria or objectives at the end-of-pipe. While partial removal of intake water would improve receiving water conditions, it would not be allowed under this option.

The GLI approach may be better: "Where proper operation and maintenance of a facility's treatment system results in removal of a pollutant, the permitting authority may establish limitations that reflect the lower mass and/or concentration of the pollutant achieved by such treatment, taking into account the feasibility of establishing such limits". The GLI further allows a facility to contribute additional mass of the intake water pollutant if: (1) an equal or greater amount of the pollutant is removed before discharge to the receiving water; (2) 100 percent of the intake water is from the same water body as the receiving water; and (3) the discharge has no greater impact on the receiving water than if the discharger had not removed and returned the intake water pollutants to the same body of water.

Option G: Allow intake water credit where the intake water is ground water. The rescinded ISWP and EBEP had no restrictions on the origins of the intake water when considering intake water credit for power plant discharges. The GLI specifically allows intake water credit for ground water where the ground water meets the definition of the same body of water as the receiving water, except where the pollutant in the intake is due partially or entirely to human activity. Given these restrictions and the difficulty of demonstrating that these conditions are met, very few dischargers would be eligible for this type of intake water credit. Lesser restrictions may not protect water quality.

Option H: Allow intake water credit where the source of the intake water is a water supply system. The rescinded ISWP and EBEP had no restrictions on the origins of the intake water when considering intake water credit for power plant discharges. The GLI specifically allows intake water credit where the source of the intake water is a water supply system if the intake water for the water supply system is from the same water body as the receiving water for the discharge. The concentration of the intake water pollutant is determined at the point where the raw water is removed, unless the water supply system treats the water and removes some of the pollutant, in which case the concentration of the intake water pollutant is determined where the water enters the distribution system. This approach allows some dischargers that receive their intake water from a water supply system to be considered for intake water credit.

Option I: Allow intake water credit where the discharge contains multiple sources of intake water. The rescinded ISWP and EBEP had no restrictions on the origins of the intake water when considering intake water credit for power plant discharges. The GLI specifically allows consideration of intake water credit where the intake water consists of multiple sources of intake water. The GLI allows the permitting authority to derive effluent limitations by applying a flow-weighted average of each source of pollutant, provided that adequate monitoring to determine compliance can be established and is included in the permit. Intake water credit could be applied to the portion of the discharge that contained intake water pollutants from the same water body as the receiving water body, whereas the remaining portion of the discharge would have to meet the criteria or objectives at the end-of-pipe. This approach allows intake water credit to be extended to discharges where less than 100 percent of the intake originates from the same water body as the receiving water.

Option J: Allow intake water credit only for certain types of discharges. Intake water credit could be restricted to certain types of discharges such as power plant discharges (as in the rescinded ISWP and EBEP) or once-through cooling water discharges (as partially recommended by the Permitting and Compliance Issues Task Force). This option may be unfair to those dischargers that do not fall into the categories that qualify for the intake water credit, but have similar circumstances. Rather than limiting the types of discharges that are eligible for intake water credit, it may be more fair to limit the circumstances under which intake water credit may be allowed. The GLI did not limit intake water credit based on discharger type.

Option K: Allow intake water credit based on pollutant types or characteristics. Intake water credit could be limited based on pollutant type or characteristics, such as ubiquitous pollutants, pollutants that do not bioaccumulate, non-metals, non-cancer-causing substances, etc. The rescinded ISWP and EBEP did not limit intake water credit based on the type or characteristic of a pollutant, but the Ocean Plan does. The U.S. EPA solicited comment on this issue when drafting the GLI. Some commented that categorizing pollutants may be difficult; others stated that any treatment needed for pollutants not eligible for intake water credit would likely remove the eligible pollutants as well. The U.S. EPA decided to not restrict intake water credit based upon pollutant type or characteristics, but leave the issue to the discretion of states and tribes.

Option L: Authorize intake water credit for a limited time only. The purpose of a time limit on authorizing intake water credit is to not discourage the development of TMDLs or watershed management strategies by providing indefinite permitting relief in non-attained waters. The GLI allowed intake water credits to be authorized for a period of up to twelve years, after which point-source dischargers must either meet criteria or objectives at the end-of-pipe or meet assigned waste load allocations. Facilities that would receive intake water credits, however, are not the facilities that would cause a water body to become impaired, since the proposed Policy will allow no net addition of pollutants. Their participation in TMDL development, therefore, may not be necessary to develop the watershed management strategy or the TMDL.

IV. STAFF RECOMMENDATION

Adopt Alternative 4 with Options A, B, C, D, E, and H.

CHAPTER 2 COMPLIANCE DETERMINATION

The Regional Water Quality Control Boards (RWQCBs) establish effluent limitations and determine compliance in accordance with applicable State and federal regulations concerning waste discharge requirements (WDRs), including National Pollution Discharge Elimination System (NPDES) permits. The four components used in determining compliance with effluent limitations for chemical-specific criteria are: (1) compliance schedules; (2) interim requirements; (3) monitoring and reporting requirements; and (4) reporting levels. When immediate compliance with federal or State water quality standards is not feasible in certain circumstances, a schedule for compliance may be warranted. The RWQCBs have the authority to require dischargers to monitor and report pollutant levels as a part of ~~waste discharge requirements~~ WDRs. The information generated by the monitoring and reporting requirements of NPDES permits and ~~waste discharge requirements~~ WDRs ~~are~~ is then used to determine compliance with effluent limitations. To assist the RWQCBs in evaluating compliance, reporting levels, levels at which the amount of pollutants in a given sample can be reliably quantified, are established.

CHAPTER 2.1 COMPLIANCE SCHEDULES

## I.	PRESENT STATE POLICY

There is no current statewide policy allowing compliance schedules in NPDES permits for discharges to inland surface waters, oceans, enclosed bays, or estuaries. However, the San Francisco Bay and Central Valley basin plans contain compliance schedule provisions applicable to NPDES permittees. Compliance schedules are also permissible in WDRs that are not issued as NPDES permits.

## II.	ISSUE DESCRIPTION

A compliance schedule, as specified in permits, refers to a designated timetable of interim dates for implementing required actions to comply with water quality standards and effluent limitations based on the standards.

State regulations authorize the SWRCB and RWQCBs to include time schedules in WDRs for discharges not required to be regulated under an NPDES permit (CCR, Title 23, §2231). No maximum time limit is specified, although the time schedule should "assure the most rapid compliance" (CCR, Title 23, §2231).

No statewide policy currently allows compliance schedules in NPDES permits.[1] In the absence of authorization, compliance with effluent limitations implementing water quality standards in permits must be immediate.[2]

Although the five-year term of the NPDES permit has generally been regarded as the maximum limit for compliance schedule length, the U.S. EPA ~~continues to believe~~ states that compliance schedules of three years or less should be sufficient to allow facilities to meet new or revised WQBELs in most cases (U.S. EPA 1996). This duration is consistent with CWA provisions, including Sections 301(b)(2), 304(l) and 402(p). For example, Section 301(b)(2)(C)-(F) provides that various technology-based effluent limitations shall be complied with as expeditiously as possible but no later than three years after effluent guidelines are promulgated. Section 304(l) requires that sources comply with individual control strategies (water quality-based requirements) within three years. Similarly, Section 402(p) mandates that permits for municipal and industrial storm water discharges provide for compliance as expeditiously as practicable, but in no event later than three years after permit issuance.

Under the Great Lakes Guidance (U.S. EPA 1995), the U.S. EPA provided for Great Lakes State and Tribal adoption of compliance schedules for WQBELs for existing discharges only. The guidance also authorizes schedules which exceed the term of the permit up to a maximum schedule length of five years in limited situations, and requires interim limits with specific compliance dates where compliance schedules exceed one year from the date of permit issuance.

The San Francisco Bay Basin Plan allows inclusion of compliance schedules of up to 10 years in NPDES permits to achieve compliance with new water quality objectives or standards. The San Francisco Bay RWQCB's primary goal in setting compliance schedules is to promote the completion of source control and waste minimization measures, including water reclamation. To accomplish this goal, the basin plan sets forth the following minimum requirements for justifying compliance schedules: (a) submission of results of a diligent effort to quantify pollutant levels in the discharge and the sources of the pollutant in the waste stream; (b) documentation of source control efforts currently underway or completed, including compliance with a pollution prevention program as described in the basin plan; (c) a proposed schedule for additional source control measures or waste treatment; and (d) a demonstration that the proposed schedule is as short as possible.

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[1] For NPDES permits, a schedule of compliance is defined as "a schedule of remedial measures included in a 'permit', including an enforceable sequence of interim requirements (for example, actions, operations, or milestone events) leading to compliance with the CWA and regulations" (40 CFR 122.2).

[2] See *In re Star-Kist Caribe, Inc.* (NPDES Appeal No. 88.5 (May 26, 1992). This opinion interpreted Section 301(b)(1)(C) of the CWA, which establishes a deadline of no later than July 1, 1977 for compliance with effluent limitations necessary to meet applicable water quality standards. In light of this requirement, the opinion held that NPDES permits may contain compliance schedules beyond July 1, 1977 to meet water quality-based effluent limitations (WQBELs) only if two requirements are met: (1) the effluent limitation is based on a post-July 1, 1977 water quality standard, or a new or revised interpretation of a pre-July 1, 1977 standard; and (2) the applicable standard or implementing state regulations explicitly authorize schedules of compliance.

The San Francisco Bay Basin Plan further requires that implementation of source control measures to reduce pollutant loadings to the maximum extent practicable be completed as soon as possible, but in no event later than four years after new objectives or standards take effect. Implementation of any additional measures to comply with effluent limitations must be completed as soon as possible, but in no event later than 10 years after new objectives or standards take effect. The basin plan also states that the issuance of a permit containing a compliance schedule should not result in a violation of any applicable requirement of the federal CWA or the California Water Code, including any applicable CWA statutory deadlines.

The Central Valley Basin Plan provides that, where the RWQCB determines it is infeasible to achieve immediate compliance with a State objective or federal criterion adopted after September 25, 1996, or an effluent limitation based on the objective or criterion, a schedule of compliance may be established in the NPDES permit. The schedule of compliance must include a time schedule for completing specific actions that demonstrate reasonable progress toward the attainment of objectives or criteria and a final compliance date, based on the shortest practicable time required to achieve compliance. In no event shall an NPDES permit include a schedule of compliance that allows more than 10 years (from the date of adoption of the objective or criterion) for compliance with water quality objectives, criteria, or effluent limitations based on the objectives or criteria.

For discharges that occur within the regions of the seven RWQCBs that have not yet authorized compliance schedules in their respective basin plans, immediate compliance with ~~WQBELs~~ water quality-based effluent limitations is required. Without authorized compliance schedules in the standards or regulations that implement the standards, a schedule for compliance can only be issued in an enforcement order (e.g., cease and desist order).

The Permitting and Compliance Issues Task Force recommended a 15-year compliance schedule for NPDES permits or other WDRs. The task force recommended that any time a new numerical interpretation of a narrative or numerical objective was placed into a permit, a new compliance period begins. It was further recommended that the RWQCB, with a good cause (e.g., when site-specific objectives are being developed), may adopt a basin plan amendment with a different compliance deadline. This recommendation could be addressed through an exception to the Policy (see Chapter 5.5).

In the CTR, the U.S. EPA is proposing to authorize up to a 5-year compliance schedule for existing NPDES permits only. This means that the discharger's opportunity to obtain a compliance schedule occurs when the existing permit for that discharge is issued, reissued, or modified, whichever is sooner. Compliance schedules cannot be extended to an indefinite point of time in the future because no final compliance date for WQBELs based upon this rule can be more than ten years from the effective date of the CTR. Any possible delays in reissuing expired permits cannot indefinitely extend the period of time during which a compliance schedule is in effect. Ten years allows for inclusion of the single maximum five-year compliance schedule in a permit which is reissued five years after the effective date of the CTR. Compliance schedules will not be allowed for new permitted discharges[3]; therefore, immediate compliance will be required. The CTR will also require interim ~~limits~~ requirements with specific compliance dates where compliance schedules exceed one year from the date of permit issuance.

An evaluation conducted by the SWRCB's Division of Clean Water Programs (SWRCB 1999b) concluded that up to 38 months could be needed to plan, fund, design, and construct wastewater treatment facility improvements, and up to an additional 12 months could be needed for prime engineering, operator training, and start-up before the new facility is operating properly and capable of meeting requirements.

In addition, TMDL-development for priority pollutants is currently scheduled through December 2011 (SWRCB 1999a). Once the TMDL is completed, wasteload allocations (i.e., effluent limitations) will be included in NPDES permits. In some cases, a discharger may not be able to achieve immediate compliance with a TMDL-derived effluent limitation.

The five alternatives presented below for compliance schedule lengths for the CTR criteria provide options based on current federal or State regulations and task force recommendations. Alternatives for interim requirements under a compliance schedule or other time schedule are presented in Chapter 2.2.

III. ALTERNATIVES FOR SWRCB ACTION

Alternative 1. No action. The CTR is providing an authorizing compliance schedule of up to five years for use by the RWQCBs. ~~However, the CTR will allow compliance schedule provisions in existing basin plans to remain in effect. Therefore,~~ The Central Valley and San Francisco Bay basin plans' 10-year compliance schedule provisions ~~would~~ also continue in effect, and the more stringent of the CTR and basin plan compliance schedule provisions would apply.

Alternative 2. Adopt a compliance schedule of up to 3 years from the effective date ~~of adoption~~ of the proposed Policy for implementing the CTR criteria. As described above, the U.S. EPA ~~believes~~ has stated that most dischargers are capable of complying with new or revised discharge requirements within ~~three~~ 3 years or less. Although this alternative is consistent with several CWA provisions, there are some facilities that would require more than ~~three~~ 3 years because of budget constraints, magnitude of new construction to improve treatment processes, and numerous other concerns. It does not appear that a 3-year compliance schedule may be lengthy enough for many facilities.

Alternative 3. Adopt a compliance schedule of up to 10 years from the effective date ~~of adoption~~ of the proposed Policy for implementing the CTR criteria. The Central Valley RWQCB and the San Francisco Bay RWQCB consider 10 years to be sufficient time to accommodate a variety of compliance challenges ranging from simple source control identification and implementation to extensive treatment options. This alternative is consistent with compliance

[3] The CTR defines a "new California discharge" to include "any building, structure, facility, or installation from which there is, or may be, a 'discharge of pollutants', the construction of which commenced after the effective date of this regulation."

schedule provisions adopted in the rescinded ISWP and EBEP, and the current San Francisco Bay and Central Valley basin plans.

Alternative 4. Adopt a compliance schedule of up to 15 years from the effective date ~~of adoption~~ of the proposed Policy for implementing the CTR criteria. The U.S. EPA has generally regarded 5 years as the appropriate maximum limit for compliance schedules. The U.S. EPA also established a 5-year maximum limit (from the date of permit issuance) in the Great Lakes Guidance (U.S. EPA 1995). The U.S. EPA is proposing in the CTR compliance schedules of up to 5 years from the date of permit issuance with no final compliance date beyond 10 years from the effective date of the rule. The 10-year CTR schedule, however, does not account for the time schedules to complete some TMDLs in California. Because California is the last state in the nation to have a comprehensive set of criteria for priority pollutants, there has already been a substantial delay in compliance with CWA §303(c)(2)(B). ~~Because of these considerations, it is unlikely that this alternative,~~ Therefore, without substantial justification and limited application, a 15-year schedule, which is the recommendation of the Permitting and Compliance Issues Task Force, ~~would be favorably considered by U.S. EPA without substantial justification.~~ would not be appropriate (see Alternative 6).

~~**Alternative 5.** Adopt a range of compliance schedules that reasonably allow for completion of necessary data collection, planning, and construction activities. The implementation of CTR criteria will require a range of activities dependent on the receiving water quality, the status of the permitted facility and other discharges in the watershed, and the development of TMDLs and site-specific objectives. This alternative provides the flexibility for the RWQCBs to recognize these needs. Compliance schedules should be kept as short as reasonable to complete each activity. This alternative allows for a range of compliance schedules ranging from immediate, for those dischargers that require no further data collection, planning, or construction, to up to 15 years for those dischargers that are participating in the development of TMDLs and will ultimately require facility upgrades.~~

Alternative 5. Adopt a compliance schedule of up to 5 years from the date of permit issuance, reissuance, or modification. This alternative is consistent with U.S. EPA precedent (e.g., the Great Lakes Guidance and the proposed CTR) and is supported by SWRCB staff's assessment of the maximum time needed to achieve compliance with a water quality-based effluent limitation (i.e., taking into account the planning, funding, and construction of a facility upgrade).

Alternative 6. Adopt a compliance schedule of up to 15 years from the effective date of the proposed Policy to develop and adopt a TMDL, and accompanying WLAs and LAs. In some situations where a TMDL is under, or scheduled for, development, it may be appropriate to allow time to complete the TMDL prior to establishing a compliance schedule for an effluent limitation that is derived directly from the CTR criterion. The current 303(d) list of water bodies for which a TMDL must be completed includes TMDL-development schedules through December 2011. If a discharger demonstrates that it is infeasible to achieve immediate compliance with a CTR-based criterion and makes appropriate commitments to support and expedite development of the TMDL, it is reasonable to provide flexibility to the RWQCBs to address such a situation. The

RWQCB would establish the shortest practicable compliance schedule, taking into account the time schedule established for the TMDL.

IV. STAFF RECOMMENDATION

Adopt Alternatives 5 and 6.

CHAPTER 2.2 INTERIM REQUIREMENTS

I. PRESENT STATE POLICY

Interim requirements can be included in WDRs if a compliance schedule is authorized in an applicable controlling plan or policy (see Chapter 2.1 for further discussion). A compliance schedule is a timetable of interim dates for implementing actions required to comply with effluent limitations based on water quality standards. These actions, referred to in this chapter as interim requirements, may include interim effluent limitations, source control measures, monitoring requirements, requirements to participate in TMDLs, facility expansion, or changes in the plant processes.

State regulations allow the inclusion of a compliance schedule in WDRs that are not NPDES permits (CCR, Title 23, §2231). These regulations state that: (a) time schedules should be included in requirements for existing discharges when it appears that the discharger cannot immediately meet the requirements; (b) time schedules shall not permit any unnecessary time lag, and periodic status reports should be required; (c) time schedules should include dates for complete design, complete financial arrangements, start of construction, 50 percent completion of work, and full compliance with requirements; and (d) time schedules should be periodically reviewed and should be updated, when necessary, to ensure the most rapid compliance. These regulations do not specify which interim actions are appropriate for certain situations or how interim limitations should be calculated.

Presently, there is no statewide policy allowing compliance schedules in NPDES permits, however, the San Francisco Bay Basin Plan and the Central Valley Basin Plan authorize compliance schedules in NPDES permits (see Chapter 2.1). The remaining RWQCBs have not specifically allowed compliance schedules in their basin plans, and immediate compliance with water quality-based effluent limitations is, therefore, required for NPDES dischargers in these regions. However, under the California Water Code, compliance schedules and interim requirements may, nonetheless, be imposed in enforcement orders, such as cease and desist orders (Water Code §13301).

Where compliance schedules have been allowed in NPDES permits by the RWQCBs, federal NPDES regulations (40 CFR 122.47), which apply in California (CCR, Title 23, §2235.2), provide that when a compliance schedule exceeds one year from the permit issuance date, interim requirements and dates for their achievement must be included in the compliance schedule, with no more than one year between interim dates. If an interim requirement is not readily divisible into stages for completion, the compliance schedule must include interim dates for the submission of progress reports, in addition to the final projected completion date. The compliance schedule must state that the discharger must notify the Director, in writing, no later than 14 days following each interim or final compliance date of its compliance or non-compliance with the interim or final requirements (or must submit a progress report, if applicable). Furthermore, the interim requirements must not result in a violation of any applicable requirement of the CWA or the Porter-Cologne Water Quality Control Act.

In addition, the San Francisco Bay Basin Plan states that compliance schedules and interim requirements may be authorized only under certain conditions, with the primary goal of promoting the completion of source control and waste minimization measures, including water reclamation. Interim requirements can only be considered where revised water quality-based effluent limitations are not currently met and where justified.

The Central Valley Basin Plan authorizes compliance schedules containing interim requirements where the RWQCB determines that it is infeasible for a discharger to comply with adopted water quality objectives or criteria immediately.

II. ISSUE DESCRIPTION

When a new or more stringent water quality standard is adopted, dischargers cannot always comply immediately with the effluent limitation established to meet the water quality standard. The dischargers may need to investigate the feasibility of building new facilities, changing treatment processes, implementing source control and waste reduction measures, conducting special studies, or pursuing alternative regulatory avenues. Implementation of selected measures to reduce pollutant loadings may take years and the outcome may be uncertain. In these situations, regulatory relief may be extended to dischargers by establishing a schedule of compliance in the WDR (see Chapter 2.1). A compliance schedule is a timetable of interim dates for implementing actions (interim requirements) necessary to comply with effluent limitations based on water quality standards.

Interim requirements may include interim effluent limitations or requirements for, source control ~~measures~~, monitoring ~~requirements, requirements to~~ or participateion in TMDLs~~, facility expansion, or changes in the plant processes~~ studies. Reasonable progress toward meeting objectives or criteria can be shown by meeting the interim effluent limitations and other interim requirements. Interim limitations are enforceable effluent limitations (see Chapter 1.2 for discussion of effluent limitations) that are effective and enforceable between the date when the WDR is adopted and the date when compliance with final water quality-based effluent limitations is required. Although interim effluent limitations may not fully protect beneficial uses, they provide at least a limited protection of beneficial uses, until compliance with final water quality-based effluent limitations can be accomplished. Interim limitations are typically set at values somewhere between the effluent limitation contained in the existing WDR and the final effluent limitation in the reissued WDR.

Interim requirements, including interim limitations, may be based on performance, and may be appropriate in situations where a lack of data prevents the permit writer from determining whether a water quality-based effluent limitation is needed or where a water quality-based effluent limitation cannot be established because of insufficient data. Technology-based effluent limitations must always be met, as must other legal requirements, such as antidegradation and anti-backsliding provisions.

In 1994, the U.S. EPA published the Guidance for NPDES Permit Issuance to assist California permit writers (U.S. EPA 1994). This document includes recommendations for establishing interim effluent limitations. Where discharges meet existing effluent limitations, these values may be specified as interim limitations in the reissued permit as the most lenient values permissible. Where discharges are not in compliance with existing effluent limitations, the noncompliance under the existing permit must be addressed through appropriate enforcement action before the permit can be reissued, unless antibacksliding requirements are met. Where effluent data are available, interim limitations based on facility performance should be included in the reissued permit.

This U.S. EPA guidance also recommends that, where insufficient data prevents the RWQCB from determining whether a water quality-based effluent limitation is necessary for a pollutant in the discharge (see Chapter 1.1 for further discussion), effluent monitoring could be included as a condition of the reissued permit. A final water quality-based effluent limitation is not necessary in this situation, but the permit should include a reopener clause (see federal regulations at 40 CFR 122.44(c)) allowing for the establishment of a water quality-based effluent limitation if the monitoring data show a need.

The Permitting and Compliance Issues Task Force made many recommendations on the establishment of interim requirements. The task force differentiated between numeric interim requirements, interim requirements to reduce pollutants in the waste stream (such as source control measures and best management practices), and interim requirements to participate in monitoring studies (such as TMDL studies and translator studies). The task force recommended that any WDR containing interim permit requirements (such as requiring the discharger to monitor further) also contain a time schedule, if appropriate, for completion of and compliance with these interim requirements.

The task force found that interim requirements could be appropriate in the following situations:

a. Available data are insufficient to determine whether effluent limitations are needed to control a pollutant in a discharge (see Chapter 1.1). In this situation, the task force recommended that numeric interim limitations and source control measures not be imposed for a pollutant, but that the RWQCB instead require the discharger to monitor and gather further information.

b. The RWQCB has determined that effluent limitations are needed to control a pollutant in a discharge, but effluent limitations cannot be calculated due to lack of data (see Chapter 1.2). In this situation, the task force recommended that numeric interim limitations be established in the WDR. This situation may arise because one of the following activities has not yet been completed:

- a dynamic modeling study;
- a translator study (see Chapter 1.2.1 and Chapter 6);
- a TMDL (see Chapter 5.4 and Chapter 6);
- a watershed management plan (see Chapter 5.4 and Chapter 6);
- a site-specific objective study (see Chapter 5.3 and Chapter 6);
- a use-attainability analysis (see Chapter 6).

The task force recommended that, in the above situations, the RWQCB may also impose interim requirements, such as requiring the discharger to participate in the activities necessary to develop final effluent limitations and implementing source control measures.

c. The RWQCB has determined that effluent limitations are needed to control a pollutant in a discharge, and effluent limitations have been calculated, but the discharger cannot immediately meet those limitations. In this situation, the task force recommended that numeric interim limitations be placed in the WDR. The RWQCB may also impose interim requirements to control the pollutant, such as requiring the discharger to implement source control measures.

In cases (b) and (c) above, where a numeric interim effluent limitation is placed in the WDR, a final effluent limitation would only be included in the permit provisions if the final limitation can be achieved within the term of the WDR or if the compliance deadline falls within the term of the WDR. Once the final limitation becomes effective, the interim limitation would no longer apply. Where final limitations are not included in the permit provisions, the task force recommended that the permit findings include the following statements, where applicable:

- the water quality criterion to be achieved;

- the reason that a final water quality-based effluent limitation is not being incorporated into the WDR as an enforceable limit at this time;

- a schedule for development of a final water quality-based effluent limitation;

- a statement that it is the intent of the RWQCB to include the final water quality-based effluent limitation as an enforceable limitation in a subsequent permit revision, and that (unless the final limitation has already been developed) the final water quality-based effluent limitation will either be based on the water quality criterion itself or dictated by future regulatory developments; and

- a statement that the water body has previously been identified as impaired.

The task force recommended that numeric interim limitations be calculated by multiplying an estimated maximum effluent concentration by a factor (future factor) that would account for unforeseen and uncontrollable circumstances that could cause a future increase in effluent concentrations. The future factor would be calculated considering the magnitude of the estimated maximum effluent concentration, and the difference between the estimated maximum effluent concentration and the reporting level (see Chapter 2.4 for further discussion of reporting levels). The task force recommended that an acceptable range (e.g., 1.15 to 2.00) be identified and that the potential for using a statistical method to establish an uncertainty factor be investigated.[4] The estimated maximum effluent concentration would be calculated using statistical procedures described in the TSD, or by using other statistical methods deemed appropriate by the SWRCB.

According to the task force, the estimated maximum effluent concentration would serve as a trigger level for initiation of corrective actions. Exceedances (defined in Appendix B) above the estimated maximum effluent concentration would result in a requirement that the discharger investigate and report the cause to the RWQCB. The RWQCB could also require that an action plan be submitted requiring the discharger to take all reasonable steps within a reasonable time to identify the cause of the exceedance and reduce pollutant levels to historic values. The permit provisions would include the estimated maximum effluent limitation and specify the actions to be taken if exceedances occur. Exceedance of the numeric interim limitation would result in appropriate enforcement actions by the RWQCB. In addition, the permit provisions would also include any other interim requirements and, if appropriate, interim dates.

The following alternatives have been developed based on the recommendations by the Permitting and Compliance Issues Task Force, and State and federal requirements.

III. ALTERNATIVES FOR SWRCB ACTION

Alternative 1. No action. Under this alternative, interim requirements, including interim limitations, would continue to be established at the discretion of the individual RWQCBs, consistent with the existing regulations governing compliance schedules.

Alternative 2. Adopt the task force recommendation for establishing interim requirements. Under this alternative, RWQCBs may determine that interim requirements (which may include numeric interim effluent limitations, pollutant control measures, and participation in monitoring studies) be placed in a WDR in addition to, or in lieu of, final water quality-based effluent limitations if certain conditions are met. These conditions and the corresponding appropriate interim requirements are described below:

a. If available data are insufficient to determine whether effluent limitations are needed to control a pollutant in a discharge as described in Chapter 1.1, the RWQCB would not impose numeric interim limitations and source control measures for the pollutant, but would instead require the discharger to monitor and gather further information as an interim requirement. Final effluent limitations would not be included in the WDR for the pollutant.

[4] SWRCB staff explored the possibility of using a statistical method for establishing a future factor, and concluded that future unforeseen events cannot be predicted.

b. If the RWQCB determines that effluent limitations are needed to control a pollutant in a discharge, but effluent limitations could not be calculated as described in Chapter 1.2 due to lack of data (e.g., because a translator study had not yet been completed), the RWQCB would require that numeric interim limitations be established in the WDR and could also impose interim requirements, such as requiring the discharger to implement source control measures and participate in the activities necessary to develop final effluent limitations.

c. If the RWQCB determines that effluent limitations are needed to control a pollutant in a discharge, and effluent limitations have been calculated, but the discharger cannot immediately meet those limitations, the RWQCB would require that numeric interim limitations be established in the WDR and could also impose interim requirements to control the pollutant, such as requiring the discharger to implement source control measures.

In all three cases, final effluent limitations would only be included in the permit provisions if the final limitation could be achieved within the term of the WDR or if the compliance deadline fell within the term of the WDR. Once the final limitation became effective, the interim limitation would no longer apply.

Where final limitations were not included in the permit provisions, the permit findings must include the following statements, where applicable:

- the water quality criterion to be achieved;
- the reason that a final water quality-based effluent limitation is not being incorporated into the WDR as an enforceable limit at this time;
- a schedule for development of a final water quality-based effluent limitation;
- a statement that it is the intent of the RWQCB to include the final water quality-based effluent limitation as an enforceable limitation in a subsequent permit revision, and that (unless the final limitation has already been developed) the final water quality-based effluent limitation will be based either on the water quality criterion itself or dictated by future regulatory developments; and
- a statement that the water body has previously been identified as impaired.

Numeric interim limitations would be calculated by multiplying an estimated maximum effluent concentration with a future factor. The estimated maximum effluent concentration would be calculated as the upper 99 percent confidence level of the 99th percentile of observed undiluted effluent concentrations using the following statistical procedure described in the Technical Support Document for Water-Quality-based Toxics Control (TSD).[5]

The coefficient of variation (*CV*) (defined in Appendix B) is found for the effluent data. For less than ten samples,[6] *CV* may be set equal to 0.6, or a higher, calculated value may be used. For ten or more samples, *CV* should be calculated as the estimated standard deviation (defined in Appendix B) divided by the arithmetic mean (defined in Appendix B) of the measured values. The uncertainty factor associated with the computed *CV* and the number of data points can be found in Table V-10 or may be calculated as follows:

1. Calculate the percentile (p) represented by the highest effluent concentration in the data set:

$$p = 0.01^{1/n}$$

where n is the number of samples.

2. Calculate the uncertainty factor:

$$uncertainty\ factor = exp((2.326 - z_p) * (ln(CV^2 + 1))^{0.5})$$

where z_p is the z-score associated with the probability p.

The uncertainty factor is multiplied by the maximum of the observed effluent concentrations. The result is the estimated maximum effluent concentration. The numeric interim limitation is found by multiplying the estimated maximum effluent concentration by the future factor. The future factor would be set between 1.15 and 2.00, taking into account the magnitude of the estimated maximum effluent concentration, and the difference between the estimated maximum effluent concentration and the reporting level.

The estimated maximum effluent concentration would serve as a trigger level for initiation of corrective actions. Exceedances above the estimated maximum effluent concentration would result in a requirement that the discharger investigate and report the cause to the RWQCB. The RWQCB could also require that an action plan be submitted requiring the discharger to take all reasonable steps within a reasonable time to identify the cause of the exceedance above the estimated maximum effluent limitation and reduce pollutant levels to historic values.

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[5] The Permitting and Compliance Task force recommended that the SWRCB use the statistical method described in the TSD or other method deemed appropriate by the SWRCB. SWRCB staff selected the 99 percent confidence level of the 99th percentile of observed undiluted effluent concentrations because it corresponds to the protective level selected for other issues (e.g., Chapter 1.2.3).

[6] Typical values for CV range from 0.2 to 1.2. A value of 0.6 is a relatively conservative estimate that may be used for CV when available data sets are small, and the uncertainty on the calculated standard deviation and arithmetic mean are, therefore, high (U.S. EPA 1991).

Table V-10. Uncertainty Factors: 99% Confidence Level and 99th Percentile

Coefficient of Variation (CV)	Number of Samples (n)													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
0.1	1.6	1.4	1.4	1.3	1.3	1.3	1.3	1.2	1.2	1.2	1.2	1.2	1.2	1.2
0.2	2.5	2.0	1.9	1.7	1.7	1.6	1.6	1.5	1.5	1.5	1.5	1.4	1.4	1.4
0.3	3.9	2.9	2.5	2.3	2.1	2.0	2.0	1.9	1.8	1.8	1.8	1.7	1.7	1.7
0.4	6.0	4.0	3.3	2.9	2.7	2.5	2.4	2.3	2.2	2.2	2.1	2.0	2.0	2.0
0.5	9.0	5.5	4.4	3.8	3.4	3.1	2.9	2.8	2.7	2.6	2.5	2.4	2.3	2.3
0.6	13	7.4	5.6	4.7	4.2	3.8	3.5	3.3	3.2	3.0	2.9	2.8	2.7	2.6
0.7	19	9.8	7.1	5.9	5.1	4.6	4.2	3.9	3.7	3.5	3.4	3.2	3.1	3.0
0.8	26	13	8.9	7.2	6.2	5.5	5.0	4.6	4.3	4.1	3.9	3.7	3.5	3.4
0.9	36	16	11	8.7	7.3	6.4	5.8	5.3	4.9	4.6	4.4	4.2	4.0	3.8
1.0	48	20	13	10	8.6	7.5	6.7	6.1	5.6	5.3	4.9	4.7	4.5	4.3
1.1	63	25	16	12	10	8.6	7.6	6.9	6.3	5.9	5.5	5.2	5.0	4.7
1.2	81	30	19	14	11	9.8	8.6	7.8	7.1	6.6	6.1	5.8	5.5	5.2
1.3	102	36	22	16	13	11	9.7	8.7	7.9	7.3	6.8	6.3	6.0	5.7
1.4	127	43	26	19	15	12	11	9.6	8.7	8.0	7.4	6.9	6.5	6.2
1.5	156	50	29	21	17	14	12	11	9.5	8.7	8.0	7.5	7.0	6.6
1.6	189	58	33	24	18	15	13	12	10	9.4	8.7	8.1	7.6	7.1
1.7	226	67	38	26	20	17	14	13	11	10	9.4	8.7	8.1	7.6
1.8	268	76	42	29	22	18	16	14	12	11	10	9.3	8.7	8.1
1.9	314	87	47	32	24	20	17	15	13	12	11	9.9	9.2	8.6
2.0	366	97	52	35	27	21	18	16	14	13	11	11	9.8	9.1
2.1	422	109	57	38	29	23	19	17	15	13	12	11	10	9.6
2.2	483	121	63	42	31	25	21	18	16	14	13	12	11	10
2.3	549	133	68	45	33	26	22	19	17	15	14	12	11	11
2.4	621	147	74	48	36	28	23	20	18	16	14	13	12	11
2.5	698	160	80	52	38	30	25	21	19	17	15	14	13	12
2.6	780	175	86	55	40	32	26	22	19	17	16	14	13	12
2.7	867	190	93	59	43	34	28	23	20	18	16	15	14	13
2.8	961	206	99	63	45	35	29	25	21	19	17	15	14	13
2.9	1059	222	106	67	48	37	30	26	22	20	18	16	15	14
3.0	1163	239	113	71	51	39	32	27	23	21	18	17	15	14
3.1	1273	256	120	74	53	41	33	28	24	21	19	17	16	15
3.2	1389	274	127	78	56	43	35	29	25	22	20	18	16	15
3.3	1510	292	134	83	58	45	36	30	26	23	21	19	17	16
3.4	1636	311	142	87	61	47	38	32	27	24	21	19	17	16
3.5	1769	330	149	91	64	49	39	33	28	25	22	20	18	17
3.6	1907	350	157	95	66	51	41	34	29	25	23	20	18	17
3.7	2050	370	165	99	69	52	42	35	30	26	23	21	19	17
3.8	2200	391	173	104	72	54	44	36	31	27	24	22	20	18
3.9	2355	412	181	108	75	56	45	37	32	28	25	22	20	18
4.0	2516	434	189	112	78	58	46	39	33	29	25	23	21	19

Table V-10 continued.

Coefficient of Variation (CV)	Number of Samples (n)													
	15	16	17	18	19	20	30	40	50	60	70	80	90	100
0.1	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
0.2	1.4	1.4	1.4	1.4	1.4	1.3	1.3	1.2	1.2	1.2	1.2	1.2	1.1	1.1
0.3	1.6	1.6	1.6	1.6	1.6	1.6	1.4	1.4	1.3	1.3	1.3	1.2	1.2	1.2
0.4	1.9	1.9	1.9	1.8	1.8	1.8	1.6	1.5	1.5	1.4	1.4	1.3	1.3	1.3
0.5	2.2	2.2	2.1	2.1	2.1	2.0	1.8	1.7	1.6	1.5	1.5	1.4	1.4	1.3
0.6	2.6	2.5	2.4	2.4	2.3	2.3	2.0	1.8	1.7	1.6	1.6	1.5	1.5	1.4
0.7	2.9	2.8	2.8	2.7	2.6	2.6	2.2	2.0	1.8	1.7	1.7	1.6	1.5	1.5
0.8	3.3	3.2	3.1	3.0	2.9	2.9	2.4	2.2	2.0	1.9	1.8	1.7	1.6	1.6
0.9	3.7	3.6	3.5	3.4	3.3	3.2	2.6	2.3	2.1	2.0	1.9	1.8	1.7	1.6
1.0	4.1	4.0	3.8	3.7	3.6	3.5	2.8	2.5	2.2	2.1	1.9	1.8	1.8	1.7
1.1	4.5	4.4	4.2	4.1	3.9	3.8	3.1	2.6	2.4	2.2	2.0	1.9	1.8	1.8
1.2	5.0	4.8	4.6	4.4	4.3	4.1	3.3	2.8	2.5	2.3	2.1	2.0	1.9	1.8
1.3	5.4	5.2	5.0	4.8	4.6	4.5	3.5	3.0	2.6	2.4	2.2	2.1	2.0	1.9
1.4	5.9	5.6	5.4	5.2	5.0	4.8	3.7	3.1	2.8	2.5	2.3	2.2	2.0	1.9
1.5	6.3	6.0	5.7	5.5	5.3	5.1	3.9	3.3	2.9	2.6	2.4	2.2	2.1	2.0
1.6	6.8	6.4	6.1	5.9	5.7	5.5	4.1	3.4	3.0	2.7	2.5	2.3	2.2	2.0
1.7	7.2	6.9	6.5	6.3	6.0	5.8	4.3	3.6	3.1	2.8	2.5	2.4	2.2	2.1
1.8	7.7	7.3	6.9	6.6	6.4	6.1	4.5	3.7	3.2	2.9	2.6	2.4	2.3	2.1
1.9	8.1	7.7	7.3	7.0	6.7	6.4	4.7	3.9	3.3	3.0	2.7	2.5	2.3	2.2
2.0	8.6	8.1	7.7	7.4	7.0	6.7	4.9	4.0	3.4	3.0	2.8	2.5	2.4	2.2
2.1	9.1	8.6	8.1	7.7	7.4	7.1	5.1	4.1	3.5	3.1	2.8	2.6	2.4	2.3
2.2	9.5	9.0	8.5	8.1	7.7	7.4	5.3	4.3	3.6	3.2	2.9	2.7	2.5	2.3
2.3	10	9.4	8.9	8.4	8.0	7.7	5.5	4.4	3.7	3.3	3.0	2.7	2.5	2.4
2.4	10	9.8	9.3	8.8	8.4	8.0	5.7	4.5	3.8	3.4	3.0	2.8	2.6	2.4
2.5	11	10	9.7	9.2	8.7	8.3	5.9	4.7	3.9	3.4	3.1	2.8	2.6	2.4
2.6	11	11	10	9.5	9.0	8.6	6.0	4.8	4.0	3.5	3.1	2.9	2.6	2.5
2.7	12	11	10	9.9	9.4	8.9	6.2	4.9	4.1	3.6	3.2	2.9	2.7	2.5
2.8	12	11	11	10	9.7	9.2	6.4	5.0	4.2	3.7	3.3	3.0	2.7	2.5
2.9	13	12	11	11	10	9.5	6.6	5.1	4.3	3.7	3.3	3.0	2.8	2.6
3.0	13	12	12	11	10	9.8	6.7	5.3	4.4	3.8	3.4	3.1	2.8	2.6
3.1	14	13	12	11	11	10	6.9	5.4	4.5	3.9	3.4	3.1	2.8	2.6
3.2	14	13	12	12	11	10	7.1	5.5	4.5	3.9	3.5	3.1	2.9	2.7
3.3	14	13	13	12	11	11	7.2	5.6	4.6	4.0	3.5	3.2	2.9	2.7
3.4	15	14	13	12	12	11	7.4	5.7	4.7	4.0	3.6	3.2	2.9	2.7
3.5	15	14	13	13	12	11	7.5	5.8	4.8	4.1	3.6	3.3	3.0	2.8
3.6	16	15	14	13	12	12	7.7	5.9	4.9	4.2	3.7	3.3	3.0	2.8
3.7	16	15	14	13	12	12	7.8	6.0	4.9	4.2	3.7	3.3	3.0	2.8
3.8	17	15	14	14	13	12	8.0	6.1	5.0	4.3	3.8	3.4	3.1	2.8
3.9	17	16	15	14	13	12	8.1	6.2	5.1	4.3	3.8	3.4	3.1	2.9
4.0	17	16	15	14	13	13	8.3	6.3	5.1	4.4	3.9	3.5	3.1	2.9

Exceedance of the numeric interim limitation would result in appropriate enforcement actions by the RWQCB.

The permit provisions would include the interim effluent limitation, the estimated maximum effluent limitation, and other interim requirements. The permit provisions would also include a compliance schedule, if appropriate, and corrective actions to be taken if exceedances occur.

Although based on performance, numeric interim limitations developed under this alternative may, in some cases, be stricter than final effluent limitations because mixing zones are not considered in the calculation. If the numeric interim limitations are more stringent than the final effluent limitations, the discharger would not be able to meet the interim limitations. In most cases, numeric interim limitations developed under this alternative would be more lenient than existing effluent limitations due to the use of the future factor. The interim limitations would, therefore, not serve as an intermediate step between the existing effluent limitation and the final effluent limitation, and could violate anti-backsliding and anti-degradation requirements. Water quality may, under this scenario, degrade rather than improve.

Another disadvantage with using this method to calculate numeric interim limitations is the use of a future factor. The future factor is meant to provide for unforeseen and uncontrollable circumstances that may cause a future increase in effluent concentrations. However, accounting for unforeseen events is not possible. State and federal regulations already contain some provisions for unforeseen and uncontrollable circumstances that may cause a future increase in effluent concentrations for a discharger. NPDES dischargers may request a permit modification based on new information if the discharge quantity or quality changes (40 CFR 122.62(a)(2)).

This alternative would provide statewide consistency in establishing interim effluent limitations and requirements.

Alternative 3. Adopt a modified version of the task force recommendation for establishing interim requirements. Like Alternative 2, under this alternative, the RWQCBs may place interim requirements (which may include numeric interim limitations, pollutant control measures, and participation in monitoring studies) in a WDR in addition to, or instead of, final water quality-based effluent limitations if certain conditions are met. These conditions and the corresponding appropriate interim requirements are described below:

a. If the discharger demonstrates that available data are insufficient to determine whether effluent limitations are needed to control a pollutant in a discharge as described in Chapter 1.1, the RWQCB would not impose numeric interim limitations and source control measures for the pollutant, but would instead require the discharger to monitor and gather further information as an interim requirement. The permit provisions would include a compliance schedule which contains the interim requirements and dates for their achievement, with no more than one year between interim dates. The compliance schedule must state that the discharger must notify the RWQCB, in writing, no later than 14 days following each interim compliance date, of its compliance or noncompliance with the interim requirements (or must submit a progress report, if applicable). When the interim requirements have been completed, the RWQCB would determine, based on the collected data, whether water quality-based effluent limitations would be needed to control the pollutant. If water quality-based effluent limitations are needed to control the pollutant, the WDR would be reopened for that pollutant and final effluent limitations included in the permit provisions, unless a compliance schedule and interim requirements were applicable under (b) and (c) below.

b. If the RWQCB determines that effluent limitations are needed to control a pollutant in a discharge, but the discharger demonstrates that effluent limitations could not be calculated as described in Chapter 1.2 due to lack of data (e.g., because a translator study ~~or a site-specific objective study has not yet been completed~~), the RWQCB would require that numeric interim limitations be established in the WDR and could also impose interim requirements, such as requiring the discharger to implement source control measures and participate in the activities necessary to develop final effluent limitations. ~~Where discharges meet existing effluent limitations, these values may be specified as numeric interim limitations in the reissued WDR as the most lenient values permissible, unless anti-backsliding provisions are met. Where discharges are not in compliance with existing effluent limitations, the noncompliance under the existing WDR must be addressed through appropriate enforcement action before the WDR can be reissued, unless antibacksliding provisions are met. Numeric interim limitations must be at least as stringent as the current performance level of the facility, unless antibacksliding provisions are met.~~ Numeric interim limitations for the pollutant would be based on current treatment facility performance or on existing permit limitations, whichever is more stringent. If the existing permit limitations are more stringent, and the discharger is not in compliance with those limitations, the noncompliance under the existing WDR would be addressed through appropriate enforcement action before the WDR can be reissued, unless antibacksliding provisions are met.

The permit provisions would include a compliance schedule which contains the interim requirements and dates for their achievement, with no more than one year between interim dates. The compliance schedule must state that the discharger must notify the RWQCB in writing no later than 14 days following each interim compliance date of its compliance or noncompliance with the interim requirements (or must submit a progress report, if applicable). ~~Compliance~~ Schedules for translator studies are discussed in Chapter 1.2.1. Permit provisions should also state the appropriate enforcement actions to be taken by the RWQCB if interim requirements, including limitations, are not met.

Except as specifically provided in Chapter 1.2.1 (Translators for Metals and Selenium), the permit provisions would not include a final effluent limitation, but the permit findings should include: (1) the water quality criteria/objectives to be achieved; (2) the reason that a final water quality-based effluent limitation is not being incorporated into the WDR as an enforceable limitation at this time; (3) a statement that it is the intent of the RWQCB to include the final water quality-based effluent limitation as an enforceable limitation in a subsequent WDR revision, and that (unless the final limitation has already been developed) the final water quality-based effluent limitation will be based either on the water quality criterion itself or on future regulatory developments; and (4) a schedule for development of a final water quality-based effluent limitation. When the interim requirements have been completed, the RWQCB would reopen the WDR for that pollutant and calculate final water quality-based effluent limitations based on the collected information and include them in the permit provisions. Once the final limitation became effective, the interim limitation would no longer apply.

c. If it has been determined that effluent limitations are needed to control a pollutant in a discharge, and effluent limitations have been calculated, but the discharger cannot immediately meet those limitations and the RWQCB determines that a compliance schedule is appropriate, the RWQCB would require that numeric interim limitations be established in the WDR and could also impose interim requirements to control the pollutant, such as requiring the discharger to implement source control measures. Numeric interim limitations and requirements would be established and included in the WDR as described in (b) above, except the final effluent limitations would be included in the permit findings if the compliance schedule exceeds the length of the WDR; otherwise, the final effluent limitations will be included in the permit provisions along with any interim requirements.

In no event can a schedule of compliance included in a WDR exceed the deadline listed in Chapter 2.1.

This alternative will not cause further degradation of the water body, yet would allow dischargers the opportunity to find more cost-effective and environmentally friendly ways to meet requirements. Unlike Alternative 2, this alternative does not specify a method for calculating an interim effluent limitation, and therefore provides the RWQCBs a greater flexibility to determine an interim limitation appropriate to the facility-specific conditions and the type of actions required to meet the final effluent limitation. For example, source reduction measures may result in a gradual improvement of effluent quality, whereas a treatment plant expansion may result in a step-wise improvement of effluent quality. A prescriptive method for determining interim limitations may not provide enough flexibility in some cases and may be too lenient in other cases. This method would, however, provide statewide consistency in establishing interim requirements, including interim effluent limitations.

IV. STAFF RECOMMENDATION

Adopt Alternative 3.

CHAPTER 2.3 - MONITORING AND REPORTING REQUIREMENTS

I. PRESENT STATE POLICY

There is currently no statewide policy regarding monitoring and reporting requirements specifically for discharges into inland surface waters, enclosed bays or estuaries. State regulations, however, address monitoring for both NPDES permits and WDRs. General monitoring and reporting requirements for discharges to ocean waters are contained in the 1997 Ocean Plan. The RWQCB basin plans specify surveillance, monitoring, and assessment provisions. These requirements are described below.

II. ISSUE DESCRIPTION

The RWQCBs have the authority to require dischargers to monitor and report pollutant levels as a part of NPDES permits and other waste discharge requirements (WDRs) (California Water Code §13267 and §13383). The information generated by the monitoring and reporting requirements of NPDES permits and WDRs is used to determine compliance with permit effluent limitations. Federal and State regulations specify monitoring requirements for NPDES permits and non-NPDES WDRs, respectively. These requirements are described below.

The U.S. EPA NPDES permit regulations, which are applicable in California (CCR, Title 23, §2235.1 and §2235.2), contain monitoring requirements to ensure compliance with permit effluent limitations. Monitoring and reporting conditions which apply to all NPDES permits are listed in 40 CFR 122.41. This section requires dischargers to maintain monitoring records, which include the date, exact place and time of sampling or measurements, the individuals(s) who performed the sampling or measurements, the date(s) analyses were performed, the individual(s) who performed the analyses, the analytical techniques or methods used, and the results of such analyses. As further stated, "Monitoring results must be conducted according to test procedures approved under 40 CFR part 136 unless otherwise specified in 40 CFR part 503, unless other test procedures have been specified in the permits." Permittees must retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by the permit, and records of all data used to complete the application for a permit, for a period of at least three years from the date of the sample, measurement, report, or application (five years or longer for sewage sludge activities).

Further, NPDES monitoring and reporting requirements are outlined in 40 CFR 122.48 and 122.44. NPDES permits must specify the following: (1) requirements concerning the proper use, maintenance, and installation, when appropriate, of monitoring equipment or methods (including biological monitoring methods when appropriate); (2) required monitoring, including type, intervals, and frequency sufficient to yield data which are representative of the monitored activity including, when appropriate, continuous monitoring; and (3) applicable reporting requirements based upon the impact of the regulated activity and as specified in 40 CFR 122.44.

In addition, 40 CFR 122.44 requires permittees to monitor: "(i) the mass (or other measurement specified in the permit) for each pollutant limited in the permit; (ii) the volume of effluent discharged from each outfall; (iii) other measurements as appropriate including pollutants in internal waste streams under §122.45(i); pollutants in intake water for net limitations under §122.45(f); frequency, rate of discharge, etc., for noncontinuous discharges under §122.45(e); pollutants subject to notification requirements under §122.42(a); and pollutants in sewage sludge or other monitoring as specified in 40 CFR part 503; or as determined to be necessary on a case-by-case basis pursuant to section 405(d)(4) of the Clean Water Act." Also, 40 CFR 122.44 requires reporting of monitoring results with a frequency dependent on the nature and effect of the discharge, but in no case less than once a year. For sewage sludge use or disposal practices, the section requires the monitoring and reporting of results with a frequency dependent on the nature and effect of the sewage sludge use or disposal practice. Minimally, this shall be as specified in 40 CFR 503 (where applicable), but in no case less than once a year. The Federal regulations do not specify QA/QC requirements for NPDES permits.

Like the federal NPDES regulations, state regulations governing non-NPDES WDRs require that monitoring results be reported no less than once a year (CCR, Title 23, §2230). Water Code §13176 requires that all environmental sample analyses be performed by a certified laboratory.

The RWQCBs ensure compliance with their basin plans, NPDES permits, and WDRs through implementation of "discharger self-monitoring" and "compliance monitoring". Dischargers are required to "self-monitor"; that is, to collect regular samples of their effluent and receiving (or ambient) waters according to a prescribed schedule to determine facility performance and compliance with their requirements. The self-monitoring data reported to the RWQCBs are submitted as a discharger monitoring report called a DMR. The RWQCBs use data from self-monitoring to determine compliance with requirements, issue enforcement orders, if appropriate, and perform water quality assessments. When the RWQCBs conduct "compliance monitoring", the RWQCBs make unannounced inspections and collect samples to determine compliance with discharge requirements and receiving water objectives, and gather data, if appropriate, for enforcement actions.

Nearly every monitoring program will require testing of the final effluent or wastewater discharge from the permitted facility or site. The nature and magnitude of the effluent monitoring requirements will depend primarily on the volume of the discharge, the frequency of the discharge, and the type of wastewater discharged. A receiving water monitoring program may not be needed for every discharge. For many minor dischargers, effluent monitoring may be sufficient. However, most major dischargers will be required to conduct receiving water monitoring in addition to effluent monitoring. The type of receiving water is considered in establishing monitoring requirements. Discharges to inland waters usually occur as an end-of-pipe discharge to a stream, river, or lake. Consideration of the flow regime of inland waters is important in the selection of monitoring requirements. Discharges to estuarine waters may occur in a variety of ways. Some discharges may enter an estuary at or near the shoreline as an end-of-pipe discharge, while other discharges may occur offshore as an end-of-pipe discharge or through a diffuser system. Consideration of current patterns, initial dilution, and dispersal of the wastewater plume are important factors in the selection of monitoring requirements.

In addition to the use of data generated from monitoring required in WDRs, the RWQCBs review data generated from comprehensive surveillance and monitoring programs to assess compliance. The surveillance and monitoring programs include the SWRCB's Toxic Substances Monitoring, State Mussel Watch, and Bay Protection and Toxic Cleanup programs, as well as cooperative regional monitoring programs such as the Interagency Ecological Program. The data from the surveillance and monitoring programs are used to identify pollutant sources, establish baseline and trends, and assess the effectiveness of the RWQCBs water quality control programs.
The Permitting and Compliance Issues Task force and, to a lesser extent, other ISWP/EBEP public advisory task forces made numerous recommendations on monitoring and reporting requirements. The common goal among all of the task force recommendations is the desire to reduce costs, avoid duplication, and promote coordination, effectiveness, and efficiency in establishing monitoring requirements. Several of the task force recommendations (e.g., providing data for establishing baselines/trends, and for developing TMDLs/WLAs/LAs, site-specific objectives, and metal translators) are actions that are currently being taken by the SWRCB and RWQCBs. Many of the task force recommendations, specifically those pertaining to certain provisions that should be included in WDRs, will be addressed in the Policy. However, the task force recommendation requesting that some effluent monitoring be substituted with ambient biological assessment or indicator monitoring will be deferred to later statewide plan amendments. Biological assessment and indicator monitoring techniques are in the primary stages of development. The recommendations involving defining statistical procedures and standardized reporting are best addressed in a guidance document to be developed independently of the policy. Some of the task force recommendations encouraged coordination and facilitation of cooperative water body, watershed, regional, and discharge monitoring while considering costs and benefits, and allocating responsibility for performing and funding the monitoring.

III. ALTERNATIVES FOR SWRCB ACTION

Alternative 1. No action. Under this alternative, RWQCBs will continue to rely on their own basin plan provisions, and State and federal regulations, for establishing monitoring requirements in WDRs. Further refinement or development of monitoring requirements would be done through individual RWQCB basin plan amendments. This alternative does not address statewide consistency.

Alternative 2. Adopt general policy language on monitoring requirements. This alternative would establish general requirements for monitoring requirements to generate data used to determine compliance with the priority pollutant criteria and effluent limitations based on those criteria. The proposed Policy language would address many of the task force concerns regarding monitoring requirements, and complement existing basin plan requirements. This alternative would address statewide consistency on a general level.

Alternative 3. Adopt specific guidance on monitoring requirements. This alternative, which addresses additional task force recommendations, would require significant efforts in developing a guidance document that would specify how the data will be generated to determine compliance with effluent limitations and water quality objectives, establish a standardized format for reporting of monitoring data, define options for statistical procedures for evaluating monitoring data, and specify laboratory certification procedures. This alternative would require extensive time and coordination among the SWRCB and the RWQCBs.

IV. STAFF RECOMMENDATION

Adopt Alternative 2.

CHAPTER 2.4 REPORTING LEVELS AND COMPLIANCE DETERMINATION

I. PRESENT STATE POLICY

The only statewide plan or policy in effect for regulating discharges of toxic substances to surface waters is the Ocean Plan. ~~Reporting levels and compliance determinations in that plan are based on Practical Quantitation Levels (PQLs). In the absence of laboratory performance data, reporting levels are based on Method Detection Limits (MDLs). These terms are defined in the 1997 Ocean Plan as follows:~~ The present Ocean Plan contains provisions for determining compliance with effluent limitations that are below a "Practical Quantification Level (PQL)." The Ocean Plan describes *when* compliance should be determined by comparing the results of single or multiple monitoring samples with published PQLs and the calculated effluent limitation. In addition, provisions are made for the statistical analysis of multiple samples when monitoring shows recurrent analytical responses between the PQL and the effluent limitation.

As an initial attempt to resolve the problem of effluent limitations set lower than analytical detection limits, a Compliance Determination section was added to the Ocean Plan in 1990. Method Detection Limits (MDL) and the Practical Quantification Level (PQL) were defined in the Plan, and a procedure was established to assist RWQCB staff in assessing when to determine compliance with permit limitations. The MDL, as defined in the Ocean Plan is as follows:

Method Detection Limit is the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero, as defined in 40 CFR 136 Appendix B.

The procedure described in 40 CFR 136, Appendix B establishes MDLs statistically by requiring analysis of seven or more samples of a laboratory standard solution.

The PQL, as defined in the Ocean Plan, is as follows:

> Practical Quantification Level is the lowest concentration of a substance which can be consistently determined within +/- 20% of the true concentration by 75% of the labs tested in a performance evaluation study. Alternatively, if performance data are not available, the PQL for carcinogens is the MDL x 5, and for noncarcinogens is the MDL x 10.

~~PQL: The lowest concentration of a substance which can be consistently determined within +/-20% of the true concentration by 75% of the labs tested in a performance evaluation study. Alternatively, if performance data are not available, the PQL for carcinogens is the MDL x 5, and for noncarcinogens is the MDL x 10.~~

~~MDL: The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero, as defined in 40 CFR 136 Appendix B.~~

RWQCB basin plans do not contain provisions for reporting levels. The RWQCBs use various approaches, including that described in the Ocean Plan and other approaches in consultation with the U.S. EPA. The rescinded Inland Surface Waters Plan and ~~the~~ Enclosed Bays and Estuaries Plan used the same approach for reporting levels as the Ocean Plan. The Chemical-Specific~~s~~ Objectives Task Force drew attention to the "moving target" aspect of current reporting levels, and indicated that this issue must be addressed in the new plans.

II. ISSUE DESCRIPTION

Effluent limitations for pollutants are occasionally set at levels that are too low to be detected by routine analytical chemistry methods. This often occurs when the pollutant is highly toxic or has a tendency to bioaccumulate in the environment. Since the ultimate goal of the effluent limitation is to protect water quality, the U.S. EPA recommends that permit limitations are set without regard to the existing analytical detection levels (U.S. EPA 1991, p. 111). Although this may create a difficult situation for determining compliance with permit limitations, a numeric effluent limit establishes a clear standard of conduct for the permitted discharger. Additionally, it is reasonable to expect that analytical detection levels will become more sensitive over time.

The U.S. EPA is interested in innovative analytical techniques capable of accurately measuring pollutants at or near water quality criteria levels. As new methods are developed, the U.S. EPA is conducting validation studies to determine method detection limits and other method performance attributes. Once the validation studies are completed, the U.S. EPA intends to propose the analytical methods at 40 CFR Part 136 for use in compliance monitoring. These new methods will provide permitting authorities, permittees, and other interested parties with the analytical capabilities to measure pollutants at water quality criteria levels.

Analytical Methods

The U.S. EPA has established priorities for the development and validation of analytical methods for priority pollutants. Several analytical methods have been developed for the determination of trace metals (e.g., arsenic, antimony, cadmium, copper, trivalent and hexavalent chromium, lead, mercury, nickel, selenium, silver, thallium, and zinc). These methods have undergone single-laboratory validation studies to investigate their capability to measure the trace metals at or near water quality criteria levels. The U.S. EPA plans to conduct an inter-laboratory collaborative validation study prior to proposal of these methods. In July of 1999, the U.S. EPA promulgated as final in the Federal Register a more sensitive method for mercury – Method 1631. This method has a reported lowest quantification level of 0.5 nanograms per liter (ng/L or parts per trillion). Because the method promulgation date is after the SWRCB's laboratory survey, no laboratory provided data relative to this method.

In the past, research by the U.S. EPA, U.S. Geological Survey, and others have shown that measurement of trace metals at water quality criteria levels requires extensive precautions to preclude false positives that arise from contamination during sample collection, handling, and analysis. To ensure that metals data accurately reflect the actual concentrations of the water body sampled, the U.S. EPA has developed three guidance documents that accompany the trace metals methods.

The U.S. EPA has developed and validated a method that extends the levels of quantitation for dioxins and furans into the low ppq range (Method 1613). The U.S. EPA plans to promulgate this method at 40 CFR Part 136 in the near future. The U.S. EPA also has developed a method (Method 1668) for determination of 12 PCB congeners that the World Health Organization (WHO) has identified as having toxic properties similar to the dioxins and furans. Method 1668 allows for determination of all the 12 "toxic" PCB congeners in the low ppq range. This method is also applicable to other PCB congeners not specified by WHO as "toxic." A collaborative validation study is planned for this method.

The U.S. EPA also plans to revise currently approved analytical methods for volatile organics (Method 1624) and for semi-volatiles and some pesticides (Method 1625). Improvements on these and other analytical methods will be conducted in the future as the technology develops and resources become available.

Reporting Levels

A reporting level is the lowest concentration of a detected substance that must be reported for specific regulatory purposes, such as determining compliance with effluent limitations and water quality criteria or objectives. Reporting levels become a problem when analytical methods are improved to detect the presence of regulated chemical substances that were previously reported as not detected. This downward shift in detection level has been referred to as a "moving target". Thus, it is possible that effluent limitations or water quality criteria/objectives at concentrations that are not currently detected[7] (or detected with reliability), and are deemed in compliance, may be later found to be unattained with the ability to detect and quantify lower concentrations.

[7] Chemical carcinogens are examples of substances whose water quality objectives are established at often undetectable concentrations. The laboratory experiments performed on potential carcinogens to determine if they are carcinogens and, if so, their corresponding potency, are usually conducted at high concentrations to produce statistically significant results within the time frame of the experiment. When substances are shown to be carcinogenic, any follow-on regulatory action that would result in establishing a water quality objective would take into account the individual substance's carcinogenic potency, bioaccumulation potential, seafood consumption rate, and regulatory risk (e.g., one increased cancer incidence in one million population). All of these factors would be used collectively to derive an estimated "safe" concentration (e.g., water quality objective) for human populations based on the toxic responses measured in laboratory tests (usually involving small mammals). The combination of these factors can result in water quality objectives that are set at very low (and undetectable) concentrations in order to adequately protect human health.

The most efficient way to evaluate these new improvements and detections is to develop sound data over a period of time to determine their accuracy and feasibility for statewide application. Recommendations for regulatory changes or actions should be based on these considerations at the end of each triennial review, or earlier if the issue were deemed significant enough.

Further, regulators and dischargers both want assurance that reporting levels are of known precision and accuracy. This assurance can be given if the amount detected and quantified is in the calibration range[8] of the analytical method. The reporting level could be as low as the lowest concentration in this range.

PQLs

As reporting levels, PQLs are somewhat problematic. First, the PQL has several definitions, including two that have been developed by different offices within the U.S. EPA. Second, data have not been developed by U.S. EPA to determine the PQLs for the priority pollutants. The U.S. EPA is actively reevaluating the use of PQLs. Since approving the 1990 Ocean Plan, the U.S. EPA has de-emphasized the use of PQLs (and other analytical measurements derived from the MDL) for the purpose of compliance determination. The U.S. EPA Technical Support Document (U.S. EPA 1991, p. 112) states: “Because the PQL has no one definition, EPA is not recommending its use in NPDES permitting.”

The use of the MDL as a reporting level, or as the basis for calculating a reporting level (i.e., PQL), also can present problems. It is statistically derived and a substance at this concentration is frequently not detectable or quantifiable with a known level of accuracy. (This statement will become clearer in the discussion ~~which~~ that follows).

Further, in the Supplemental Information Document for the Final Water Quality Guidance for the Great Lakes System, (Pages 419 and 420), U.S. EPA rejected both the MDL and PQL for reporting purposes, as follows:

> “EPA rejected the use of the MDL and other non-quantifiable concentration levels because these concentrations, by definition, do not represent concentrations that are both reproducible and quantifiable indicators … hence are not reliable measures for permit compliance purposes.”
>
> “Since the EPA is actively reevaluating its use of the traditional PQL values, EPA does not endorse them for evaluating compliance …:

~~The Final Water Quality Guidance for the Great Lakes System (40 CFR, Part 132) contains a definition for a reporting level that meets the criteria above: (1) that it be of known precision and accuracy; (2) that it lie within the calibration range of the analytical method; and (3) that it be the~~

[8] The calibration range is that region where instrument responses to individual substances detected are proportional to the actual concentration of substance being measured.

lowest concentration in this range necessary to determine compliance with criteria/objectives. The term used in the guidance is Minimum Level (ML) and it is defined by the U.S. EPA as follows:

> "...the concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure...."

By this definition, a reporting level would not be established for any detectable concentration between the first detectable instrument signal and the response just below the lowest point on the line of calibration. Instead, the reporting level would be established at the lowest point on the line of calibration. The reason for this is that the variability of the earliest recognizable signals is greater than the precision required for acceptable quantification. This is also the region where the MDL appears, and why it is not acceptable as a reporting level. The MDL is based on detection alone without regard to acceptable quantification criteria.

The U.S. EPA allows states to establish appropriate statistical procedures for handling situations where the concentration of a regulated substance is below the ML, but above the MDL. Since any concentration in this region is of lesser quality (in terms of precision and accuracy) there cannot be a reliance on single sample measurements for compliance purposes. A proper procedure would be replicate measurements and the computation of a mean and confidence interval. There are several possible procedures, which vary in the number of replicates used, whether the mean is arithmetic or geometric, and whether the confidence interval is at the 95th or 99th percent level (approximately equal to 2 or 3 times the standard deviation, respectively). In addition, any procedure needs to address the existence of any measurements below the MDL and its effect on the computation of the mean and confidence interval.

The SWRCB conducted a statewide survey requesting ML values for the priority pollutants based on existing laboratory data relative to the lowest routine calibration standard employed by the laboratory in combination with the analytical method for the substance. The collected data for each substance were evaluated and a technic-specific ML value determined. In many cases, most notably for trace metals, there were significant differences between each substance’s technic-specific ML value.

Owing to this spread of ML values, RWQCBs will have to be instructed on the selection of allowed analytical methods for each permit. The relationship between the various ML values for a substance and its calculated effluent limitation will determine if a RWQCB will have to restrict the discharger’s access to an analytical method. The degree of restriction, and its subsequent impact on compliance costs, vary with each calculated permit limit and the spread of ML values.

To increase assurances that water quality is being protected, the lowest accurate analytical data needed to determine compliance must be used. It is possible that there will be cases where the lowest ML value for a given substance still will be higher than the calculated effluent limitation. In those cases, water quality protection issues demand that a RWQCB restrict the discharger to the one technic with the lowest ML value. There are possible significant difficulties for the dischargers in that the one available method is not widely available and the discharger may also incur increased analytical costs. However, to allow the discharger access to a analytical method that is more readily available, less costly, but with a higher ML value will impede the State's protection of water quality.

Confusion can occur with the ML concept in cases where the analytical method treats calibration standards and samples differently. For example, the methods for semi-volatile organic substances require the sample to undergo an extraction step in order to remove the substance from interferences and to concentrate the substance into a smaller volume. However, calibration standards are not so processed. The method accounts for this differential treatment by "correcting" the extract concentration back to the original sample concentration by the application of a correction factor. This differential treatment explains why the ML values derived appear significantly larger than one would expect. Therefore, for purposes of reporting and compliance determination (see Chapters 2.3 and 2.4), correction factors may apply for certain analytical technics.

There are 38 priority pollutants which have a water quality criterion/objective that is below the lowest cited ML value for the substance based on the SWRCB's recent ML Survey. The extent to which the water quality criterion/objective differs from the lowest ML is given in the following table:

Substance Grouping	#	Ratio of ML/criterion
Volatile Organics	6	2 times to 4 times
Cyanide	1	6 times
Pesticides/PCBs	9	10 times to 10,000 times
Semi-volatile Organics	17	1.5 times to 10,000 times
Metals	5	2 times to 400 times

Due to a lack of ML data, this listing does not include: dioxins/furans, trivalent chromium, and asbestos.

The SWRCB and U.S. EPA recognize that many of the priority pollutants cause unacceptable toxic effects at very low ambient concentrations. Therefore, established water quality criteria are, in many instances, below levels of reliable detection and quantitation using currently required methods of analysis. The U.S. EPA is interested in innovative analytical techniques capable of accurately measuring pollutants at or near water quality criteria levels. As new methods are developed, the U.S. EPA is conducting validation studies to determine method detection limits and other method performance attributes. Once the validation studies are completed, the U.S. EPA intends to propose the analytical methods at 40 CFR Part 136 for use in compliance monitoring. These new methods will provide permitting authorities, permittees, and other interested parties with the analytical capabilities to measure pollutants at water quality criteria levels.

The U.S. EPA has established priorities for the development and validation of analytical methods for priority pollutants. Several analytical methods have been developed for the determination of trace metals (e.g., arsenic, antimony, cadmium, copper, trivalent and hexavalent chromium, lead, mercury, nickel, selenium, silver, thallium, and zinc). These methods have undergone single-laboratory validation studies to investigate their capability to measure the trace metals at or near water quality criteria levels. The U.S. EPA plans to conduct an inter-laboratory collaborative validation study prior to proposal of these methods, which is anticipated in 1998.

In the past, research by the U.S. EPA, U.S. Geological Survey, and others have shown that measurement of trace metals at water quality criteria levels requires extensive precautions to preclude false positives that arise from contamination during sample collection, handling and analysis. To ensure that metals data accurately reflect the actual concentrations of the water body sampled, the U.S. EPA has developed three guidance documents that accompany the trace metals methods.

The U.S. EPA has developed and validated a method that extends the minimum levels of quantitation for dioxins and furans into the low ppq range (Method 1613). The U.S. EPA plans to promulgate this method at 40 CFR Part 136 in the near future. The U.S. EPA also has developed a method (Method 1668) for determination of 13 PCB congeners that the World Health Organization (WHO) has identified as having toxic properties similar to the dioxins and furans. Method 1668 allows for determination of all the 13 "toxic" PCB congeners in the low ppq range. This method is also applicable to other PCB congeners not specified by WHO as "toxic." A collaborative validation study is planned for this method and should be completed in 1998.

The U.S. EPA also plans to revise currently approved analytical methods for volatile organics (Method 1624) and for semi-volatiles and some pesticides (Method 1625). Improvements on these and other analytical methods will be conducted in the future as the technology develops and resources become available.

Minimum Levels

For most NPDES permitting situations, U.S. EPA now recommends that the compliance level be defined in the permit as the Minimum Level (ML). A 1991 U.S.EPA definition of the Minimum Level was (U.S. EPA 1991, p. 111):

> *the level at which the entire analytical system gives recognizable mass spectra and acceptable calibration points when analyzing for pollutants of concern. This level corresponds to the lowest point at which the calibration curve is determined.*

The ML concept provides a reliable and reproducible lower limit to analytical determinations by using the lowest standard in the laboratory calibration curve for a particular analytical method.

During the scientific peer review of this issue for the Ocean Plan, the reviewer suggested that the above ML definition should be expanded to include a wide range of analytical techniques, rather than only mass spectral analyses (SWRCB 1998).

U.S.EPA subsequently modified their original 1991 ML definition when publishing the 1995 Water Quality Guidance for the Great Lakes System in the Federal Register 60(56):153366-15425. Page 15389 of this Rule reads:

> *Minimum Level (ML) is the concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method-specified sample weights, volumes and processing steps have been followed.*

The U.S. EPA's Water Quality Guidance for the Great Lakes requires the use of MLs when water-quality based effluent limitations are below the quantification level (U.S. EPA 1995a). SWRCB staff believe that this ML definition is the most suitable version for inclusion into the Ocean Plan.

<u>Derivation of Statewide Minimum Levels</u>

Analytical laboratories in California that measure pollutant levels in wastewater for regulatory purposes generally use the approved U.S. EPA methods described in 40 CFR 136. In some cases the analytical method appearing in 40 CFR 136 is modified by the laboratory to enhance the analytical performance of the method; all modifications to the analytical methods are made with RWQCB approval. These methods require each laboratory to establish their own calibration curves. As a result, each laboratory develops their own, unique, ML for each pollutant/method combination.

A single ML value for statewide use can be derived for each pollutant/method combination. The statewide ML for each pollutant could be derived from the individual MLs obtained from the large group of California laboratories that are certified to conduct analyses for NPDES compliance; this would approximate the "entire analytical system" of California-certified laboratories. These statewide MLs could then be used to determine compliance with permit limitations.

Staff in the Division of Water Quality's Quality Assurance Unit requested chemistry results in 1997 and 1998 from 160 State-certified laboratories to derive suitable statewide MLs. The laboratories were asked to provide the concentration of the lowest calibration standard routinely used in calibration curves for the determination of the 126 priority pollutants. The laboratories were also asked to provide the method reference and any appropriate concentration or dilution ratios applicable to the calibration standards. Fifty-nine laboratories voluntarily responded to the ML data request. Because some laboratories provided more than one calibration concentration, some chemical/technique combinations contained more than 59 data points.

Staff then derived pollutant-specific ML values by finding the 20th percentile of the laboratory ML data for each pollutant. The computed MLs thus obtained were rounded to the closest multiples of 1, 2, 5, or 10. These multiples represent common ratios used in analytical chemistry, and laboratories commonly choose calibration standards having these multiples. For example, the responding laboratories submitted 67 cyanide calibration concentrations developed using the Colorimetric Method. The 20th percentile of this group of cyanide data was 5.4 ug/L (Figure 1). The 20th percentile value was adjusted to the closest multiple for a final derived ML value of 5 ug/L.

Although rounding the ML to the closest multiple will introduce bias into the final ML (SWRCB 1998), the overall effect of rounding towards a lower number will tend to cancel the effect of rounding towards a higher number. The practical basis for rounding the ML to these multiples is to simplify instrument calibrations and to reduce errors when preparing volumetric calibration solutions.

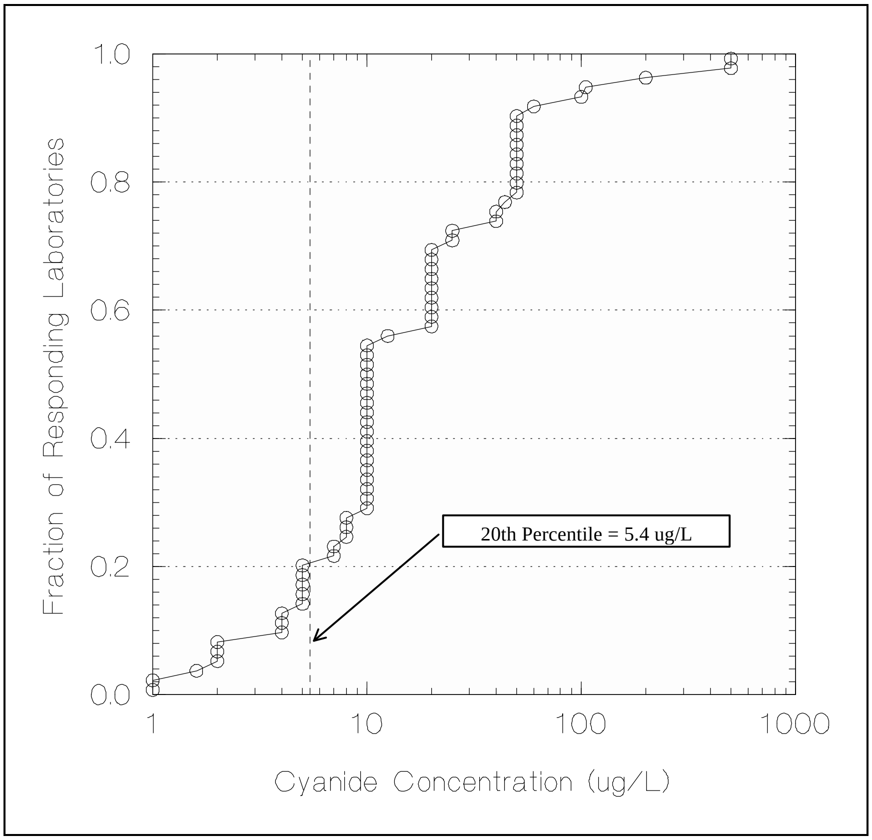


Figure 1. Cumulative frequency distribution for 67 cyanide calibration standards obtained from responding laboratories using the Colorimetric method.

Staff selected the 20th percentile for MLs as an acceptable compromise point. Selecting the ML from the lowest percentiles would give increased analytical sensitivity, whereas selecting the ML from the highest percentiles would guarantee that most laboratories could measure the pollutant at the required level without changes to their current practices. Setting the statewide ML at the 20th percentile means that 20% of the responding laboratories can detect the pollutant at the ML using their current equipment and practices.

Once the statewide MLs were derived, the SWRCB Quality Assurance Officer performed on-site verification interviews with 14 randomly-selected laboratories. During these verification interviews, laboratory personnel were asked to confirm the accuracy of the original calibration standard data they provided the SWRCB. In addition, laboratory personnel were allowed to examine the proposed statewide MLs and to determine if they would be able to calibrate their equipment using the statewide MLs. All of the laboratory personnel interviewed indicated that they could readily calibrate using the statewide MLs. Some laboratory personnel indicated that their lowest calibration point is often set based on personal preference, client or regulatory demands, or historical needs.

The results of the verification interviews indicate that many laboratories could set their lowest calibration point toward a lower chemical concentration without a major change in analytical equipment. SWRCB staff acknowledges that the subjectivity involved in a laboratory's selection of the lowest calibration standard could lead to unintended biases in the derived statewide ML. However, staff believes that the statewide 20th percentile MLs are currently achievable by most laboratories performing analyses for NPDES regulatory work in California. Furthermore, the MLs are expected to be adjusted to smaller magnitudes as laboratories having the highest calibration standards begin using lower calibration standards. Presumably, even lower MLs could be obtained by laboratories intent on lowering their calibration standard concentrations or through a controlled inter-laboratory study of pre-defined calibration standards.

Statewide Minimum Levels

Tables V-11 through V-14 present results derived from the SWRCB Minimum Level Survey for priority pollutants. The present list of MLs represents the 20^{th} percentile of the reported lowest concentrations of a pollutant that can be quantitatively measured given the current state of performance in analytical chemistry methods in California. SWRCB staff intend to update this list as existing methods are improved and as new methods are promulgated.

Tables of ML Values

Tables V-11 – V-14. Minimum Levels for use in reporting and compliance determination. These Minimum Levels represent the lowest concentration of a pollutant that can be quantitatively measured in a sample given the current state of performance in analytical chemistry methods in California.

Table V-11 - Volatile Substances*	GC ML µg/L	GCMS ML µg/L
1,1 Dichloroethane	0.5	1
1,1 Dichloroethene	0.5	2
1,1,1 Trichloroethane	0.5	2
1,1,2 Trichloroethane	0.5	2
1,1,2,2 Tetrachloroethane	0.5	1
1,2 Dichlorobenzene (volatile)	0.5	2
1,2 Dichloroethane	0.5	2
1,2 Dichloropropane	0.5	1
1,3 Dichlorobenzene (volatile)	0.5	2
1,3 Dichloropropene (volatile)	0.5	2
1,4 Dichlorobenzene (volatile)	0.5	2
Acrolein	2.0	5
Acrylonitrile	2.0	2
Benzene	0.5	2
Bromoform	0.5	2
Bromomethane	1.0	2
Carbon Tetrachloride	0.5	2
Chlorobenzene	0.5	2
Chlorodibromo-methane	0.5	2
Chloroethane	0.5	2
Chloroform	0.5	2
Chloromethane	0.5	2
Dichlorobromo-methane	0.5	2
Dichloromethane	0.5	2
Ethylbenzene	0.5	2
Tetrachloroethene	0.5	2
Toluene	0.5	2
trans-1,2 Dichloroethylene	0.5	1
Trichloroethene	0.5	2
Vinyl Chloride	0.5	2

*The normal method-specific factor for these substances is 1, therefore the lowest standard concentration in the calibration curve is equal to the above ML value for each substance.

Table V-12 – SEMI-VOLATILE SUBSTANCES*	GC ML µg/L	GCMS ML µg/L	LC ML µg/L	COLOR ML µg/L
1,2 Benzanthracene	10	5		
1,2 Dichlorobenzene (semivolatile)	2	2		
1,2 Diphenylhydrazine		1		
1,2,4 Trichlorobenzene	1	5		
1,3 Dichlorobenzene (semivolatile)	2	1		
1,4 Dichlorobenzene (semivolatile)	2	1		
2 Chlorophenol	2	5		
2,4 Dichlorophenol	1	5		
2,4 Dimethylphenol	1	2		
2,4 Dinitrophenol	5	5		
2,4 Dinitrotoluene	10	5		
2,4,6 Trichlorophenol	10	10		
2,6 Dinitrotoluene		5		
2- Nitrophenol		10		
2-Chloroethyl vinyl ether	1	1		
2-Chloronaphthalene		10		
3,3’ Dichlorobenzidine		5		
3,4 Benzofluoranthene		10	10	
4 Chloro-3-methylphenol	5	1		
4,6 Dinitro-2-methylphenol	10	5		
4- Nitrophenol	5	10		
4-Bromophenyl phenyl ether	10	5		
4-Chlorophenyl phenyl ether		5		
Acenaphthene	1	1	0.5	
Acenaphthylene		10	0.2	
Anthracene		10	2	
Benzidine		5		
Benzo(a) pyrene(3,4 Benzopyrene)		10	2	
Benzo(g,h,i)perylene		5	0.1	
Benzo(k)fluoranthene		10	2	
bis 2-(1-Chloroethoxyl) methane		5		
bis(2-chloroethyl) ether	10	1		
bis(2-Chloroisopropyl) ether	10	2		
bis(2-Ethylhexyl) phthalate	10	5		
Butyl benzyl phthalate	10	10		
Chrysene		10	5	
di-n-Butyl phthalate		10		
di-n-Octyl phthalate		10		
Dibenzo(a,h)-anthracene		10	0.1	

Table V-12 – SEMI-VOLATILE SUBSTANCES*	GC ML µg/L	GCMS ML µg/L	LC ML µg/L	COLOR ML µg/L
Diethyl phthalate	10	2		
Dimethyl phthalate	10	2		
Fluoranthene	10	1	0.05	
Fluorene		10	0.1	
Hexachloro-cyclopentadiene	5	5		
Hexachlorobenzene	5	1		
Hexachlorobutadiene	5	1		
Hexachloroethane	5	1		
Indeno(1,2,3,cd)-pyrene		10	0.05	
Isophorone	10	1		
N-Nitroso diphenyl amine	10	1		
N-Nitroso-dimethyl amine	10	5		
N-Ntiroso -di n-propyl amine	10	5		
Naphthalene	10	1	0.2	
Nitrobenzene	10	1		
Pentachlorophenol	1	5		
Phenanthrene		5	0.05	
Phenol**	1	1		50
Pyrene		10	0.05	

*With the exception of phenol by colorimetric technic, the normal method-specific factor for these substances is 1000, therefore the lowest standard concentration in the calibration curve is equal to the above ML value for each substance multiplied by 1000.

**Phenol by colorimetric technic has a factor of 1.

Table V-13 – INORGANICS*	FAA ML µg/L	GFAA ML µg/L	ICP ML µg/L	ICPMS ML µg/L	SPGFAA ML µg/L	HYDRIDE ML µg/L	CVAA ML µg/L	COLOR ML µg/L	DCP ML µg/L
Antimony	10	5	50	0.5	5	0.5			1000
Arsenic		2	10	2	2	1		~~25~~ 20	1000
Beryllium	20	0.5	2	0.5	1				1000
Cadmium	10	0.5	10	0.2	0.5				1000
Chromium (total)	50	2	10	0.5	1				1000
Chromium VI	5							10	
Copper	20	5	10	0.5	2				1000
Cyanide								5	
Lead	20	5	5	0.5	2				10,000
Mercury				0.5			0.2		
Nickel	50	5	20	1	5				1000
Selenium		5	10	2	5	1			1000
Silver	10	1	10	0.2	2				1000
Thallium	10	2	10	1	5				1000
Zinc	20		20	1	10				1000

*The normal method-specific factor for these substances is 1, therefore the lowest standard concentration in the calibration curve is equal to the above ML value for each substance.

Table V-14 - PESTICIDES – PCBs*	GC ML µg/L
4,4’-DDD	0.05
4,4’-DDE	0.05
4,4’-DDT	0.01
a-Endosulfan	0.02
a-Hexachloro-cyclohexane	0.01
Aldrin	0.005
b-Endosulfan	0.01
b-Hexachloro-cyclohexane	0.005
Chlordane	0.1
d-Hexachloro-cyclohexane	0.005
Dieldrin	0.01
Endosulfan Sulfate	0.05
Endrin	0.01
Endrin Aldehyde	0.01
Heptachlor	0.01
Heptachlor Epoxide	0.01
Lindane(g-Hexachloro-cyclohexane)	0.02
PCB 1016	0.5
PCB 1221	0.5
PCB 1232	0.5
PCB 1242	0.5
PCB 1248	0.5
PCB 1254	0.5
PCB 1260	0.5
Toxaphene	0.5

*The normal method-specific factor for these substances is 100, therefore the lowest standard concentration in the calibration curve is equal to the above ML value for each substance multiplied by 100.

Techniques:

GC - Gas Chromatography
GCMS - Gas Chromatography/Mass Spectrometry
HRGCMS - High Resolution Gas Chromatography/Mass Spectrometry (i.e., EPA 1613, 1624, or 1625)
LC - High Pressure Liquid Chromatography
FAA - Flame Atomic Absorption
GFAA - Graphite Furnace Atomic Absorption
HYDRIDE - Gaseous Hydride Atomic Absorption
CVAA - Cold Vapor Atomic Absorption
ICP - Inductively Coupled Plasma
ICPMS - Inductively Coupled Plasma/Mass Spectrometry
SPGFAA - Stabilized Platform Graphite Furnace Atomic Absorption (i.e., EPA 200.9)
DCP - Direct Current Plasma
COLOR - Colorimetric

Note that the MLs presented in these tables were based on the actual lowest analytical standards used by laboratories. The ML concentrations in these tables represent pollutant concentrations in water samples after the method-specified sample weights, volumes, and processing steps have been followed. Often, a water sample is concentrated or diluted prior to detection by the analytical instrument. Analytical calibration standards, in contrast, are not usually concentrated or diluted before detection by the instrument, but mixed directly from a reference solution and detected by the instrument.

Samples analyzed for semi-volatiles in the statewide survey were most commonly concentrated 1,000 times prior to detection; samples analyzed for pesticides were most commonly concentrated 100 times prior to detection. For this reason, laboratory analysts wishing to calibrate their instruments will need to multiply the statewide ML by an appropriate multiplier in order to determine the calibration standard concentration. Footnotes in Tables V-11 and through V-14 indicate the most common multiplier to use in order to convert the ML concentration into a calibration standard concentration.

Reporting Protocols for Compliance Monitoring

Results of compliance monitoring can be reported based on where the sample concentration is relative to the statewide ML and the laboratory's MDL. Three reporting levels are possible:

1. Sample results greater than or equal to the ML could be reported as measured by the laboratory (i.e., the measured pollutant concentration in the sample);
2. Sample results less than the ML but greater than or equal to the laboratory's MDL (as defined in the Ocean Plan) could be reported as Detected, But Not Quantified, or DNQ. The MDL should still be reported. This designation readily emphasizes that a sample detected within this range of concentrations, although detectable, is unreliable for compliance determination; and
3. Sample results less than the laboratory MDL could be reported as Not Detected, or ND. The MDL would continue to be reported.

Compliance Determination Using Minimum Levels

The certainty associated with accurately quantifying a sample's pollutant concentration decreases as the pollutant concentration decreases towards the MDL. Conversely, there is a high degree of certainty in concluding that a monitoring sample is out of compliance when the pollutant concentration is greater than the effluent limitation and greater than or equal to the statewide ML.

Compliance should be based on the situation having the higher degree of certainty. Using this concept, a discharger would be deemed out of compliance when the pollutant concentration in the sample exceeds the effluent limitation and is greater than or equal to the ML. Although this strategy will give the benefit of the doubt to the discharger, this will eliminate out of compliance determinations based on unreliable or poorly quantified analytical data (e.g., some pollutant concentration lower than the statewide ML). Additionally, this strategy will provide certainty whenever a sample is found to be out of compliance.

To reiterate, compliance with single-constituent effluent limitations using MLs can be determined by considering this general rule:

Dischargers shall be out of compliance with the calculated effluent limitation if the concentration of the constituent of concern in the monitoring sample is greater than the calculated effluent limitation and greater than or equal to the statewide ML. If the calculated effluent limitation is less than the ML and sample results are reported as DNQ, the discharger shall be required to conduct a Pollutant Minimization Program to characterize the effluent *when there is evidence that the constituent is present in the effluent above the calculated effluent limitation.* If the calculated effluent limitation is less than the MDL and sample results are reported as ND, the discharger shall also be required to conduct a Pollutant Minimization Program when there is evidence that the constituent is present in the effluent above the calculated effluent limitation. Additionally, the procedures discussed below for determining compliance using multiple samples could be incorporated.

ML-based Compliance Determination using Multiple Samples

Discharge monitoring programs are often designed to collect and measure a single sample during the compliance monitoring period. This is the least costly monitoring strategy. However, effluent discharges are inherently variable in their pollutant concentrations over time. Multiple samples may provide a better understanding of this variability. Some permits require an increased sampling frequency when a single sample shows an "out of compliance" condition.

Multiple samples collected during an allowable averaging period (e.g., a 30-day average limitation) may include sample results reported as ND or DNQ. These unquantified reporting levels are not easily incorporated into an overall average value since the left side of the true distribution is "censored"; it is usually "not appropriate" to calculate the arithmetic mean for such "ordinal" data (Zar 1984). Data on an ordinal scale of measurement may be ordered or ranked using relative, rather than quantitative, differences.

Many methods have been developed to estimate the mean of data that includes results reported as ND (Clark 1998). A commonly used method is to substitute zero, or the MDL, or one-half the MDL whenever the sample result is ND. These substitution methods attempt to assign a real number to the ND result in order to allow the mean to be calculated. The substituted number, however, may be arbitrarily chosen and could unduly influence the determination of compliance.

A different approach is possible. Since the three reporting levels can objectively be ranked from lowest to highest concentration (ND, DNQ, and "as measured"), a more appropriate measure of central tendency for these type of data is the median. The median is the middle measurement in a set of data (Zar 1984) and can be used for data on the ordinal measurement scale. Therefore, the median could be used to estimate the central tendency of the constituent of concern if a set of multiple samples contain results reported as ND or DNQ. This approach would avoid the need to substitute a numeric value for the censored datum.

Finding the median value for a set of samples is straightforward when there is an odd number of samples. For example, if three measurements are reported as {DNQ, 12.5, 25}, the median would be the second result of 12.5 ug/L. Finding the median with an even number of samples that could include ordinal data requires an averaging of the two middle values. For example, if one additional sample was collected and found to be 20 ug/L, the median of {DNQ, 12.5, 20, 25} would be ½(12.5 + 20) or 16.3. However, if the additional sample was ND, the median of {ND, DNQ, 12.5, 25} is not readily apparent. We must, in this case, set up a logic rule as follows: If, in an even number of samples, one or both of the middle values is ND or DNQ, the median concentration shall be considered to be the lower of the two middle values. In this example, the central tendency of the entire data set is represented by the actual sample result of DNQ. For compliance determination purposes, the primary concern is to determine when compliance with an effluent limitation is achieved rather than to estimate the true mean value of the data set (i.e., the numerical concentration).

If all of the samples are reported in the quantifiable range (i.e., greater than or equal to the ML), other appropriate measures of central tendency (arithmetic mean, geometric mean, etc.) may be compared to the effluent limitation to assess compliance.

<u>Pollutant Minimization Programs</u>

Section 5.73 of the U.S. EPA Technical Support Document for Water Quality-Based Toxics Control (U.S. EPA 1991) reads:

> *Where water quality-based limits below analytical detection levels are placed in permits, EPA recommends that special conditions also be included in the permit to help ensure that the limits are being met and that excursions above water quality standards are not occurring.*

These special permit conditions were expressed as Pollutant Minimization Programs (PMP) in the Water Quality Guidance for the Great Lakes (U.S. EPA 1995a). The Great Lakes Final Rule (40 CFR Part 132) requires the discharger to "develop and conduct a PMP for each pollutant with a WQBEL [water quality-based effluent limitation] below the quantification level" (i.e., the Minimum Level). U.S. EPA maintains that such a program is necessary because monitoring data may not always be sufficient to ensure that effluent limitations set below the ML are being attained.

A PMP, however, does not necessarily need to be incorporated into the permit, by default, when the effluent limitation is set below the ML. A more prudent policy would require a PMP only when evidence exists that the pollutant is present in the effluent above the calculated effluent limitation and the effluent limitation is lower than the ML. Evidence may include fish consumption advisories for the receiving waters, sample results from more sensitive methods, the presence of whole effluent toxicity, or benthic and aquatic organism tissue sampling results.

The fundamental problem is that MDLs and the statewide MLs are, for some pollutants, high in magnitude relative to water quality objectives for some pollutants, especially carcinogens. Federal regulations at 40 CFR 122.44(d)(1)(iii), however, require that any discharge that has the "reasonable potential" to exceed the State water quality objective must contain an effluent limitation for that pollutant. The Clean Water Act makes no exception to this, even when technological limits prevent the quantification of the pollutant.

III. ALTERNATIVES FOR SWRCB ACTION

Alternative 1. No action. If no new requirements for reporting levels are described in the implementation policy, then RWQCBs will continue to accept analytical data according to current discharge permit requirements. These requirements vary from region to region. Even within a region, reporting levels may not be consistent from one discharger to the next because dischargers interpret the reporting level requirements differently.

Alternative 2. Require that the reporting levels for compliance determination be the PQL or MDL. The specific approach taken would be determined by the amount of available laboratory performance data. Use of the PQL presents several problems. As noted above, the term has more than one definition and there is no agreement as to which is preferred. The definition used in the Ocean Plan was based on a U.S. EPA definition and was considered appropriate for use at the time it was adopted in 1990. However, the U.S. EPA has not developed the interlaboratory data necessary to identify a PQL for each of the priority pollutants. Also, the use of this reporting level has fallen somewhat into disfavor because of the lack of these data.

The MDL has an inherent problem in its definition. It is based on the lowest concentration above zero that can be detected with 99% confidence, a value too low to be reliably quantified.

Alternative 3. Require that the reporting levels for compliance determination be the MLs based on the SWRCB laboratory survey. Under this alternative, ~~MLs would be listed in the Policy, and the Policy~~ the statewide MLs assembled by SWRCB staff would be used for compliance determinations. The SWRCB would recognize that (1) analytical detection capability will improve over time, which would allow for lowering of reporting levels, and (2) there is a need to collaboratively test these new detection capabilities before new reporting levels and, subsequently, effluent limitations are established. This alternative meets the goal that acceptable reporting levels must be based on the lowest concentrations that can be measured by laboratories within known levels of precision and accuracy. Further, ML concentrations are routinely established by laboratories, which means that this information is readily available and would not require a special interlaboratory performance study. The list of MLs would be added to Appendix 2 of the proposed Policy and would not change until modified by a subsequent amendment to the Policy.

~~In order to determine ML values for each substance, the SWRCB's Quality Assurance Program conducted an ML study in 1997. This study requested existing laboratory data relative to the lowest routine calibration standard employed by the laboratory in combination with the analytical method for the substance. These ML values are presently being compiled and verified, and will soon be made public in a supplementary document.~~

~~In situations where the concentration of a regulated substance falls below the ML, but above the MDL for that substance, the RWQCB would stipulate multiple analyses of each sample followed by computation of a selected mean and confidence interval from the analytical results.~~

Alternative 4. Require that reporting levels for compliance determination based on U.S. EPA MLs. MLs for two highly sensitive methods (1624 and 1625) are currently listed in 40 CFR 136. For other analytical methods, the U.S. EPA has tentatively recommended the use of "interim MLs." The Draft National Guidance for the Permitting, Monitoring, and Enforcement of Water Quality-based Effluent Limitations set below Analytical Detection Limits (U.S. EPA 1994b) defines interim MLs as: "The interim ML is calculated when a method specified ML does not exist. It is equal to 3.18 times the method-specified MDL rounded to the nearest multiple of 1, 2, 5, 10, 20, 50, etc. The interim ML should be used until an analytically developed ML can be established." Staff in the Division of Water Quality (DWQ) have determined that the methods for which MLs are published in the federal regulations are not being used by most laboratories in California for wastewater analysis. Thus, in adopting the MLs for these methods, laboratories would need to invest a great amount of time and expense. In contrast, the statewide MLs derived by DWQ staff are representative of the conditions and methods currently used in California for wastewater analysis.

Alternative 5. Require that reporting levels based on MLs developed from a controlled interlaboratory study. This alternative involves conducting an in-depth performance study of laboratories in California. The objective of such a study would be to develop an interlaboratory quantification level. SWRCB staff would need to provide laboratory standards for 126 priority pollutants to approximately 160 laboratories qualified for wastewater analysis using many different analytical methods. Staff in the DWQ believe that the time and financial costs of such a study would be large. A study of this magnitude would be best conducted by a joint effort of other concerned groups such as the American Chemical Society, American Society for Testing and Materials, and the U.S. EPA.

IV. STAFF RECOMMENDATION

Adopt Alternative 3.

CHAPTER 3 2,3,7,8-TCDD EQUIVALENTS

I. PRESENT STATE POLICY

Amendments to the Ocean Plan, adopted by the SWRCB under Resolution No. 90-27 on March 22, 1990 (SWRCB 1990a), established a water quality objective of 0.0039 picograms per liter (pg/l) for TCDD equivalents. TCDD equivalents are defined as the sum of the concentrations of seven chlorinated dibenzodioxins (2,3,7,8-CDDs) and ten chlorinated dibenzofurans (2,3,7,8-CDFs) multiplied by their individual toxicity factors.

The SWRCB adopted the Ocean Plan TCDD equivalents water quality objective based on the U.S. EPA criterion for 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (2,3,7,8-TCDD), a criterion which considers cancer potency, cancer risk level, bioconcentration, and average fish (including shellfish) consumption rates. However, based upon California Department of Health Services recommendation, the Ocean Plan TCDD equivalents objective adjusted the U.S EPA criterion to reflect California-specific fish consumption rates, and was adopted as TCDD equivalents, which takes into consideration the toxicity of similar, structurally related 2,3,7,8-CDDs and 2,3,7,8-CDFs. The SWRCB was challenged in court on the inclusion of the equivalence factors as part of the water quality objective. The court upheld the SWRCB process to develop the TCDD water quality objective and application of the objective to the equivalents.

While none of the RWQCBs have adopted water quality objectives for TCDD equivalents, the San Francisco Bay RWQCB has included TCDD equivalents as effluent limits in some waste discharge requirements and is monitoring TCDD equivalents in other discharges.

II. ISSUE DESCRIPTION

CDDs and CDFs represent two families of chemicals, chlorodibenzo-*p*-dioxins (dioxins), and chlorodibenzo-*p*-furans (furans), respectively, which, taken together, comprise over 200 closely related compounds. Dioxins and furans generally occur in the environment as mixtures of various congeners; that is, they rarely appear individually. Dioxins and furans containing chlorine at the 2,3,7 and 8 positions are some of the most toxic substances in existence; additionally, they are environmentally persistent, they bioaccumulate, and some are probable human carcinogens. The dioxin compound that is best studied and considered the most toxic is 2,3,7,8-TCDD.

The proposed CTR water quality criteria (freshwater and saltwater) for 2,3,7,8-TCDD are less stringent than the existing Ocean Plan water quality objective for TCDD equivalents for ~~two~~ the following reasons:

1. ~~One of the bases for criteria development, that is, the fish consumption rate used in calculating the freshwater and saltwater criteria; and~~ Use of a different fish consumption rate, which is one of the bases for calculating fresh water and salt water criteria; and

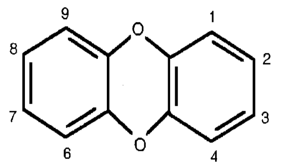
2. U.S. EPA's application of the information,; specifically, it did not consider the toxicity of the 2,3,7,8-TCDD congeners.

The proposed CTR criteria for all carcinogens, including 2,3,7,8-TCDD, are based on five factors: cancer potency, cancer risk level, bioconcentration factor, average sea food consumption rate, and the average adult weight. Three of the factors, fish consumption rate, cancer risk level, and average adult weight are constant factors; that is, they are the same used for calculation of criteria for any carcinogenic chemical compound. The SWRCB used the U.S. EPA's method to calculate the Ocean Plan water quality objective for TCDD equivalents, using the same constant and variable factors, except for a higher fish consumption rate. To calculate the CTR water quality criteria for dioxin, the U.S. EPA used a fish consumption rate of 6.5 grams per day (g/day) per person, roughly equivalent to one (7 ounce) or two (3.5 ounce) meal(s) a month. U.S. EPA 1991 lists a range of fish consumptions rates from 6.5 g/day to 180 g/day. As noted above under "Present State Policy", the SWRCB, in adopting the Ocean Plan, used the Department of Health Services recommended fish consumption rate of 23 g/day per person. This higher rate still may not be high enough to represent the amount of fish eaten by Californians such as recreational and subsistence level fishermen.

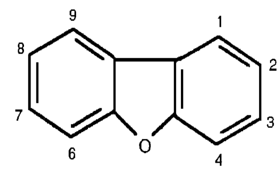
The fish consumption rate is important because (1) it represents a direct route of exposure, particularly for any pollutant that accumulates in fish and shellfish, and (2) food consumption is believed to be the primary route of exposure to dioxin for humans. Fish consumption rates for establishing water quality criteria take into consideration the amount of pollutants that fish and shellfish are exposed to, the type of fish species, the type of fish tissue, and the tissue lipid content. Compared to the Ocean Plan fish consumption rate, the U.S. EPA fish consumption rate results in a more lenient CTR criterion, one that may not adequately protect human health in this State. The arguments regarding fish consumption rates extend to all criteria for bioaccumulative pollutants. (Fish consumption rate is a variable which directly affects protection of human health.) Additional information will be available when the California Office of Environmental Health Hazard Assessment (OEHHA) releases its report reviewing fish consumption rates within the State. The revised final draft report will be issued for public comment early in 2000, and issued as a final report subsequent to the public review.

The second issue of concern regarding the CTR criteria is particular to dioxin. The draft CTR proposes to promulgate criteria for only the 2,3,7,8-TCDD congener. However, in the CTR preamble, the U.S. EPA indicates its continued support and approval of the SWRCB's previous adoption of TCDD equivalents in the rescinded ISWP/EBEP. The concept of applying the criterion for the most toxic form of CDD to include less toxic congeners is not new for dioxins and furans. For example, the U.S. EPA criterion for polychlorinated biphenyls (PCBs), a group of 209 different PCB congeners, has been based on commercial mixtures, not on a single PCB compound.

The SWRCB, in adopting the Ocean Plan water quality objective for TCDD equivalents, first calculated a water quality objective for 2,3,7,8-TCDD, then applied the concept of equivalents, assuming that the toxic equivalent factors (for humans/mammals) would represent the relative potency of the CDDs and CDFs (SWRCB 1990b). The approach remains sound, as it is based upon the molecular structure of the CDDs and CDFs.



CDD



CDF

Briefly, the presence of chlorine at the 2, 3, 7, and 8 positions on the ring structures is related to the toxicity of these compounds. Seventeen of the CDD and CDF congeners have chlorine at all four of the 2, 3, 7, and 8 positions. These 17 are structurally very similar, and have similar physical and chemical properties (U.S. EPA 1985). The structural similarities of these congeners result in similar health effects (including health effects other than cancer) due, in part, to their ability to bind with the protein, aryl hydrocarbon (Ah) receptor, initiating effects on gene activity at the cellular level. This type of structure-activity relationship is pharmacologically sound, and has been clearly demonstrated for dioxin and dioxin-like compounds (SWRCB 1990b). The North Atlantic Treaty Organization Committee on Challenges of Modern Society used this relationship to establish the International Toxic~~ity~~ Equivalency Factors (TEFs) which standardize estimates of relative toxicity and cancer potency for the CDD and CDF congeners relative to the toxicity of 2,3,7,8-TCDD, the most potent congener.

Research published since SWRCB adoption of the Ocean Plan TCDD equivalents water quality objectives indicates that the basis for the toxic equivalency factor approach (namely, that the structure-activity relationships may be used to establish relative levels of toxicity and carcinogenicity) remains unchanged. Recent studies of dioxin and dioxin-related compounds (1) indicate additivity of CDD and CDF congeners (Birnbaum et al. 1995, Nagao et al. 1993, Schrenk et al. 1994), (2) confirm the principle of toxic equivalency factors with refinement of individual factors (Nagao et al. 1993, Rozman et al. 1993), and (3) tend to confirm that dioxin-related compounds are probable human carcinogens.

Further, other dioxin-like compounds, such as bromine substituted congeners (Safe 1990) and co-planer PCBs (Ahlborg et al. 1994, Birnbaum et al. 1995, Safe 1990) also exhibit dioxin-like toxicity.

At a June 1997 meeting held in Stockholm, participants in a World Health Organization (WHO) expert meeting on TEFs revised three human/mammalian TEFs. The new TEFs are as follows, by congener: 1,2,3,7,8-pentaCDD, 1.0 (formerly 0.5); octaCDD and octaCDF, 0.0001 for each congener (formerly 0.001). The WHO expert meeting participants also developed a list of CDD and CDF TEFs for fish and for birds, in addition to listing TEFs for twelve "dioxin-like" PCBs in all three categories (humans/mammals, fish, and birds. The U.S. EPA currently is reassessing the sources, toxicity, and environmental fate of dioxin. This reassessment, which began in 1994, is planned for completion, including peer review and U.S. EPA Science Advisory Board review, in 2000.

~~In a separate activity, the U.S. EPA is proposing to add a chemical category that includes dioxin and 27 dioxin-like compounds to the list of toxic chemicals subject to the reporting requirements under the Emergency Planning and Community Right to Know Act (EPCRA) of 1986 (Federal Register, Vol. 64. No. 2, Jan. 5, 1999, pages 688-729). The chemicals include seven CDDs, 10 CDFs, and 11 PCBs. The U.S. EPA also is proposing to modify the existing EPCRA Section 313 listing for PCBs to exclude those PCBs that are included in the proposed dioxin and dioxin-like compounds category. A study of these substances in San Francisco Bay fish (white croaker, striped bass, shiner surf perch, leopard shark, and halibut) has shown that the dioxin-like PCB concentrations are much greater than the concentrations of CDDs and CDFs (San Francisco Bay RWQCB 1995, Contaminant Levels In Fish Tissue From San Francisco Bay, Final Report).~~

A problem with regulating CDDs and CDFs is that they appear to be ubiquitous, which presents a challenge to those responsible for controlling sources. San Francisco Bay RWQCB staff has estimated the following relative mass discharges of CDDs/CDFs to San Francisco Bay: (1) storm runoff, 67%; (2) air deposition to water, 31%; (3) sewage treatment plants, 2%; and (4) refineries, 0.05%. If aerial deposition is not taken into consideration, the staff estimates that storm runoff accounts for 98% of this CDD/CDF input to the Bay. These estimates are preliminary, and more data must be gathered to refine the percentages. For example, Dwain Winters (U.S. EPA, personal communication) in a January 20, 2000 presentation to a public forum in Oakland, California, noted that air deposition is a major source of dioxin in soil, and that soil erosion is a major source of dioxin in water.

III. ALTERNATIVES FOR SWRCB CONSIDERATION

Alternative 1. No action. This alternative could result in the RWQCBs implementing the draft CTR criteria for 2,3,7,8-TCDD for only one of the dioxin~~s~~ congeners. Further, the criteria for inland water and enclosed bays and estuaries would be less stringent than the water quality objective for ocean waters for two reasons: (1) the objective would not apply to all 2,3,7,8-TCDD congeners, and (2) a lower fish consumption rate was used to calculate the criteria. These lower water quality criteria could pose a problem for dischargers discharging to inland surface waters or, more particularly, to enclosed bays or estuaries if they had to ensure not only that their effluent meets the requirements of the immediate receiving water body, but also that their effluent quality would not cause or contribute to a violation of the water quality objective downstream in the ocean.

This alternative is inconsistent with the precedent set by the Ocean Plan, in that the CTR criteria will set a lower level of protection of human health because a lower fish consumption value is used (i.e., 6.5 g/day compared with 23 g/day for the Ocean Plan); however, the RWQCBs have the option of adopting effluent limitations more stringent than required by the criteria if (1) they have substantial evidence that more stringent effluent and receiving water limits are necessary to protect beneficial uses, or (2) to ensure that downstream receiving water standards are met. Such permit limits could be based in part on a regional fish consumption rate. Also, criteria the CTR implemented for 2,3,7,8-TCDD alone does not consider the toxic effects of the other congeners. However, this alternative would be the easiest for dischargers to meet.

Alternative 2. Implement the CTR criteria for 2,3,7,8-TCDD as TCDD equivalents. Under this alternative, the CTR criteria would be applied to all of the 17 CDD and CDF congeners chlorinated at the 2, 3, 7, and 8 positions. This application of the CTR criteria would be consistent with the Ocean Plan water quality objective for TCDD equivalents. Interpretation of the CTR 2,3,7,8-TCDD criteria as equivalents is supported by the structural-activity relationship, relative toxicity, additivity of the congeners, and common practice. Like Alternative 1, this alternative is inconsistent with the precedent set by the Ocean Plan, in that the CTR criteria will set a lower level of protection of human health because a lower fish consumption value is used.

Overall, this alternative is consistent with the goal of SWRCB to first implement the CTR criteria and then, in Phase 2 of ISWP/EBEP, to adopt water quality objectives for priority pollutants. It is anticipated that the revised TEFs and the appropriate fish consumption rates would be considered at that time.

Alternative 3. Adopt a water quality objective for 2,3,7,8-TCDD equivalents. Under this alternative, the CTR criteria for 2,3,7,8-TCDD would be adopted as TCDD equivalents objectives, adjusted to incorporate a California-specific fish consumption rate. This approach would be consistent with the Ocean Plan. Because selection of an appropriate fish consumption rate affects more than one pollutant covered in the CTR, it is appropriate to defer this issue to Phase 2 of the ISWP/EBEP.

Alternative 4. Implement the CTR criteria for 2,3,7,8-TCDD as 2,3,7,8-TCDD only, and require monitoring of all 17 congeners by NPDES dischargers and, as appropriate, other dischargers. Under this alternative, effluent limitations based on the CTR criteria for 2,3,7,8-TCDD would be established in WDRs if reasonable potential is determined. The RWQCB would adopt an order to amend the monitoring provisions of NPDES permits (and non-NPDES permits, if appropriate) to require that dischargers monitor the discharged effluent to assess the presence and amounts of the congeners being discharged to inland surface waters, enclosed bays, and estuaries in the State.

The monitoring requirement would include determining the sum of the concentrations of the congeners, multiplied by their respective TEFs.

Based on the monitoring results, the RWQCB may, at its discretion, increase the monitoring requirement (e.g., increase sampling frequency) to further investigate frequent or significant detections of any congener.

The congeners appear to be ubiquitous, and the sources and control measures are uncertain. Monitoring during the interim period would provide information needed to appropriately address this issue in Phase 2. The technical reports submitted by dischargers would be considered by the SWRCB in establishing water quality objectives for 2,3,7,8-TCDD and other congeners in Phase 2 of ISWP/EBEP development.

IV. STAFF RECOMMENDATION

Adopt Alternative 4.

CHAPTER 4 - TOXICITY CONTROL PROVISIONS

The intent of a chronic toxicity objective is to prevent harmful effects of pollutants on the survival, growth, and reproduction of aquatic life in surface waters. Toxicity testing to assess chemical pollution provides information unavailable from chemical analysis of water samples. Toxicity tests directly measure the effects of effluent or ambient water on the species tested. They also measure the aggregate toxicity of all constituents in complex mixtures, including chemicals for which there are no water quality objectives.

An assumption behind toxicity testing is that test results can predict aquatic ecosystem impairments. This assumption is supported by a preponderance of published evidence (U.S. EPA 1991; Waller et al. 1996; Dickson et al. 1996; de Vlaming 1997).

This chapter discusses: (1) a chronic toxicity objective; (2) a set of test methods to measure compliance with the objective; and (3) an enforcement approach that emphasizes corrective action. These three topics are covered in Chapters 4.1 through 4.3, respectively.

CHAPTER 4.1 CHRONIC TOXICITY OBJECTIVE

I. PRESENT STATE POLICY

Currently, there is no statewide toxicity objective for California's inland surface waters, enclosed bays, and estuaries. However, all of the RWQCB basin plans contain toxicity objectives, which generally require that all waters be free of toxic substances in toxic amounts. These toxicity objectives and their associated implementation policies vary among the RWQCBs.

The North Coast Basin Plan toxicity objective is typical. It states:

> "All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life. Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration, or other appropriate methods as specified by the Regional Water Board.
>
> "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**, 18th Edition (1992). As a minimum, compliance with this objective as stated in the previous sentence shall be evaluated with a 96-hour bioassay."

Toxicity objectives in most other basin plans closely resemble the objective of the North Coast Basin Plan. Main differences are outlined below.

The San Francisco Bay Basin Plan toxicity objective is more detailed than most. This toxicity objective states:

> "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 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."

The Los Angeles Basin Plan resembles the North Coast Basin Plan, but also covers chronic toxicity as follows:

> "There shall be no chronic toxicity in ambient waters outside mixing zones. To determine compliance with this objective, critical life stage tests for at least three species with approved testing protocols shall be used to screen for the most sensitive species. The test species used for screening shall include a vertebrate, an invertebrate, and an aquatic plant. The most sensitive species shall then be used for routine monitoring. Typical endpoints for chronic toxicity tests include hatchability, gross morphological abnormalities, survival, growth, and reproduction."

The toxicity objectives of the Santa Ana Basin Plan are substantially different from the North Coast toxicity objective. The following is the Santa Ana Basin Plan toxicity objective for enclosed bays and estuaries:

> "Toxic substances shall not be discharged at levels that will bioaccumulate in aquatic resources to levels which are harmful to human health.

> "The concentrations of toxic substances in the water column, sediment or biota shall not adversely affect beneficial uses."

The Santa Ana Basin Plan toxicity objective for inland surface waters contains the above language and the following phrase:

> "The concentrations of contaminants in waters which are existing or potential sources of drinking water shall not occur at levels which are harmful to human health."

Chronic toxicity is regulated for all discharges within the jurisdiction of the Ocean Plan. The chronic toxicity objective in the Ocean Plan is 1 TU_c as a daily maximum.

The Ocean Plan defines TU_c (Toxic Units Chronic) as 100/NOEL. NOEL (No Observed Effect Level) "is expressed as the maximum percent effluent or receiving water that causes no observable effect on a test organism, as determined by the result of a critical life stage toxicity test...."

II. ISSUE DESCRIPTION

Beneficial use designations pertaining to aquatic habitat apply to the majority of surface waters in California. The application of a chronic toxicity objective to these waters should help ensure the protection of these beneficial uses. Along with an implementation program, including a standard set of toxicity tests to measure compliance, efforts to protect aquatic life from toxicity should become more consistent and uniform throughout the State.

An objective for chronic toxicity could take either a narrative or a numerical form. The objective would apply outside any designated mixing zone (discussed in Chapter 1.2.2).

The rescinded ISWP and EBEP contained the following objective for chronic toxicity:

> "There shall be no chronic toxicity in ambient waters outside mixing zones. The water quality objective for chronic toxicity is 1.0 TU_c as a daily average."

The ISWP and EBEP further stated: "Chronic toxicity, expressed as TU_c, equals 100/NOEL. NOEL (No Observed Effect Level) is the maximum percent test water that causes no observed effect on a test organism, as determined in a critical life stage toxicity test listed in Table 4."

The Toxicity Task Force met and discussed the issue of a toxicity objective. A majority of the task force members preferred a uniform statewide objective, expressed as a narrative, and detailed implementation procedures. Six out of eleven stakeholder representatives supported the following narrative objective:

> "Surface waters outside of any allowed mixing zones shall be free from lethal or sublethal toxicity in amounts which impair designated aquatic resource beneficial uses. Aquatic life community structures and function shall not be degraded by toxic discharges."

The stakeholders representing Agriculture and Storm Water supported the following narrative objective:

> "Surface waters outside of any mixing zones shall be free from lethal or sublethal toxicity in amounts which impair designated aquatic resource beneficial uses."

The Agricultural Waters Task Force developed a recommendation on a narrative objective for toxicity which includes language similar to the Central Valley Basin Plan's toxicity objective. The task force's proposed toxicity objective also contained language delineating the type of waters to which it should be applied.

Those Toxicity Task Force members in favor of a narrative toxicity objective suggested that it would allow for flexibility in implementation of the objective. A narrative objective allows for options other then setting numeric permit limits for effluent toxicity. Toxicity Task Force members concluded that "Adoption of a narrative objective with distinct implementation steps potentially increases the array of permitting possibilities and available responsive actions". Some task force members were of the opinion that a numeric toxicity objective would leave permitted dischargers with "little or no incentive to extend monitoring beyond attempts to comply with individual permit limits, whereas implementation of a narrative objective to protect surface waters in a given watershed would incorporate monitoring beyond end of pipe." Most task force members felt that the adoption of a narrative toxicity objective would facilitate watershed management and assist in application of the toxicity objective to nonpoint sources of pollution.

The Department of Fish and Game (DFG) representative and some RWQCB staff favored a numeric chronic toxicity objective, because it would "...provide adequate, uniform and consistent protection of aquatic life in California..." These members stated that "where beneficial uses are impaired, it is far easier for Regional Boards to pursue corrective actions where numeric objectives are in place." They also suggested that it would "set an explicit level where aquatic life and their beneficial uses are affected by pollution". These task force members contended that it would "simplify enforcement and compliance procedures" because it would be simple to identify violations. The need for flexibility "could be introduced in implementation of permit limits by the use of average values and/or maximum magnitude level, by varying the points of application, and by setting compliance procedure to eliminate toxicity".

III. ALTERNATIVES FOR SWRCB ACTION

Alternative 1. No action. The RWQCBs would continue to apply their existing toxicity objectives contained in the basin plans. This alternative would ~~allow~~ retain RWQCBs ~~the~~ flexibility to determine what toxicity objective is best suited to their region, but would not address Toxicity Task Force members' concerns about inconsistency of the varied objectives in the basin plans. All of the existing basin plan toxicity objectives are narrative objectives and have been approved by the U.S. EPA.

Alternative 2. Adopt a narrative toxicity objective. Toxicity Task Force members concluded that a narrative toxicity objective would allow for flexibility in implementation. The adoption of a narrative objective was considered by most task force members to allow for a variety of permitting approaches and response actions to deal with specific water body types. A ~~single statewide~~ narrative toxicity objective would allow for the development of a statewide implementation program that deals with task force concerns about the variability of toxicity test results~~. A single statewide toxicity objective would also allow a statewide implementation policy~~ and, as recommended by all Toxicity Task Force members, that deals with solutions to toxicity problems and not just enforcement actions. A statewide implementation program for toxicity could be applied to a statewide toxicity objective or to the existing toxicity objectives in basin plans.

Alternative 3 Adopt a numeric toxicity objective. Some task force members recommended this alternative. A numeric objective would set an explicit level that signifies when toxicity occurs. It could simplify enforcement and compliance procedures by clearly defining a violation. It would restrict permitting approaches and response actions, and would not address the variability of toxicity test results.

IV. STAFF RECOMMENDATION

Adopt Alternative ~~2~~ 1.

~~When developing and adopting water quality objectives, the Porter-Cologne Act (Water Code Section 13241) requires that the following factors be taken into consideration: (a) past, present, and probable future beneficial uses of water; (b) environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto; (c) water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area; (d) economic considerations; (e) the need for developing housing within the region; and (f) the need to develop and use recycled water. These factors were considered when developing the chronic toxicity objective and toxicity control provisions. This objective does not significantly change the chronic toxicity objectives in the RWQCB's basin plans, but ensures a minimum, consistent level of control of toxicity in the waters of the State. The chronic toxicity objectives in the current basin plans are intended to protect the past, present, and probable future beneficial use of the waters of the State. This is also the goal of the proposed chronic toxicity objective. Environmental characteristics of the hydrographic units under consideration have been considered by allowing flexibility in implementing the proposed objective~~

~~which will allow the specific factors of the discharge location to be considered when dealing with toxicity. The proposed toxicity control program allows for coordinated control of all factors that affect water quality by allowing flexibility in implementing the objective and also by allowing multiple dischargers to work together in identifying and controlling toxicity in receiving waters. Economic consideration of the toxicity objective and control provisions is considered in Attachment 2 of Section VIII (Economic Considerations) of this FED. The proposed objective should have no impact on the need for developing housing within the region and the need to develop and use recycled water.~~

CHAPTER 4.2 SELECTION OF CHRONIC TOXICITY TESTING METHODS

I. PRESENT STATE POLICY

Several test methods are in use to measure compliance with chronic toxicity objectives in the Ocean Plan and various basin plans. They are outlined below.

<u>Ocean Plan Marine and Estuarine Chronic Toxicity Tests</u>

In March 1997, the SWRCB revised the list of nine critical life stage toxicity testing protocols to be used for determining toxicity of ocean waste discharges. They include the following nine tests:

<u>Plant</u>:
Giant kelp, *Macrocystis pyrifera;* germination and germ tube length

<u>Invertebrates</u>:
Red abalone, *Haliotis rufescens;* larval shell development
East coast mysid shrimp, *Mysidopsis bahia* (non-indigenous); survival, growth, and fecundity
West coast mysid shrimp, *Holmesimysis costata;* survival and growth
Echinoderm fertilization: sand dollar, *Dendraster excentricus,* and purple sea urchin, *Strongylocentrotus purpuratus*
Echinoderm development: sand dollar, *D. excentricus,* and purple sea urchin, *S. purpuratus*
Pacific oyster, *Crassostrea gigas,* and mussel, *Mytilus spp*.; embryo-larval development

<u>Fish</u>:
Topsmelt, *Atherinops affinis;* larval growth and survival
Inland silverside, *Menidia beryllina* (non-indigenous); larval survival and growth

The seven test methods using indigenous test organisms are the preferred toxicity tests for compliance monitoring. The RWQCBs will allow waste dischargers to use inland silversides and the east coast mysid shrimp when other test organisms are not available.

Freshwater Chronic Toxicity Tests

The San Francisco Bay RWQCB has approved the following toxicity test methods for use in measuring toxicity of waste discharges to fresh waters as part of compliance monitoring:

Fathead minnow, *Pimephales promelas*; larval survival and growth
Daphnid, *Ceriodaphnia dubia*; survival and reproduction
Green alga, *Selenastrum capricornutum*; growth

These freshwater chronic toxicity test methods were developed and revised by U.S. EPA (U.S. EPA 1994) and U.S. EPA recommends them for use in NPDES permits.

II. ISSUE DESCRIPTION

Most members of the Toxicity Task Force agreed that the SWRCB should consider new chronic toxicity test methods, using new species or life-stages, as they are developed. The current list of critical life stage toxicity tests had to satisfy several protocol selection criteria in order to be considered for inclusion in the Ocean Plan. The nine criteria are listed below:

1. the existence of a detailed written description of the test method;
2. a history of testing with a reference toxicant;
3. interlaboratory comparisons of the method;
4. adequate testing with wastewater;
5. measurement of an effect that is clearly adverse;
6. measurement of at least one nonlethal effect;
7. use of marine organisms native or established in California;
8. information that documents relative sensitivity to toxic/reference materials and compares to current Ocean Plan-listed tests; and
9. the organism(s) specified in the protocol must be readily available either by field collection or by laboratory culture.

For the most recent triennial review of the Ocean Plan, SWRCB staff convened a 10 member external advisory group known as the Protocol Review Committee (PRC) to review test protocol selection criteria and to consider updating the 1990 Ocean Plan list of standard tests. The PRC is an assemblage of aquatic toxicology experts representing industry, academia, and government.

In October 1994, the PRC recommended to SWRCB staff a revised list of critical life stage tests acceptable for use in measuring compliance. The list includes four west coast protocols (giant kelp, red abalone, west coast mysid shrimp, and topsmelt fish) developed by the SWRCB=s Marine Bioassay Project (MBP), one protocol (sea urchin and sand dollar development) developed by the Southern California Coastal Water Research Project, and four test methods--(1) sea urchin and sand dollar fertilization, (2) silversides fish, (3) oyster and mussel, and (4) east coast mysid shrimp--developed by the U.S. EPA.

Development of Alternate Test Methods Using Indigenous Test Species

Alternate test procedures may be developed using organisms indigenous to the receiving water of the waste discharge. However, the following factors should be considered before undertaking such a task: (1) development of a new test method will require years of research and significant financial investment; (2) the newly-developed tests (marine and estuarine) should meet the nine criteria established by the PRC to be considered for the Ocean Plan list; and (3) the new protocol will have to be at least as sensitive as U.S. EPA's 40 CFR 136 methods.

While most members of the Toxicity Task Force supported SWRCB consideration of newly-developed tests, industry members were opposed, for the following reasons: (1) finding a quality testing laboratory to perform the toxicity monitoring may be difficult due to technicians' inexperience conducting alternate indigenous species tests; (2) tests may not be available year-round due to inadequate supply; (3) newly-revised or developed test methods will not have published toxicity identification evaluation (TIE) methods so dischargers will have great difficulty identifying and controlling sources of effluent toxicity; and (4) there is little scientific basis for concluding that using indigenous (alternate) test species provides any additional protection of the beneficial uses of receiving waters.

III. ALTERNATIVES FOR SWRCB ACTION

Alternative 1. Adopt the Ocean Plan list of critical life stage protocols for measuring toxicity of ocean and estuarine waters and discharges, and U.S. EPA's 40 CFR 136 test methods for monitoring inland waters and discharges. The current Ocean Plan list of critical life stage protocols reflects the latest advancements in the field of aquatic toxicology and has already been approved by the SWRCB and U.S. EPA for use in compliance monitoring.

Alternative 2. Consider adoption of additional test methods for monitoring toxicity of surface waters and discharges as these are developed. Alternate test procedures may use organisms indigenous to the receiving water of the waste discharge. However, the following factors bear on such development and adoption: (1) development of a new test method will require years of research and significant financial investment; (2) new tests (marine and estuarine) should meet the nine criteria used to evaluate Ocean Plan tests; and (3) the new protocol must be no less sensitive than U.S. EPA's 40 CFR 136 methods.

IV. STAFF RECOMMENDATION

Adopt Alternatives 1 and 2.

CHAPTER 4.3 PROGRAM OF IMPLEMENTATION

I. PRESENT STATE POLICY

It has been about a dozen years since RWQCBs began to use "chronic" toxicity tests to assess the ability of effluents and surface waters to sustain conditions suitable for aquatic life. Whole-effluent toxicity (WET) testing at permitted discharges has been boosted by U.S. EPA regulations that require large POTWs to perform those tests and require WET limits in permits for discharges that "cause, have a reasonable potential to cause, or contribute to" toxicity in receiving waters.

From these years of experience, the SWRCB and RWQCBs, with much public and agency participation, have developed programs to monitor, characterize, and eliminate toxicity in surface waters. Refinement of test methods and of procedures to identify the sources and agents of toxicity has been continuous.

Guidance on point source toxicity testing, such as test species, effluent sampling procedures, dilution series, monitoring frequency, dilution waters, and reference toxicant testing requirements, is found in the U.S. EPA publication, Denton and Narvaez (1996). This publication also offers guidelines for conducting toxicity reduction evaluations (TREs) . For other handbooks on TREs, see U.S. EPA 1989a, 1989b, 1992, 1993b, 1993c and 1996.

The general approach to toxicity control at RWQCBs consists of five steps: (1) routine monitoring with bioassays; (2) when and if necessary, a determination that the pattern of test results shows persistent or substantial toxicity; (3) a TRE; (4) a compliance schedule, if needed; and (5) enforcement actions, if appropriate.

Although the RWQCB approach is well established, controversy has arisen regarding the pattern of test results used to confirm the presence of toxicity, and how these test results are used in a compliance program. These issues are discussed below.

The San Francisco Bay Basin Plan section entitled "Whole effluent toxicity limits and control program" states:

> "Permits shall require that if consistent toxicity is exhibited, then a chronic toxicity identification evaluation (TIE) and toxicity reduction evaluation (TRE) shall be conducted. Specific language in permits requires the development of workplans for implementing TIEs. TIEs will be initiated within 30 days of detection of persistent toxicity. The purpose of a TIE is to identify the chemical or combination of chemicals causing the observed toxicity. Every reasonable effort using currently available TIE methodologies shall be employed by the discharger. The Regional Board recognizes that identification of causes of chronic toxicity may not be successful in all cases.

> "The purposes of a TRE are to identify the source(s) of the toxic constituents and evaluate alternative strategies for reducing or eliminating their discharge. The TRE shall include all reasonable steps to reduce toxicity to the required level. In addition, the Regional Board will review chronic toxicity test results to assess acute toxicity and consider the need for an acute TIE.
>
> "Following completion of the TRE, if consistent toxicity is still exhibited in a discharge, then the discharger shall pursue all feasible waste minimization measures at a level that is acceptable to the Regional Board. The discharger must document that the acceptable level of participation is maintained by submitting reports to the Regional Board according to a specified schedule.
>
> "A toxicity reduction evaluation may again be required in situations where chronic toxicity still exists and new techniques for identifying and reducing toxicity become available. Alternatively, the cause of effluent toxicity may change, so that existing techniques will enable identification and reduction of toxicity.
>
> "Consideration of any enforcement action by the Regional Board for violation of the effluent limitation will be based in part on the discharger's actions in identifying and reducing sources of persistent toxicity."

The Santa Ana Basin Plan states:

> "The Regional Board requires the initiation of a Toxicity Reduction Evaluation (TRE) if a discharge consistently exceeds its chronic toxicity effluent limit. The Regional Board, to date, has interpreted the "consistently exceeds" trigger as the failures of three successive monthly toxicity tests, each conducted on separate samples. Initiation of a TRE has also been conditioned on a determination that a sufficient level of toxicity exists to permit effective application of the analytical techniques required by a TRE."

II. ISSUE DESCRIPTION

Regarding interpretation and enforcement of toxicity limitations, the Toxicity Task Force recommended that the "SWRCB should adopt a provision that: No single test result shall constitute a violation." The rationale "centered on the variability of test results (especially chronic WET tests) and the reliability of these test results in determining permit compliance. In addition single toxicity test results cannot characterize the duration, magnitude or frequency of the toxicity measured in ambient waters or discharge sites."

The task force stated further that: "Equally important, resolution of unacceptable toxicity through the Toxicity Identification/Reduction Evaluation...process requires toxicity to be demonstrated on more than one occasion. U.S. EPA states in its TIE guidance [U.S. EPA. 1988. Methods for Aquatic Toxicity Identification Evaluations. Phase I Toxicity Characterization Procedures. EPA-600/3-88/034] that `TIEs require that toxicity be present frequently enough so that repeated testing can characterize and subsequently identify and confirm the toxicant in Phases II and III.

Therefore, enough testing should be done to assure consistent presence of toxicity before TIEs are initiated.'"

One task force member, from the DFG, took exception for cases "where the toxicity exceedance is of large magnitude or contributed to a significant environmental impact...e.g., high acute toxicity...Because routine whole effluent toxicity testing may occur less frequently than other NPDES monitoring requirements and receiving water monitoring generally occurs even less, a single test result may be the only evidence that a serious, deleterious discharge has or is occurring. Therefore, the Regional Boards should retain their discretionary power to enforce toxicity permit limits or compliance objectives when they deem it appropriate."

Staff believes that the DFG argument is directed at acute or lethal toxicity, not to sensitive life stage, sublethal or "chronic" toxicity.

"Trigger" Alternatives

If a single instance of exceeding an effluent limitation or water quality objective for toxicity is not to be considered a violation, a policy must identify a number or pattern of failed test results that would "trigger" further action such as intensified testing or a TRE, or would constitute a violation.

There are many options for multiple-sample TRE triggers for chronic toxicity. For example, the Santa Ana Basin Plan, quoted above, identifies the trigger as "failures of three successive monthly toxicity tests."

Another option provides a two-step trigger. Under this concept, a defined level of failure of routine toxicity tests would constitute the first trigger, and would lead to accelerated testing. Then a second trigger, typically confirmation by the accelerated testing of the earlier test results, would invoke a TRE. The purpose of accelerated monitoring is to be able to identify persistent toxicity and the need for a TRE in a shorter time than would be provided through routine monitoring. Versions of this option were recommended by the Toxicity Task Force and in U.S. EPA guidance (Denton and Narvaez 1996), and are used in the San Francisco Bay Basin Plan.

The task force offered several suggestions for the first-step trigger for accelerated monitoring. These included a single test showing high toxicity (e.g., response of test organisms differ from that of control organisms by more than a given ratio or percentage -- say, 75 percent increase in defined anomalies), or two successive samples exhibiting toxicity.

U.S. EPA guidance (Denton and Narvaez 1996) suggests a first-step trigger of any one test result greater than 2 TU_c. The San Francisco Bay Basin Plan provides that dischargers who monitor toxicity quarterly must increase to monthly sampling if a three-sample median exceeds 1 TU_c or if any single sample exceeds 2 TU_c, after any allowance for dilution.

For a second-step trigger (that is, to identify persistent or repeated toxicity), the task force suggested various combinations using three, four, or five tests in which the mean or median test result shows toxicity. U.S. EPA Regions 9 and 10 guidance for major dischargers is to run six tests in the twelve weeks following the first exceedance of a permit requirement; if chronic toxicity occurs in any of the six tests, then a TRE should begin.

The same first- or second-step trigger may not be suitable for every case. Trigger mechanisms may need to be adapted to such factors as monitoring frequency, discharge variability, and other statistical considerations.

Different types of discharge vary in toxicity over time, often unpredictably. The factors which influence temporal variability in urban runoff are different from those influencing agricultural runoff or treatment plant effluent, and trigger mechanisms might need to take account of such variability.

Statistical analysis of test results, and the sensitivity of those tests, are also important considerations in selection of a trigger. For example, some test methods can detect a 10 percent difference between the responses of test organisms and control organisms as a statistically significant difference, while other test methods cannot detect less than a 40 percent difference. It may be reasonable to rely on a longer series of test results showing toxicity, based on a more sensitive test, but a shorter series, based on a less sensitive test, before requiring corrective action.

Differences in sensitivity also occurs among laboratories, among tests runs, among organisms and life stages, etc.

Implications for Enforcement

In recommending multiple-sample triggers, the Toxicity Task Force also recognized the desirability of resolving apparent violations through corrective action. Under the concept of a "triggered" compliance mechanism, enforcement actions would be taken if the discharger fails to initiate or conduct the appropriate corrective action, such as accelerated monitoring or a TRE, in a timely fashion. The task force recommended that:

> "The SWRCB should adopt a process to implement the toxicity objective that includes the following elements:
>
> (a) routine monitoring and trigger if there is a "toxic event" then go to
> (b) accelerated monitoring if there is persistent toxicity then go to a toxicity reduction evaluation (TRE) and if necessary
> (c) a compliance schedule (which may include Best Management Practices, permit limits, etc.)."

This is similar to the provision in the San Francisco Bay Basin Plan:

> "Consideration of any enforcement action by the Regional Board for violation of the effluent limitation [for toxicity] will be based in part on the discharger's actions in identifying and reducing sources of persistent toxicity."

U.S. EPA Regions 9 and 10 appear to concur. Their guidance (Denton and Narvaez 1996) deals with this subject in Chapter 5, "Enforcement guidelines for WET [whole effluent toxicity] violations." It states:

> "In general, U.S. EPA or the State should not take enforcement action following a violation of a WET limitation if the discharger adequately complies with its NPDES

> permit requirements for accelerated testing and conducting a TRE. Enforcement action would be appropriate if the permittee failed to aggressively conduct a TRE or was otherwise recalcitrant in addressing the toxicity...Exceptions to this general guideline include situations where the WET violation(s) are of large magnitude, or contributed to significant environmental impacts..."

In the same chapter, under the heading, "When to take enforcement action", Denton and Narvaez state:

> "In comparison to chemical-based effluent violations, it can be more difficult to identify the causative agents of WET violations and to isolate the sources of toxicity. In addition, once the toxic agents and sources are identified, it can be more difficult to control these sources, especially without costly technological solutions. This is especially true for municipal treatment facilities where the public, commercial establishments and industry can all contribute to toxicity. Although these factors should not deter EPA or the State from taking enforcement action, they should be considered when assessing the appropriate enforcement response and determining reasonable compliance dates."

The rescinded ISWP/EBEP stated, in the Program of Implementation, part D, Toxicity Reduction Requirements: "If a discharge consistently exceeds an acute or chronic toxicity effluent limitation, a toxicity reduction evaluation (TRE) is required. The TRE shall include all reasonable steps to identify the source(s) of toxicity. Once the source of toxicity is identified, the discharger shall take all reasonable steps necessary to reduce toxicity to the required level."

III. ALTERNATIVES FOR SWRCB ACTION

Alternative 1. Allow RWQCBs to use results from single toxicity tests to confirm the presence of chronic toxicity. This alternative, while not specified in any current basin plan, is not inconsistent with the basin plans or with U.S. EPA guidance. This option could strengthen the importance of individual toxicity testing results and give the RWQCBs more alternatives for enforcement.

Alternative 2. Require the RWQCBs to use results from multiple samples to confirm the occurrence or persistence of chronic toxicity. This alternative is consistent with current basin plans and RWQCB practice, with U.S. EPA guidance, and with the recommendation of the Toxicity Task Force. It compensates for variability in toxicity test results. It provides a firm basis for a decision to conduct a TRE.

IV. STAFF RECOMMENDATION

Adopt Alternative 2.

CHAPTER 5 SPECIAL PROVISIONS

The following subchapters include provisions that address certain discharges and factors that could affect the application of other provisions in the proposed Policy. They include: (1) storm water and urban runoff; (2) nonpoint source discharges; (3) site-specific objectives; (4) watershed management and TMDLs; and (5) exceptions to the proposed Policy provisions.

CHAPTER 5.1 STORM WATER AND URBAN RUNOFF

I. PRESENT STATE POLICY

The 1972 amendments to the Federal Water Pollution Control Act, also known as the CWA, specified that point source discharges of pollutants to surface waters must be in compliance with an NPDES permit. In California, NPDES permits are issued by the SWRCB and the nine RWQCBs. The 1987 amendments to the CWA added Section 402(p) which specified that discharges of storm water from municipal separate storm sewer systems (MS4's) serving a population of 100,000 or more, and from industrial activities (specified at 40 CFR 122.26), must be in compliance with NPDES permits.

MS4 PERMITTING

The RWQCBs have adopted NDPES storm water permits for MS4's required to be permitted and for facilities not suited for coverage under the General Industrial Permit (discussed below). The MS4 permits require the discharger to develop and implement a Storm Water Management Plan whose goal is to reduce the discharge of pollutants to the maximum extent practicable (MEP). MEP is the performance standard specified in Section 402(p) of the Clean Water Act. Components of the storm water management plan address public education and outreach; illicit connection/illegal discharge detection and elimination; fiscal resources; monitoring; and the best management practices (BMPs) which will be utilized. To date, the efforts of the municipalities subject to MS4 permits have been focused on implementation of BMPs to *reduce* pollutants, rather than on treatment of storm water to *remove* pollutants.

INDUSTRIAL/CONSTRUCTION PERMITTING

The SWRCB has adopted two statewide NPDES general storm water permits. The first, originally adopted on November 19, 1991, and subsequently reissued on April 17, 1997, addresses storm water discharges associated with 10 broad categories of industrial activities. This permit is known as the General Industrial Permit. The second, originally adopted on August 20, 1992 and later reissued on August 19, 1999, addresses storm water discharges associated with construction activities resulting in a land disturbance of at least five acres. This permit is known as the General Construction Permit. Both of these permits are implemented (inspections, report review, complaint investigation and enforcement) by the RWQCBs.

Both the General Industrial and Construction Permits are NPDES permits and must meet all applicable provisions of Sections 301 and 402 of the Clean Water Act. These permits require the implementation of management measures that will achieve the performance standard of best available technology economically achievable (BAT) and best conventional pollutant control technology (BCT). Both the General Industrial and Construction Permits require the development of a Storm Water Pollution Prevention Plan (SWPPP) and a monitoring plan. The General Industrial Permit requires that an annual report be submitted each July 1; the General Construction Permit requires only filing of an annual certification.

Through the SWPPP, sources of pollutants are to be identified and the means to manage the sources to reduce storm water pollution are described. The SWPPP must include BMPs which can range from good housekeeping to structural controls.

Regulations recently adopted by U.S. EPA will expand the storm water program at the SWRCB and RWQCBs. Programs will be developed over the next few years to permit storm water discharges from small cities and from construction sites between one and five acres. Permits will be issued in February 2003.

II. ISSUE DESCRIPTION

Storm water discharges are highly variable both in terms of flow, pollutant load, and concentrations. In addition, the relationships between storm water discharges and water quality can be complex. The water quality impacts of storm water discharges are related to the uses designated by states and tribes in their water quality standards, the quality of the storm water discharge, and the quantity of the storm water. Uses can be impacted by both the water quality and water quantity. Depending upon site-specific considerations, some of the water quality impacts of storm water discharges may be more related to the physical effects than the type and amount of pollutants present in the discharge. Because of the nature of storm water discharges and the typical lack of information on which to base numeric water quality based effluent limitations, it has not been feasible for the SWRCB to establish numeric effluent limitations for storm water permits. The effluent limitations contained in the storm water permits (both MS4, and General Industrial and Construction Permits) are, therefore, narrative and include the requirement to implement the appropriate control practices and/or BMPs. The BMPs may include treatment of storm water discharges, along with source reduction which will meet the appropriate performance standard (MEP for MS4 permits or BAT/BCT for the general industrial and construction permits) and achieve compliance with the Clean Water Act requirements.

In a decision (Defenders of Wildlife v. Browner)[1] of the 9th Circuit Court of Appeals dated September 15, 1999, the Court found that the Clean Water Act does not require municipal storm water discharges regulated by NPDES permits to strictly comply with water quality standards. Rather, the Clean Water Act established a technology-based standard of "maximum extent practicable" for the reduction of pollutants in municipal storm water discharges. In addition, the

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1 *Defenders of Wildlife* v. *Browner* (9th Cir. 1999) 191 F.3d 1159.

Court found that ". . . the EPA has the authority to determine that ensuring strict compliance with state water-quality standards is necessary to control pollutants." Thus, the Court upheld the Arizona MS4 permits under review, which included narrative requirements to achieve compliance with state water standards, based on U.S. EPA's discretion to establish those requirements. The Court also unequivocally stated that industrial storm water dischargers do have to comply with both technology-based and water quality-based requirements. This discretion and the authority under the California Water Code have provided the basis for the municipal NPDES storm water permits and support the precedent decisions in SWRCB Orders 91-03, 91-04, 96-13, 98-01, and 99-05. The SWRCB has the option to reconsider the precedent established in those decisions in the future.

The Permitting and Compliance Issues Task Force made the following recommendations that have relevance to storm water permits:

(1) For permits that do not contain quantitative effluent limits (e.g., storm water permits). the following policy should be adopted: "Permits shall require the implementation of control measures and tasks designed to achieve water quality objectives and other goals of the Statewide Plans. Compliance with permits will then be based on the degree of implementation of control measures and tasks."

(2) "There is not a clear method of demonstrating compliance with narrative water quality objectives when they are incorporated into permits. Where possible. compliance with narrative water quality objectives should be linked to compliance with numerical limits and toxicity limits."

III. ALTERNATIVES FOR SWRCB ACTION

Alternative 1. No action. This alternative makes no changes in the existing storm water program at the SWRCB and RWQCBs. As the State agencies responsible for the protection of water quality, the SWRCB and the RWQCBs are responsible for the issuance of NPDES permits as well as the implementation of the storm water program. Currently, all NPDES storm water permits require that the discharges must be protective of the beneficial uses of the receiving waters and that the discharge must be in compliance with existing statewide water quality control plans and appropriate basin plans. The existing NPDES storm water permits contain narrative objectives, rather than the numeric limits found in the more conventional NPDES permits. Compliance with these narrative objectives is a function of the dischargers' timely and effective implementation of the management practices and programs identified in the storm water management plan (MS4 permits) or the storm water pollution prevention plan (industrial/construction permits).

The specific narrative language and requirements relative to standards compliance is developed on a permit-by-permit basis. This allows the permit writer to consider the developmental state of the programs to be implemented, as well as other area-specific considerations.

This alternative is consistent with the Permitting and Compliance Task Force recommendation (1), above.

Alternative 2. Adopt a policy establishing standard language for use in NPDES storm water permits relative to compliance with water quality standards. In Order WQ 98-01, as amended by Order WQ 99-05, the SWRCB adopted standard receiving water limitation language to be included in future municipal storm water permits.

IV. STAFF RECOMMENDATION

Adopt Alternative 1.

CHAPTER 5.2 NONPOINT SOURCE POLLUTION DISCHARGES

I. PRESENT STATE POLICY

Nonpoint source pollution control programs are used by the RWQCBs to protect beneficial uses, in waters of the State affected by nonpoint source pollution discharges. Currently, the SWRCB and RWQCBs are implementing three activities for control of nonpoint source pollution:

1. Nonpoint Source Management Plan (adopted by the SWRCB in November 1988);

2. Initiatives in Nonpoint Source Management (adopted by the SWRCB and submitted to the U.S. EPA in September 1995); and

3. Watershed Management Initiative (WMI) (described in Chapter 5.4).

The Nonpoint Source Management Plan (NPS Plan adopted by SWRCB in November 1988) is the foundation of the SWRCB/RWQCB nonpoint source pollution control program. The NPS Plan states that nonpoint sources are a major cause of water pollution in California and that more effective management of nonpoint sources will require:

- An explicit long-term commitment by the ~~State Board~~ SWRCB and ~~Regional Water Quality Control Boards (Regional Boards)~~ RWQCBs

- More effective coordination of existing ~~State Board~~ SWRCB and ~~Regional Board~~ RWQCB nonpoint source related programs

- Greater use of ~~Regional Board~~ RWQCB regulatory authorities coupled with non-regulatory programs

- Stronger links between the local, State, and federal agencies which have powers that can be used to manage nonpoint sources

- Development of new funding sources.

The NPS Plan provides a general procedural approach to addressing all types of nonpoint source discharges. It does not address specific measures for individual types of nonpoint source discharges or sources of nonpoint source pollution. The management approach is referred to as the Three-Tier Approach (to address nonpoint source pollution problems). RWQCBs have the discretion to decide which or what mix of the three options are appropriate to address any given nonpoint source pollution problem. Those management approaches are:

1. Discharger voluntary implementation of best management practices (BMPs);

2. Regulatory based encouragement of BMP implementation; and

3. Adoption of effluent limitations in waste discharge requirements (WDRs).

BMPs are methods, measures, or practices designed and selected to reduce or eliminate the discharge of nonpoint source pollution. BMPs include structural and non-structural controls, and operation and maintenance procedures, which can be applied before, during, and/or after pollution producing activities. The NPS Plan also states that "[i]n general the least stringent option that successfully protects or restores water quality will be employed, with more stringent measures considered if timely improvements in beneficial use protection are not achieved". The NPS Plan further states that "[w]hen necessary to achieve water quality objectives, Regional Boards will actively exercise their regulatory authority over nonpoint sources through enforcement of effluent limitations and other appropriate regulatory measures."

The Initiatives in Nonpoint Source Management (Initiatives) was developed in partial response to the Coastal Zone Act Reauthorization Amendments (CZARA 1990). CZARA requires states to develop and implement management measures for nonpoint source pollution to restore and protect coastal waters. The U.S. EPA and the National Oceanic and Atmospheric Agency (NOAA) jointly prepared guidance documents with specific management measures that would fulfill CZARA requirements. Under the SWRCB's NPS Program, technical advisory committees (TAC) were formed to examine the U.S. EPA/NOAA management measures and their applicability to California. A statewide approach was undertaken to reduce resource expenditures and to eliminate the potential for regulatory inequities, which might occur if a separate nonpoint source pollution control program was instituted for coastal areas. TACs were convened regarding: Confined Animals; Irrigated Agriculture; Pesticide Management; Plant Nutrient Management; Range Management; Abandoned Mines; Hydromodification; Wetlands and Riparian Areas; Marina and Recreational Boating; On-site Sewage Disposal Systems; and Urban Runoff. Each TAC prepared its own report with recommendations. These TAC reports identified a wide range of activities that were incorporated into the ~~State Board's~~ SWRCB's report titled "Initiatives in Nonpoint Source Management".

The draft September 1995 Coastal Nonpoint Pollution Control Program (CNPCP) Submittal and the Initiatives were provided to the U.S. EPA and NOAA pursuant to Section 6217 of CZARA in September 1995. The ~~response~~ CNPCP Submittal included two documents: California's *Coastal Nonpoint Pollution Control Submittal*, detailing the State's existing programs related to NPS pollution management, and the *Initiatives in Nonpoint Source Management*, based on the recommendations of the TACs.

The U.S. EPA and NOAA released draft findings and conditions on the CNPCP Submittal in October 1996. In August 1997, the SWRCB, California Coastal Commission (CCC), U.S. EPA Region 9, and U.S. EPA and NOAA headquarters staffs negotiated the *Action Plan* which outlined a framework and activities for the State to achieve both an approvable program consistent with CZARA and an *"enhanced status"* NPS Program by addressing the nine key elements in the U.S. EPA's *NPS Program and Grants Guidance of 1997 and Future Years*. In July 1998, the U.S. EPA and NOAA issued their Final Findings and Conditional Approval for California's submittal. Consistent with the *Action Plan* and final administrative changes to ~~coastal~~

nonpoint pollution control program (CNPCP) guidance issued in October 1998, the State must, for final approval: (1) adopt management measures consistent with the *Guidance Specifying Management Measures for Sources of Nonpoint Pollution to Coastal Waters* (USEPA 1993); (2) identify back-up and enforceable policies and mechanisms for the management measures; (3) demonstrate the ability for widespread implementation of the management measures; and (4) address the nine key elements.

The Plan for California's Nonpoint Source Pollution Control Program (Program Plan) is the State's final submittal intended to satisfy both the CWA Section 319(h) requirement for "an upgraded program" and the CZARA requirements for a CNPCP. The Program Plan (adopted by the SWRCB on December 14, 1999 and by the CCC on January 11, 2000) continues the three-tier approach[2] established by the 1988 NPS Plan and achieves this goal by providingings a single unified, coordinated statewide approach to dealing with NPS pollution structured around 61 management measures. Management measures serve as general goals for the control and prevention of polluted runoff. Site-specific management practices are then used to achieve the goals of each management measure. Implementation of management measures will occur using a fifteen-year strategy with three imbedded five-year implementation plans. The fifteen-year strategy and each five-year implementation plan were developed using an iterative program process. The program process includes: (1) assessing Program activities; (2) targeting efforts; (3) planning activities based on Program goals and objectives; (4) coordinating the efforts of federal, State, and local agencies and stakeholders; (5) implementing coordinated actions; (6) tracking and monitoring the results of implemented actions; and (7) reporting on Program results. The Program Plan is designed to be flexible and adaptable over time

In addition, the SWRCB will be maintaining an information clearing-house related to watershed projects, provide technical assistance (e.g., data management, standards development), evaluate the effectiveness and progress of watershed projects, provide financial assistance, support educational efforts, and coordinate program and agency efforts. Management agency agreements are and will be used to promote interagency cooperation when addressing NPS problems.

The RWQCB's basin plans provide additional discussion and provisions, such as, conditional waivers of WDRs, for some types of nonpoint source discharges including agriculture, silviculture, mining, grazing, marinas and boating, highways, on-site septic systems, erosion and sediment control, and dredging. Additionally, the basin plans of the San Francisco Bay, Central Valley, Santa Ana, and San Diego RWQCBs have prohibitions of discharge applicable to nonpoint sources.

II. ISSUE DESCRIPTION

Nonpoint sources of water pollution are generally defined as sources which are diffuse and/or not subject to regulation under a CWA NPDES permit; however, RWQCBs may issue WDRs on nonpoint source discharges. Appendix E is a partial listing of categories of nonpoint source discharge types. Nonpoint source discharges continue to be a major source of pollution in the

[2] The three-tier approach to nonpoint source pollution control was established in State law (Water Code Section 13369) in January 2000.

State's waters. Most nonpoint discharges are diffuse in nature and, therefore, not generally susceptible to the same control measures as point source discharges. Water Code §13360, in general, does not allow the RWQCBs to specify the manner of compliance when issuing ~~waste discharge requirements (~~WDRs~~)~~. Therefore, while WDRs may specify effluent quality and receiving water quality, they ordinarily may not specify how those limits are to be met.

BMPs, such as prevention, source reduction, and alternative products and/or practices, are the primary current means of controlling nonpoint sources of pollution. From a regulatory perspective, implementation of BMPs is easiest to accomplish through voluntary action on the part of the discharger, or through RWQCB adoption of a conditional waiver of WDRs. As stated above, the establishment and enforcement of effluent limits and receiving water limits in WDRs for diffuse nonpoint source discharges is difficult. Control of nonpoint source pollution needs an alternative flexible approach which may consist of any array of control techniques and which allows for periodic, if not continual, reassessment of success. WMI in conjunction with the NPS Plan provides such an approach.

The SWRCB requested two task forces to assist in development of this area for the ISWP/EBEP. Those task forces were the Watershed Task Force and Agricultural Waters Task Force. The Watershed Task Force, which addressed issues that overlap with the work of the CZARA TACs, recommended that the NPS Plan's three-tier approach be incorporated into the ISWP/EBEP without modification.

The Agricultural Waters Task Force's charge was to examine issues related to waters affected by agriculture; it did not include a broad examination of all types of nonpoint source pollution. This task force addressed issues in common with the CZARA TACs on irrigated agriculture, pesticide management, confined animals, range management, and plant nutrient management. The Agricultural Waters Task Force provided extensive recommendations regarding drainage from irrigated agriculture including: exemptions from beneficial use designations and water quality objectives, categorization of waters receiving drainage, definitions of new beneficial use subcategories, setting of water quality objectives, and implementation time schedules and provisions. The majority of the task force recommendations are directly or indirectly related to standards and standard setting. Recommendations regarding implementation are generally based upon the preceding recommendations addressing beneficial use definitions and designations, and water quality objectives. The proposed Policy focuses on implementation issues and is not intended to address beneficial use definitions or designation, or to establish numeric water quality objectives. Those issues will be addressed in Phase 2 of the ISWP/EBEP.

III. ALTERNATIVES FOR SWRCB CONSIDERATION

Alternative 1. No action. Under this alternative, the SWRCB would continue support for the ~~Watershed Management Initiative~~ WMI process, ~~and~~ NPS Plan, and Program Plan, and in the future would undertake review and consideration of specific types of nonpoint source discharges. Nonpoint source dischargers should be encouraged to (1) participate fully in the watershed initiative approach, and (2) work closely with the RWQCBs to utilize the existing provisions of the federal regulations allowing modification of beneficial use designations (seasonal and subcategories of uses), in addition to determining the need and appropriateness of site-specific water quality objectives.

Alternative 2. Require the RWQCBs to make full use of the regulatory authority granted in the Water Code to bring nonpoint source discharges into compliance with the CTR criteria and the toxicity requirements of the Policy. This alternative, which is based on the acknowledgement that nonpoint source pollution continues to degrade the quality of the waters of the State, would deviate from the existing three-tiered approach in the NPS Plan and Program Plan. However, this alternative takes away the flexibility of the RWQCBs and nonpoint source dischargers by reducing, if not eliminating, the possibility of a cooperative watershed stewardship-based approach.

IV. STAFF RECOMMENDATION

Adopt Alternative 1.

CHAPTER 5.3 SITE-SPECIFIC OBJECTIVES

I. PRESENT STATE POLICY

Currently, there is no state policy on the development of site-specific water quality objectives for inland surface waters, enclosed bays, and estuaries. The Ocean Plan allows the RWQCBs to establish alternative water quality objectives (i.e., site-specific objectives) under specified conditions (described below). Language on the development of site-specific objectives is included in the basin plans of four of the nine RWQCBs.

II. ISSUE DESCRIPTION

Site-specific water quality objectives refer to objectives that are based on the conditions of a particular area, or site. Generally, these objectives are adopted by the RWQCBs in their basin plans. The proposed priority pollutant criteria[3] developed for the CTR are based on general nation-wide conditions. The U.S. EPA does not intend to undertake a complete analysis of every body of water in the State in the development of the proposed CTR criteria. Thus, there may be situations where application of the CTR (or NTR) criteria is inappropriate for a particular water body (i.e., they are too stringent or not stringent enough) and the development of State-adopted site-specific objectives is appropriate.[4]

The Federal regulation at 40 CFR 131.11(b)(1)(ii) allows states to adopt water quality criteria based on CWA Section 304(a) guidance "modified to reflect site-specific conditions". Like all water quality criteria, site-specific objectives must protect the designated uses and be based on sound scientific rationale (40 CFR 131.11(a)), and are subject to U.S. EPA review and approval (40 CFR 131.21).

Under State law (Water Code э13241), water quality objectives must ensure "the reasonable protection of beneficial uses and the prevention of nuisance". Factors that shall be considered by a RWQCB in establishing water quality objectives include:

1. Past, present and probable future beneficial uses of water.
2. Environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto.

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3 Federal water quality "criteria" are comparable to State water quality "objectives".

4 The U.S. EPA (1994) acknowledges that national criteria may be under- or over-protective if (1) the species at the site are more or less sensitive than those included in the national criteria data set, or (2) the physical and/or chemical characteristics of the site alter the biological availability and/or toxicity of the chemical. In response, the U.S. EPA developed three procedures to derive site-specific objectives: (1) the recalculation procedure; (2) the water-effect ratio procedure; and (3) the resident species procedure. The U.S. EPA has issued guidance on each of these procedures, which are designed to develop site-specific criteria to protect the uses of the specific water body if applied appropriately (U.S. EPA 1994).

3. Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area.
4. Economic considerations.
5. The need for developing housing within the region.
6. The need to develop and use recycled water.

In addition to Federal regulations and State law, provisions for establishing site-specific objectives, as well as site-specific objectives themselves, are contained in current water quality control plans. For example, the Ocean Plan includes language related to site-specific objectives that states:

> "the Regional Boards may establish more restrictive water quality objectives and effluent quality requirements than those set forth in this Plan as necessary for the protection of beneficial uses of ocean waters."

It also states that:

> "Regional Boards may impose alternative less restrictive provisions than those contained within Table B [i.e., water quality objectives] of the plan, provided an applicant can demonstrate that:
>
> Reasonable control technologies (including source control, material substitution, treatment and dispersion) will not provide for complete compliance; or
>
> Any less stringent provisions would encourage water reclamation;
>
> Provided further that:
>
> a) Any alternative water quality objectives shall be below the conservative estimate of chronic toxicity ... [provided in the Ocean Plan for selected constituents], and such alternative will provide for adequate protection of the marine environment;
>
> b) A receiving water toxicity objective of 1 TU_c is not exceeded; and
>
> c) The State Board grants an exception ... to the Table B limits as established in the Regional Board findings and alternative limits."

The San Francisco Bay Basin Plan states that "the Regional Board intends to work toward the derivation of site-specific objectives for the Bay-Delta estuarine system" and "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." The basin plan further states that the RWQCB may consider developing and adopting site-specific objectives when (1) it is determined that promulgated water quality standards or objectives are not protective of beneficial uses, and (2) site-specific conditions warrant less stringent effluent limits than those based on promulgated water quality standards or objectives, without compromising the beneficial uses of the receiving water. The basin plan states that such "site-specific objectives will be developed to provide the same level of environmental protection afforded by national criteria, but will more accurately reflect local conditions."

The Los Angeles Basin Plan states that the RWQCB "supports the idea of developing site-specific objectives (SSOs) in appropriate circumstances." The basin plan further states that the "development of site-specific objectives requires complex and resource intensive studies" and that "resources will limit the number of studies that will be performed in any given year." The basin plan also: (1) lists several elements that should be addressed to justify the need for a site-specific objective; (2) states that a detailed workplan will be developed with RWQCB and SWRCB staff, U.S. EPA, and other agencies (if appropriate) to develop the study; (3) acknowledges the need to conduct a use attainability analysis (UAA)[5] study, under certain conditions, before site-specific objectives may be developed; and (4) lists factors to be addressed in proposing a new objective.

Regarding items (1), (2), and (3), the Los Angeles Basin plan states:

> "Site-specific objectives must be based on sound scientific data in order to assure protection of beneficial uses. There may be several acceptable methods for developing site-specific objectives. A detailed workplan will be developed with Regional Board staff and other agencies (if appropriate) based on the specific pollutant and site involved. State Board staff and the USEPA will participate in the development of the studies so that there is agreement on the process from the beginning of the study.
>
> Although each study will be unique, there are several elements that should be addressed in order to justify the need for a site-specific objective. These may include, but are not limited to:
>
> - Demonstration that the site in question has different beneficial uses (e.g., more or less sensitive species) as demonstrated in a UAA or that the site has physical or chemical characteristics that may alter the biological availability or toxicity of the chemical.
>
> - Provide a thorough review of current technology and technology-based limits which can be achieved at the facility(ies) on the study reach.

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5 A use attainability analysis (UAA), as defined in 40 CFR 131.3(g), is a structured scientific assessment of the factors affecting the attainment of the use which may include physical, chemical, biological, and economic factors as described in 40 CFR 131.10(g). Under 40 CFR 131.10(j), states are required to conduct a UAA whenever (1) the state designates or has designated uses that do not include the [fishable-swimmable] uses specified in CWA §101(a)(2), or (2) the state wishes to remove a designated use that is specified in CWA §101(a)(2) or adopt subcategories of such uses that require less stringent criteria (also U.S. EPA 1994).

- Provide a thorough review of historical limits and compliance with these limits at all facilities in the study reach.

- Conduct a detailed economic analysis of compliance with existing, proposed objectives. Conduct an analysis of compliance and consistency with all federal, state, and regional plans and policies."

Two basin plans contain general statements regarding site-specific objectives. The Central Valley Basin Plan states that "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." The Lahontan Basin Plan states that adequate data on existing ambient levels of constituents were used to develop numerical objectives for specific water bodies and that the site-specific objectives supersede the objectives that apply to all waters in the region to the extent of any overlap.

The other five RWQCB basin plans do not address developing site-specific objectives specifically. A few basin plans contain site-specific objectives for priority pollutants (i.e., the San Francisco Bay Basin Plan and the Santa Ana Basin Plan include site-specific objectives for some metals, and the Central Valley Basin Plan contains site-specific objectives for some metals and selenium.

The rescinded ISWP and EBEP contained the following language on the development of site-specific objectives:

> "After compliance with CEQA, and with State Board approval, a Regional Board may establish more restrictive water quality objectives, as necessary for the protection of beneficial uses, or impose less restrictive water quality objectives than those set forth in this plan. Such objectives are subject to approval by EPA. Site-specific objectives may be established provided all required control measures have been taken and it can be shown that either:
>
> 1. (a) the site-specific objective is derived by scientifically defensible methods (e.g., as described in U.S. EPA 1993 Water Quality Standards Handbook, U.S. EPA Office of Water Regulations and Standards, Washington, D.C.), and
>
>   (b) the most sensitive beneficial use is protected (for aquatic life, that use should be the most sensitive use that has existed since 1975 or, if these data are not available, that use should reflect the best water quality that has existed since 1975), and
>
>   (c) for aquatic life objectives, a chronic toxicity objective of 1.0 TU_c is not exceeded, or it is shown that the substance for which a site-specific objective is proposed does not contribute to chronic toxicity, and

(d) for human health objectives for existing or designated use of municipal or domestic water supply (MUN), the site-specific objective does not exceed the Maximum Contaminant Level (MCL), and

(e) tissue concentrations of the pollutant in question in fish and shellfish are below levels harmful to aquatic life or wildlife, or the health of human consumers of such organisms. Site-specific human health objectives shall be based on a recalculation of the objective using measured site-specific bioconcentration factors, fish consumption, body weight, and/or relevant factors, and

(f) the site-specific objective will provide for the attainment and maintenance of the water quality objectives of downstream waters; or

2. the full potential of designated beneficial uses has not existed since 1975 and the requirements of 40 CFR 131, including a use attainability analysis, if required, have been met.

Site-specific acute or chronic toxicity objectives may only be developed through a use attainability analysis (i.e., option 2).

Site-specific objectives shall be established consistent with the Porter-Cologne Water Quality Control Act and the federal Clean Water Act."

The Chemical-Specific Objectives Task Force recommended that: (1) the development of site-specific water quality objectives for inorganic and organic chemicals should be allowed where appropriate; and (2) the State should develop detailed guidance for the development of site specific objectives similar to the outline being developed by the Site-Specific Objectives Task Force (discussed below). The task force further stated that water quality objectives "must be based on sound scientific rationale and protect the designated use of the receiving water" and that "under the following conditions, RWQCBs may consider the development of site-specific objectives (SSO) when:

- a statewide objective is not being achieved in the receiving water;
- an NPDES permittee does not meet an anticipated numeric effluent limit based on the statewide objective and cannot be assured of achieving the effluent limit through reasonably achievable pollution prevention measures; and
- a written request for a site-specific study is filed with the Regional Board and funding sources are identified;
- or, the statewide objective does not adequately protect the beneficial uses of a specific water body."

The task force also noted that the development of total maximum daily loads (TMDLs)/wasteload allocations (WLAs) to achieve the statewide standards may be more appropriate than developing a site-specific objective and that, under certain circumstances, a use attainability analysis may be appropriate. They stressed the need for consistency in the development of SSOs and that guidance should be provided by the SWRCB "regarding policies and procedures for developing SSOs based on scientifically defensible methods."

The Site-Specific Objectives Task Force recognized the importance of site-specific objectives in water quality planning and proposed language that provides a framework for their development. As the task force report states: "The key element of the plan language is a requirement that, for each SSO study, the regional board enter into a Memorandum of Understanding with interested parties which outlines the budget and cost-sharing plan, the responsibilities of the parties, study work plan, etc. The language also provides a mechanism for separating technical and policy decisions and addresses the establishment of permit limits during the time SSOs are being developed." The task force further stated that regulatory options other than site-specific objectives (e.g., total maximum daily loads, permit relief) may be appropriate in some cases and addressed such options in the proposed language.

The task force's proposed framework language, which was recommended by all interest group representatives of the task force (except as described below), follows:

"1. Water quality objectives shall be developed in a manner consistent with the Clean Water Act and the Porter-Cologne Act. In accordance with State law, objectives must provide for the reasonable protection of beneficial uses based on consideration of the factors listed in э13241 of the Porter-Cologne Act. In accordance with federal law and regulations, the objectives must be based on sound scientific rationale and protect the designated beneficial uses of the receiving water.

2. The Regional Water Quality Control Board (Regional Board) may develop site specific objectives whenever it determines, in the exercise of its professional judgment, that it is appropriate to do so. Under certain circumstances, other approaches to achieve the statewide objective may be more appropriate than development of a Site Specific Objective (SSO). These approaches include, but are not limited to, use-attainability analyses and development of total maximum daily loads/wasteload allocations. The Regional Board may investigate and implement other approaches as appropriate in the circumstances.

3. Regardless of action taken by the Regional Board pursuant to number 2 above, the Regional Board shall initiate the development of SSOs if:

   (a) a written request for a site-specific study, accompanied by a preliminary commitment to fund the study, subject to development of a Memorandum of Understanding (MOU), is filed with the Regional Board, and:

   (b) Either:

(i) an existing or potential statewide objective or beneficial use is not achieved in the receiving waters;

OR

(ii) a holder of waste discharge requirements, including an NPDES permittee, does not or may not in the future meet an existing or potential effluent limit based on the statewide objective and cannot be assured of achieving the effluent limit through reasonably achievable pollution prevention measures.

4. In the event there are insufficient data to make the determinations outlined in 3 (b) and there is reasonable likelihood that one or all of these conditions may exist, the source control, effluent, and receiving water data necessary to make these determinations may be collected. The Regional Board shall amend the waste discharge requirements and/or permits in accordance with the relevant compliance schedule provision in the Statewide Water Quality Control Plan (Plan) if necessary to allow a reasonable time period to collect and analyze the data and report the results.

5. Prior to proceeding with site-specific objectives studies, the Regional Board shall enter into an MOU with interested parties, including, but not limited to, U.S. EPA Region IX, the State Water Quality [sic] Control Board (State Board), and the affected dischargers. The MOU shall include the following elements:

(a) Formation of a project team, including the signatories to the MOU, the State Department of Fish and Game, the U.S. Fish and Wildlife Service, and public interest groups.
(b) Responsibilities of the parties.
(c) Budget and cost-sharing plan.
(d) Administrative policies and procedures to govern oversight of the SSO process.
(e) Project schedule.
(f) A process for conflict resolution.
(g) Development of an SSO work plan.

6. SSOs shall be developed as follows:

(a) The Regional Board shall utilize guidance to be developed by the State Board to establish one or more scientifically defensible potential objective(s). The scientifically defensible potential objective(s) shall be derived using methods appropriate to the situation. Such methods may include U.S. E. P.A. approved methods, including, but not limited to, Water Effects Ratio (WER) procedure, recalculation procedures, a combination of recalculation and WER procedures, Resident Species Procedure, and/or other methods agreed to by the parties to the MOU. The State Board shall periodically review and update this guidance as new information and methodologies, including a risk-based framework for water quality criteria currently being developed by U.S. E.P.A., become available. In the absence of guidance, these concepts would be incorporated into the MOU.

(b) If, during the data interpretation phase of technical site-specific studies, the Regional Board, State Board, EPA Region IX, and/or other interested parties have differing opinions with regard to the interpretation of data collected in establishing the scientifically defensible potential objective(s), the Regional Board shall seek the advice of an independent scientific review panel consisting of at least three scientists with expertise in the field of aquatic toxicology and water quality criteria development methodology. The method of selecting the panel and other details regarding the conflict resolution process shall be included in the MOU. The findings of the scientific review panel shall be provided to the parties to the MOU, and made available to the members of the Regional Board in the event a scientific dispute remains unresolved at the time the scientifically defensible potential objective(s) is presented to the Regional Board for consideration.

(c) Following completion of the scientific studies and data interpretation, the Regional Board staff shall present to the Regional Board scientifically defensible potential objective(s). The Regional Board shall consider the following factors in adopting an SSO(s):

- (i) the beneficial uses of the water body;
- (ii) environmental characteristics of the water body;
- (iii) water quality conditions that can reasonably be achieved through coordinated control of all pollutant sources;
- (iv) economic considerations;
- (v) the need for housing in the region;
- (vi) the need to develop and use recycled water.

To ensure that economic and environmental impacts are adequately addressed, the Regional Board staff shall, as part of the SSO work plan:

- (i) Direct the preparation of an economic analysis documenting the economic impacts from one or more of the scientifically defensible potential objective(s) and the projected effluent limits derived from the objective(s) and present the economic analysis to the Regional Board;
- (ii) Comply with the California Environmental Quality Act.

(d) If attainment of the potential objective(s) is anticipated to be infeasible (as defined in 40 CFR 131), or if the Regional Board otherwise determines it is appropriate, the Regional Board shall conduct use attainability analyses in accordance with 40 CFR 131. If such analyses conclude that attainment of the designated beneficial uses is infeasible, the Regional Board shall designate alternative beneficial uses or subcategories of beneficial uses and develop appropriate water quality objectives to protect those beneficial uses.

7. During the period when site-specific objectives studies are being conducted, the Regional Board shall place effluent limits based upon the statewide water quality objectives into NPDES permits and waste discharge requirements only in conjunction with an appropriate compliance schedule. The compliance schedule shall allow sufficient time for collection of data, completion of SSO studies, and determination of compliance measures. While SSO studies are being conducted, interim effluent limits may be established by the Regional Board as provided in the Plan. Following final adoption of a site-specific objective, existing effluent limits shall be replaced with effluent limits consistent with the adopted site-specific objective. In the event that, for reasons beyond the control of the permittee, a decision whether or not to adopt site specific objectives has not been made before the end of the compliance schedule, the compliance schedule shall be extended for an additional period to allow time for a decision whether or not to adopt an SSO. However, in no event may a compliance schedule exceed the time period allowed for compliance with the statewide water quality objectives in the Policy, unless a variance has been granted.

8. A site specific objective may include a compliance schedule."

The RWQCB representative on the Site-Specific Objectives Task Force objected to the proposed language requirement (cited above) that the RWQCB must initiate the development of site-specific objectives under the specified conditions and recommended that item number 3 begin as follows:.

"3. Regardless of action taken by the Regional Board pursuant to number 2 above, the Regional Board shall at a public meeting, consider initiating the development of SSOs if:"

This alternate language was proposed to address RWQCB concerns that they may be required or forced to develop a site-specific objective when it may not be appropriate. Other task force members stated that "in some cases dischargers must have the certainty of knowing that the studies will be done, especially since there is wide agreement that SSOs must be an integral part of the revised water quality [control] plans. SSO development provides the regional boards with a viable option of addressing economic and environmental impacts on a water body by water body basis. ... The inclusion of narrow and reasonable triggers helps assure that SSOs will be developed where needed and that the regional board will play an active role in the process."

To address several regulatory approaches in addition to, or instead of, the development of site-specific objectives, the Site-Specific Objectives Task Force prepared a decision tree and associated narrative discussion to provide a framework for determining an appropriate course of action. The decision tree is intended to help avoid initiation of costly and time-consuming studies that are not appropriately designed to resolve the specific issue in question. During the development of the proposed Policy, it was noted that several of the studies proposed for inclusion in the policy would benefit from both the proposed framework language and the decision tree developed by the task force. These task force products have been incorporated into Section VI of this FED (Special Studies) as a basis for an approach to be considered for all special studies (i.e., TMDLs, mixing zones, metals translators, use attainability analyses, regional monitoring, etc.) relevant to the proposed Policy

Presently SWRCB and RWQCB staffs are working with U.S. EPA to initiate a contract for preparing technical guidance on the development of site-specific objectives. Staff hopes to have the contract in progress by the beginning of 2000.

III. ALTERNATIVES FOR SWRCB ACTION

Alternative 1. No action. Under this alternative, RWQCBs would continue to address the issue of site-specific objectives under current practices consistent with State and Federal law, and with a consideration of Federal guidance. This alternative does not provide clarity on site-specific objectives development nor promote statewide consistency.

Alternative 2. Adopt policy language which provides a process framework for initiating and conducting site-specific objectives studies. Under this alternative, provisions would generally describe the process steps to be taken for: (1) determining the situations under which a site-specific objectives study may be appropriate; and (2) once the decision has been made to pursue a study, (a) general guidance on the study methods, and (b) the regulatory requirements to be applied while the study is being conducted. This general policy framework balances the concerns of the regulators of protecting water quality, by ensuring that the development of a site-specific objective is appropriate for the situation, with the concerns of the regulated community over existing or potential noncompliance with CTR criteria that may not be appropriate for the water body in question.

Alternative 3. Prepare and adopt technical guidance on the development of site-specific objectives. Under this alternative, SWRCB staff, in coordination with RWQCB staff and the U.S. EPA, would be responsible for the review of existing methods for deriving water quality objectives and the preparation of technical guidance. The technical guidance would be used by the SWRCB and RWQCB staff, as well as other interested persons, to develop site-specific objectives, if needed. Completion of this task will require significant time and resources, and will be addressed by the SWRCB after Phase 1 of the ISWP/EBEP.

Options to Supplement Alternative 2

Option A. Initiate and plan the process for developing site-specific objectives through a Memorandum of Understanding (MOU). Establishing an MOU entails defining the roles and responsibilities of the parties with respect to the tasks to be completed under their respective authorities. Because an MOU requires time-consuming negotiation and agreement, and is subject to administrative approvals, it would be cumbersome and difficult to formalize in a reasonable period of time. In addition, in the case of standards actions, entering into an MOU with a regulated entity would create a conflict of interest situation for the SWRCB and RWQCBs.

Option B. Initiate and plan the process for developing site-specific objectives through a workplan. A workplan identifies the tasks to be completed and could, if necessary, define the roles of the entities that will implement the tasks. Thus, a workplan can achieve the overall purpose of an MOU while providing the flexibility needed to conduct the site-specific objectives study in a timely manner.

Option C. Require the RWQCB to initiate development of a site-specific objective under the two conditions specified by the Site-Specific Objectives Task Force in item 3. Under this option, a RWQCB would have no choice but to pursue the development of a site-specific objective if (1) a written request for a site-specific objectives study and a preliminary commitment to fund the study were filed with the RWQCB, and (2) either (a) an existing or potential statewide objective (or CTR criterion) or beneficial use is not achieved in the receiving waters, or (b) a permitted discharger does not, or may not in the future, meet an existing or potential effluent limitation based on a statewide objective (or CTR criterion) and cannot be assured of achieving the effluent limitation. Because the RWQCB has the authority and responsibility to address standards actions as necessary to protect beneficial uses, it is inappropriate to remove RWQCB discretion regarding the development of site-specific objectives. Furthermore, this option may limit RWQCB flexibility to address noncompliance situations in other more innovative or appropriate means.

Option D. Allow RWQCB discretion, based on consideration of information submitted under the two conditions specified by the Site-Specific Task Force in item 3, to initiate development of a site-specific objective. Under this option, the RWQCB would consider requests for site-specific objectives development at a public meeting, such as one convened to consider issues for the triennial reviews of the basin plans. The proponent of the site-specific objective development would submit the information required to support the request and the RWQCB would consider it and all other public comments received on the matter in its determination on whether or not to pursue the study. This public process provides that all interested persons have the opportunity to present relevant data, including recommendations for alternative regulatory solutions to noncompliance, as well as voice opposition or support for the site-specific objectives study proposal. The decision would, appropriately, remain with the RWQCB based on the public input.

IV. STAFF RECOMMENDATION

Adopt Alternative 2, and Options B and D.

CHAPTER 5.4 WATERSHED MANAGEMENT AND TMDLs

I. PRESENT STATE POLICY

In 1995, the SWRCB adopted a Strategic Plan for the SWRCB and RWQCBs (SWRCB 1995). Strategic Goal 1 is stated as follows:

> "Our goal is to provide water resource protection enhancement and restoration while balancing economic and environmental impacts.
>
> There is a growing need for comprehensive water resource protection. Ground and surface water, nonpoint and point source pollution and economic as well as environmental impacts must be brought into the decision making equation. This concept is guided by the following principles which are embodied in what is generally considered watershed management..."

The first strategy listed for this SWRCB goal is:

> "Phasing in an integrated watershed management approach that prioritizes water resource protection actions within watersheds through watershed management plans.

The SWRCB and RWQCBs have developed a Watershed Management Initiative - Integrated Plan (WMI) (SWRCB 1998) to develop comprehensive, watershed-based strategies to address water quality issues. RWQCB chapters of the WMI were updated in May 1999 and will be updated again in January 2000.

Total maximum daily load (TMDL) requirements are set forth in Federal statute and regulations.

II. ISSUE DESCRIPTION

TMDLs

The Clean Water Act (CWA) under Section 303(d) and the U.S. EPA's Water Quality Planning and Management Regulations (40 CFR Part 130) establish the TMDL process.
U.S. EPA is in the process of revising these regulations, and expects to promulgate the new regulations in the year 2000 (check date w/SKV).

A total maximum daily load (TMDL), is the amount of a pollutant that may be discharged into a water body and still maintain water quality standards with seasonal variations and a margin of safety that takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality. Under existing U.S. EPA regulations, the TMDL process generally consists of five steps:

(1) Identification by each RWQCB of water quality limited waters[6] and type of impairment;

(2) Establishment of priority rankings for the development of TMDLs;

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[6] Waters that cannot meet or are not expected to meet water quality standards after implementation of technology-based controls (e.g., secondary treatment), more stringent state or locally-imposed effluent limitations, and other pollution control requirements (e.g., BMPs). See 40 CFR Section 130.7(b)(1).

(3) Development of TMDLs, wasteload allocations (WLAs), and load allocations (LAs);

(4) Incorporation of the loadings in the RWQCB basin plans; and

(5) Submittal of segments identified, priority ranking, and loads established to U.S. EPA for approval.

This information is reported to U.S. EPA in the 303(d) list. It is also compiled by the SWRCB and included in the 305(b) Report (SWRCB, 1996). While TMDLs must be developed for 303(d) listed waters, they may also be developed for pollutants and water bodies that have not been designated as impaired on the 303(d) list.

The objective of a TMDL is to allocate allowable pollutant loads among different sources so that the appropriate control actions can be taken and water quality standards achieved. A common method to determine the allowable load for the water body of interest is to find the pollutant loading that will attain and maintain applicable water quality criteria. Any loading above this capacity risks violating water quality standards. The allowable TMDL is defined as the sum of the individual wasteload allocations (WLAs) for point sources and load allocations (LAs) for nonpoint sources. The WLAs are those portions of the TMDL assigned to limit the amount of pollutants from existing and future point sources, while the LAs are those portions of the TMDL that are assigned to existing or future nonpoint sources and background sources (40 CFR 130.2.) A margin of safety must be included with the two types of allocations to ensure that allocated loads, regardless of source, would not produce an excursion above water quality standards. Current Federal regulations specify that TMDLs need to take into account critical conditions for stream flow, loading, and water quality parameters (40 CFR 130.7(c)(1)).

The SWRCB supports locally-developed stewardship-based TMDLs that satisfy U.S. EPA regulations, but must rely on other strategies (i.e., regulatory approaches) when needed. Working with multiple strategies and transforming the focus from one to another requires participation and a lot of patience by affected parties. The more of the TMDL process a watershed group takes on upfront, the more flexibility they have to evaluate different scenarios for allocation loads and achieving attainment of water quality standards. The more stakeholders rely on U.S. EPA or the RWQCBs to develop TMDLs, the less flexibility they have. The SWRCB continues to urge U.S.EPA to incorporate more of a collaborative approach in their upcoming revisions to the TMDL regulations.

Emphasis has traditionally been on point source wasteload allocations, which were easily enforced by incorporating them into NPDES permits as discharge limits. Controlling point source discharges, however, does not ensure attainment of water quality standards, especially when nonpoint sources are a significant contributor to water quality problems. The current approach to the TMDL process is to weigh contributing pollution sources and develop an integrated pollution reduction strategy for point and nonpoint sources using a watershed management approach. This approach allows States to take a holistic view of their water quality problems from the perspective of instream conditions.

Watershed Management

Using a watershed management approach provides a flexible framework for addressing existing water quality problems for a specified geographic area, whether emanating from point or nonpoint sources. The watershed management approach facilitates cooperation between federal, state, and local agencies, and public and private entities with a stake in the process.

The goals of the WMI are to (1) provide water resources protection, enhancement, and restoration while balancing economic and environmental impacts; (2) promote cooperative relationships and better assist the regulated community and public through a voluntary, collaborative decision-making process that is open to all stakeholders; (3) coordinate point source regulatory programs, nonpoint source programs, and other resource management programs on a watershed basis to promote effectiveness and efficiency; and (4) reduce the impact of nonpoint sources (SWRCB 1995a and 1997). The 303(d) list is expected to play an integral role as RWQCBs prioritize watersheds in the WMI process.

Several persons who commented on the 1997 draft Policy and FED requested an overview of the WMI. The following information is an excerpt from the 1998 SWRCB/RWQCB Integrated Plan for Implementation of the Watershed Management Initiative:

> INTRODUCTION
>
> The Integrated Plan contains eleven Chapters (one each for State Board and USEPA, and one each for the Regional Boards). The Chapters contain the strategies and proposed activities of those organizations to implement the Watershed Management Initiative (WMI). Chapters contain prioritized inventories of all planned activities at each organization over the next five years.
>
> The WMI is attempting to achieve the water quality goals in all of California's watersheds by supporting the development of local solutions to local problems with the full participation of all affected parties. Some commitments have already been made by Water Boards to work collaboratively with local stakeholders to meet specific watershed goals. This implementation plan supports the need to live up to these commitments.
>
> The State and Regional Boards in partnership with the U.S. Environmental Protection Agency (EPA) have put forward the integrated planning process to more effectively and efficiently direct the limited State and federal funds to the highest priority activities. Priorities are based on the strategies that each Regional Board has developed to address the watersheds within its boundaries. Statewide priorities are developed by the State Board with participation of the Regional Boards and EPA.
>
> The WMI will try to make the best possible use of existing funds and will provide justifications for requests for additional funds, based on the priorities set at the individual organizations. Efforts made to date to implement the WMI have identified greater needs for resources than were previously realized. The effort to determine the true extent of

resources needed to address water quality problems in California, and to prioritize these needs, will continue to be key to successfully implementing the WMI.

This implementation plan focuses on integrating the water quality activities of the State and Regional Boards, and the EPA. These include regulatory, monitoring, assessment, planning, standard setting, and nonpoint source activities, etc. The need to coordinate these activities with the related efforts at other State, local, and federal agencies will also be addressed, as will the need to coordinate with local stakeholders and non-agency initiatives and interest.

WMI CHAPTERS

The Chapters describe the management plan under which each organization intends to operate. They explain how and why organizational goals and priorities were established and describe the strategies to be used to achieve the water quality goals. The strategies have both an annual component of which activities will be done in the next year and a five year plan component.

The Chapters identify both funded and currently unfunded activities. The unfunded activities will be identified in the Chapters, in part to support requests for funding (e.g. the preparation of BCP's to get additional funding). The watershed strategies and priorities in the Chapters will be used to justify the need to fund currently unfunded activities.

Future updates of the Chapters are scheduled to be done in November of each year and will incorporate the use of watershed performance measures that are specifically designed to evaluate the degree to which organizations have met the watershed goals and objectives stated in their Chapters. These measures will target those high priority activities currently conducted that are not well represented by the use of standard "bean counts".

A WMI Workgroup has been formed to plan for and support implementation of the WMI. The Workgroup is composed of representatives of the State Board, the nine Regional Boards, and the USEPA. The Workgroup itself will not make fiscal decisions. That responsibility primarily rests with the managers of the eleven organizations (e.g. Executives, the MCC, and ultimately the Board Members). The Workgroup, working closely with the relevant program staff, will review specific water quality decisions and will evaluate how they are made. The Workgroup may then make recommendations to management on how these decisions could be made to better support the watershed management strategies at the State and Regional Boards.

Other functions of the Workgroup include:

1. Facilitating communication and coordination amongst Regional Board, State Board, and USEPA staff.

2. Providing a forum for outside agencies to learn about the Watershed Management Initiative and for the Water Boards to learn about watershed management activities at other agencies.

3. Assisting local stakeholder efforts by identifying opportunities for watershed training, technical assistance, and financial assistance.

RWQCB Approach

Individual RWQCBs are expected to take a variety of approaches to watershed management, which may include the following:

- RWQCBs may pursue watershed management activities in areas other than those that pose the greatest risk to human health or ecological resources in order to protect pristine waters, take advantage of strong stakeholder interest, or because they must address other important WMAs [watershed management areas].

- RWQCBs will attempt to implement watershed management activities in full coordination with stakeholders.

- RWQCBs will identify priority watersheds for focused attention.

- RWQCBs will focus significant amounts of their resources in WMAs, but they will also have to maintain a baseline presence throughout their regions to address other issues that are not amenable to the watershed approach.

- RWQCBs will identify opportunities for flexibility in Federal and State mandates (schedules, workplan requirements, permit-renewal cycles, reporting requirements) which will facilitate the implementation of regulatory programs on a reasonable schedule within a watershed or WMA.

- RWQCBs will take advantage of in-house coordination between existing programs (e.g. Nonpoint Source, NPDES, monitoring and assessment) to support water quality protection on a watershed basis.

Public Advisory Task Forces

Outlined below are the recommendations made in 1995 by the Public Advisory Task Forces regarding the issues of watershed management and TMDLs.

The Watershed Task Force set forth the following Mission Statement and Objectives:

> "Mission Statement: Provide input to the ISWP and EBEP to ensure that they are implemented in a manner that promotes a coordinated and comprehensive approach to addressing all factors affecting water quality.

Objectives:

A. Describe watershed management and ensure it is promoted in ISWP and EBEP as an implementation strategy for protecting beneficial uses.

B. Promote net environmental gain concept in ISWP and EBEP.

C. Measure the effectiveness of watershed management approach on a water quality on a statewide and on an individual watershed basis.

D. Consideration of site-specific objectives may be part of [the] watershed management planning process.

E. Assure commitment by State Board, Regional Boards, U.S. EPA, and other entities.

F. Ensure adequate and accurate information on which to base decisions.

G. Promote public awareness, education, and involvement."

The Permitting and Compliance Issues Task Force recommended that the TMDL process be included in the statewide water quality control plans and include such topics as:

- use of a collaborative, watershed process emphasizing the inclusion of all affected parties;
- a detailed discussion of the criteria for determining whether a water body is impaired and for listing (and delisting) it on the Section 303(d) list;
- guidance for choosing monitoring stations;
- net environmental gain;
- adjustment of individual pollutant TMDLs based on net environmental gain;
- definition of procedural steps and roles of participants; and
- calculation of effluent limits based on WLAs.

Some members of this task force believed that the present U.S. EPA process for TMDLs is cumbersome and time-consuming and that scarce resources should be focused more directly on water quality improvements. They recommended a broader definition of TMDL than envisioned by U.S. EPA.

The Agricultural Waters Task Force recommended a planning process in which agricultural waters would be identified, categorized, assessed, and prioritized. This task force went on to recommend use of watershed management or nonpoint source management approaches and in certain circumstances a fairly detailed watershed regulatory approach for agricultural water. This task force also recommended that statistics identifying TMDLs and WLAs should not be required - instead TMDLs should be viewed as a tool to mitigate water quality impacts if other tools have been ineffective.

III. ALTERNATIVES FOR SWRCB ACTION

Alternative 1. No Action. This provision of the Policy does not create new regulatory provisions for watershed management or TMDLs. These activities are already being developed by U.S. EPA, the SWRCB, and RWQCBs. However, including reference to watershed management and TMDLs in this Policy may encourage stakeholders to move toward a local, collaborative approach to watershed management. For this reason, it is worthwhile to include this information in the Policy.

Alternative 2. Adopt recommendations of Watershed Task Force. The SWRCB staff recommend addressing the Watershed Task Force's Objective A by discussing the breadth, purpose, and process of watershed management and by stating that SWRCB policy is to encourage stakeholders to use the watershed approach to address water quality issues. The SWRCB and RWQCBs are moving toward a watershed approach (see above description of WMI). The intent of the task force Objective A recommendations, as well as some of the language recommended by this task force, should be incorporated into the Phase 1 policy to encourage everyone involved to utilize opportunities for a watershed management approach to address water quality problems involving priority pollutants whenever it is feasible to do so.

Site-specific objectives and how special studies for issues such as site-specific objectives could fit into watershed management planning (task force Objective D) should be discussed in sections of the Phase 1 policy that address these issues. (See Policy and FED sections for these topics.) The development of SWRCB policy regarding the other objectives of this task force (measuring effectiveness of a watershed management approach [Objective C] and public education [Objective G]) are being addressed by the SWRCB and RWQCBs, to the extent it is appropriate to do so, as part of the WMI process. Promotion of the concept of net environmental gain (Objective B) is not being addressed at this time. The SWRCB and RWQCBs are committed to the watershed management planning process (Objective E) as outlined in the WMI. However, the SWRCB cannot “regulate” commitment by other agencies. It is not appropriate to regulate the adequacy and accuracy of information used by watershed stakeholder groups for their decision-making process (Objective F). These decisions should be left to the local stakeholder groups.

The task force also recommended a TMDL process that is more "flexible" than the process set forth in the Clean Water Act and in federal regulations. The SWRCB continues to encourage U.S. EPA to provide flexibility and a collaborative approach to development of TMDLs. It is, however, ultimately U.S. EPA which will establish this process in the 40 CFR TMDL regulations currently under consideration.

Alternative 3. Adopt recommendations of the Permitting and Compliance Issues Task Force. The Phase 1 policy should encourage~~s~~ and provide~~s~~ an explanation of a collaborative, watershed approach to addressing water quality issues as recommended by this task force. The development of SWRCB policy regarding the other recommendations of this task force (determining how a water body is listed or delisted, definition of procedural steps and participant roles in watershed planning and TMDLs, guidance for selection of monitoring stations, net environmental gain) are not being addressed in the proposed Policy. The SWRCB is developing regulations to guide 303(d) listing and delisting. U.S. EPA regulations guide many of the procedural steps for TMDLs. SWRCB and RWQCB watershed planning is laid out in the WMI; it is, however, not appropriate for the proposed Policy to set forth procedures for local watershed groups. Such procedures are best developed by the local stakeholder groups. Guidance for selection of monitoring stations for metals translator studies is set forth in U.S. EPA guidance (The Metals Translator: Guidance for Calculating a Total Recoverable Permit Limit from a Dissolved Criterion, June 1996, EPA 823-B-96-007). In addition, the SWRCB is developing a "Plan for Implementing a Comprehensive Program for Monitoring Ambient Surface and Groundwater Quality." This plan will develop ambient water sampling designs that may be utilized by watershed groups. This task force's recommendations regarding listing and delisting have been forwarded to the RWQCB staff who are developing 303(d) listing regulations.

This task force's recommendations regarding TMDLs could not be incorporated in a State policy because, as stated in response to the recommendations of the Watershed Task Force, the process for TMDLs is set forth in federal regulations. Stakeholders certainly can and are encouraged to proceed with actions that improve water quality. Whether their actions meet TMDL requirements though, is another issue.

Alternative 4. Adopt recommendations of Agricultural Waters Task Force. The Phase 1 policy is not specifically addressing the implementation of water quality standards in agricultural waters. The Phase 1 policy cannot, therefore, specifically address the prioritization of agricultural waters.

As recommended by this task force, the Phase 1 policy should include language that encourages the use of watershed management and nonpoint source management approaches to address water quality issues. This task force also recommended in certain circumstances some fairly detailed procedures for the watershed management process. These procedures can be utilized in a watershed if the stakeholders choose to do so; however, for the reasons identified by the Watershed Task Force (below), the SWRCB is not requiring that these specific processes be followed:

> "...The bottom-up or grass roots approach has often consisted of voluntary efforts taken by local watershed stakeholders to control nonpoint sources and enhance beneficial uses via collaborative problem-solving. Because participants in these efforts have seen their interests effectively addressed, commitments have remained strong, and lasting, on-the-ground results have been achieved. In contrast, the top-down or regulatory approach consists of command-and-control specification of procedures, products, schedules, participants, etc. If regulators focus too heavily on procedural concerns, local stakeholder

> interests risk being neither identified nor addressed, commitment may be lacking, and improvements in beneficial uses may be nonexistent. A straightforward indication of the lack of attention to local stakeholders' real interests will be the development of watershed management plans that are never implemented. The regulatory approach can be useful in fostering the participation of stakeholders; however, it will usually be of more importance to focus on a grass roots watershed management approach."

As stated in the discussion of Alternative 3, stakeholders can proceed with beneficial actions even though a TMDL has not been written. However, federal TMDL requirements must ultimately be met, and be incorporated in the watershed management plans, for water quality-limited waters included on the 303(d) list.

Alternative 5. SWRCB staff develop, in consultation with RWQCB staff, criteria and guidance on TMDLs and watershed management approach. As described earlier in this FED section, the SWRCB supports watershed management both from a Policy perspective and through the WMI. The current focus of the WMI is on the development of watershed management strategies at each of the RWQCBs. These strategies will emphasize regulatory coordination and flexibility to focus on the most important problems (i.e., targeted watershed activities). These strategies are contained in each RWQCB's chapter of the WMI.

As also discussed earlier in this FED, U.S. EPA sets forth regulations for development of TMDLs.

Alternative 6. Encourage use of existing watershed management and TMDL opportunities. The Watershed, Permitting and Compliance Issues, and Agricultural Waters public task forces recommended that the SWRCB encourage the watershed approach to addressing water quality issues. As explained earlier in this FED section, the SWRCB encourages and supports, both as a matter of policy and through the WMI, a collaborative, consensus-based watershed management approach to addressing water quality problems. Additionally, TMDLs can be developed to address water quality issues in a watershed. Local watershed management groups can develop TMDLs for both 303(d) or non 303(d) listed water bodies if they comply with federal TMDL regulations. However, a watershed group has less flexibility to develop stakeholder-driven TMDLs if they wait for U.S. EPA or RWQCBs to develop the TMDLs.

Under this alternative, the Policy would not create new procedures or guidelines for watershed management or TMDLs. It encourages the use of these existing approaches to addressing water quality issues and provides a brief explanation of these approaches. Because these provisions would not have regulatory effect, they would be included as an appendix to the Policy.

IV. STAFF RECOMMENDATION

Adopt Alternative 6.

CHAPTER 5.5 EXCEPTIONS

I. PRESENT STATE POLICY

While the SWRCB does not have a general policy regarding exceptions to either water quality objectives or to provisions implementing those water quality objectives, it has established a precedent, in the Ocean Plan for allowing consideration of exceptions to State plans. Specifically, the Ocean Plan allows the SWRCB, in compliance with the California Environmental Quality Act, subsequent to a public hearing, and with the concurrence of the U.S. EPA, to grant exceptions to the Ocean Plan where the SWRCB determines that granting the exception will not compromise protection of ocean waters for beneficial uses, and that the public interest will be served.

Additionally, of those regions which have adopted prohibitions of discharge in their basin plans, the North Coast, San Francisco Bay, Central Coast, and Lahontan regions allow for exceptions to those prohibitions.

II. ISSUE DESCRIPTION

The provisions of the proposed Policy are based on general, statewide conditions with the intent of providing statewide consistency in implementing the CTR criteria and the toxicity water quality objective for the reasonable protection of beneficial uses. Despite the Policy goal of statewide consistency, the SWRCB recognizes that there are inherent differences between the nine hydrologic basins of the State and site-specific differences within the basins. Where site-specific conditions in individual water bodies or watersheds differ sufficiently from statewide conditions and those differences cannot be addressed through other provisions (e.g., site-specific objectives), an exception to the Policy may, therefore, be appropriate.

The U.S. EPA water quality standards regulations authorize the states to grant exceptions to their water quality standards. Specifically, the regulations allow the states to include policies in their water quality standards "generally affecting their application and implementation, such as ... variances" (40 CFR э131.13). The purpose of a variance is to provide a mechanism for not changing the underlying standards, while, at the same time, allowing NPDES permits to be issued in compliance the Clean Water Act (U.S. EPA 1994). A variance is a type of exception from water quality standards. In general, two types of exceptions from standards, including policies that implement the standards, are possible:

1. *Categorical exceptions* for categories of discharges, such as legally-mandated resource and pest management activities, and
2. *Case-by-case exceptions* specific to individual permitted dischargers.

Categorical exceptions would allow temporary, short-term, or seasonal exceedance of water quality standards for categories of discharges, such as, discharges incidental to pest control or resource management activities. The rescinded ISWP/EBEP referred to this type of exception as a "variance". The language of the rescinded ISWP/EBEP was not inclusive of all State, Federal, and local agencies with pest control and resource management responsibilities. The rescinded ISWP/EBEP specified that the RWQCBs could, "after compliance with the California Environmental Quality Act (CEQA), allow short-term variances [categorical exceptions] from plan provisions, if determined to be necessary to implement control measures for vector and weed control, pest eradication, or fishery management which [were] being conducted to fulfill statutory requirements under California's Fish and Game, Food and Agriculture, or Health and Safety Codes." The rescinded ISWP/EBEP also stated that RWQCBs could, "after compliance with CEQA, allow short-term or seasonal variances from plan provisions, if determined necessary, to implement control measures regarding drinking water which are being conducted to fulfill statutory requirements under the Federal Safe Drinking Water Act or the California Health and Safety Code" and "[s]uch variances may also be granted for draining water supply reservoirs, canals, and pipelines for maintenance, for draining municipal storm water conveyances for cleaning or maintenance, or for draining water treatment facilities for cleaning or maintenance." The Toxicity Task Force recommended that the language of the rescinded ISWP/EBEP be retained.

State and local agencies with statutorily-required resource management or pest control responsibilities would be the primary recipients of categorical exceptions to allow them flexibility in meeting their mandates. If such agencies are not granted categorical exceptions from water quality standards, most would have to substantially change their practices to labor intensive, longer term, higher cost alternatives. In some cases, alternative methods of pest management may not be available.

As there is no statewide policy regarding categorical exceptions, a few RWQCBs have addressed some of the above resource and pest management issues using different approaches. Where a RWQCB has demonstrated a reasonable, reliable, and successful approach to resource/pest management, that approach could be expanded statewide. For example, the Lahontan RWQCB addresses the use of rotenone for fishery management through basin plan provisions and a memorandum of understanding (MOU) with the DFG. The Department of Health Services, Environmental Health Branch has a permit from the U.S. Army Corps of Engineers and CWA Section 401 certification from the SWRCB for mosquito abatement activities in wetlands in the San Francisco Bay, and parts of the North Coast, Central Coast, and Central Valley regions. A successful regional approach, expanded into all applicable regions, has the advantage of known success and increases statewide consistency.

Case-by-case exceptions would allow consideration of exceptions to Policy provisions for individual permitted dischargers. The Permitting and Compliance Issues Task Force recommended that this type of exception be allowed after compliance with CEQA and where the exception would not compromise protection of beneficial uses and is in the public interest. This approach is consistent with existing Ocean Plan provisions.

III. ALTERNATIVES FOR SWRCB ACTION

Alternative 1. <u>No action</u>. Under this alternative, the SWRCB would not allow consideration of exceptions to the Policy provisions. RWQCBs would be required to implement the Policy provisions without modification. Consequently, discharges associated with resource and pest management activities, as well as other activities, would have to meet water quality standards. This alternative limits not only SWRCB and RWQCB flexibility, but also the flexibility of other State and local resource agencies. For resource/pest management agencies, it could result in higher short- and long-term costs from conversion to mechanical, manual, or other alternative methods. This alternative would eliminate any possibility of impacts to non-target species during pest management activities. Overall effectiveness of pest management could be hampered. This alternative could lead to inadequate protection of sensitive water bodies in the State, and conversely to over regulation of some resource management discharges, i.e., beyond what is necessary for the protection of beneficial uses. With the promulgation of Federal water quality criteria and/or State adoption of water quality objectives, the potential for violation of the new water quality standards would increase if chemical methods are employed by the agency responsible for the resource/pest control action. This alternative is not consistent with the precedent set in the Ocean Plan.

Alternative 2. Allow the RWQCBs to grant categorical short-term or seasonal exceptions for resource management and pest control activities provided certain conditions are met. Under this alternative, a RWQCB could allow exceedance of the CTR criteria or toxicity objective for a limited period of time for statutorily-mandated resource management and pest control activities if the following conditions are met:

- The discharger must: notify potentially affected public and governmental agencies and provide a detailed description of the proposed action, including the proposed method of completing the action, time schedule, discharge and receiving water quality monitoring plan (before project initiation, during the project, and after project completion, with the appropriate quality assurance and quality control procedures), project CEQA documentation, contingency plans, identification of alternate water supply (if needed), residual waste disposal plans, and, upon completion of the project, certification by a qualified biologist that the receiving water beneficial uses have been restored.

This alternative provides flexibility to the RWQCBs and the resource management agencies, and the specified conditions for approval would ensure long-term protection of beneficial uses. Categorical exceptions would allow exceedance of one or more CTR criteria or the toxicity objective and may result in impairment of beneficial use(s) during the span of the exceptions. The specified conditions could nominally increase resource/pest management agency costs for increased monitoring and documentation.

Alternative 3. Allow case-by-case, discharger-specific exceptions to the proposed Policy that may be granted by the SWRCB provided certain conditions are met. Where site-specific conditions in individual water bodies or watersheds differ sufficiently from statewide conditions and those differences cannot be addressed through other provisions of the Policy, the SWRCB may, in compliance with the California Environmental Quality Act, subsequent to a public hearing, and with the concurrence of the U.S. EPA, grant an exception to meeting a CTR criterion, the statewide toxicity objective of this Policy, or any other provision of this Policy where the SWRCB determines:

1. The exception will not compromise protection of enclosed bay, estuarine, and inland surface waters for beneficial uses, and

2. The public interest will be served.

IV. STAFF RECOMMENDATION

Adopt Alternatives 2 and 3.

CHAPTER 6 SPECIAL STUDIES

I. PRESENT POLICY

Currently, there is no statewide policy for conducting special studies. However, the Los Angeles RWQCB has some guidance regarding special studies for site-specific objectives in their basin plan. RWQCBs do have the discretion to conduct studies as they see the need.

II. ISSUE DESCRIPTION

The CTR is promulgating chemical-specific, numeric criteria for priority toxic pollutants for the State of California. These criteria are based on Federal criteria guidance and recent recalculations of those criteria guidance. The CTR criteria were derived and are intended to protect human health and aquatic life, and they apply generally to surface waters, excluding ocean waters. In addition, the State's proposed Policy includes a toxicity objective for the non-ocean surface waters of the State.

In some instances, implementing the CTR criteria, SWRCB toxicity objective, or application of existing basin plan objectives for priority toxic pollutants may require a special study. A special study can examine the site-specific factors of a water quality issue for a specified portion of the waters of the State. Obtaining site-specific data through a special study can provide data necessary for regulatory or watershed decisions.

For example, a discharger may want to propose a mixing zone for effluent that is being discharged to a stream. In order to determine the appropriate size of the mixing zone, a study evaluating the characteristics of the discharge and stream may be necessary (see Chapter 1.2.2). The study may be complex enough that other regulatory agencies or stakeholders are involved.

In other instances, the CTR criteria may not be appropriate for a water body of concern. A special study may be useful to determine whether the site warrants a site-specific objective and what that objective should be. The study would evaluate such things as the beneficial uses of the water body, environmental characteristics of the water body, and water quality conditions that could reasonably be achieved.

Special studies may also be used to: conduct a use attainability analysis pursuant to 40 CFR 131.10; conduct regional ambient monitoring; conduct a metals translators study (see Chapter 1.2.1); evaluate reasonable potential to exceed CTR criteria in a water body (see Chapter 1.1); conduct contaminant fate and transport monitoring, etc.

In addition, some water quality problems may be better addressed on a watershed or water body basis rather than by an individual discharger (see Chapter 5.4). The SWRCB wishes to encourage and facilitate collaborative water body and watershed approaches, emphasizing the inclusion of all affected stakeholders. Stakeholders may identify a need for a special study to address such issues as site-specific objectives, TMDL/WLA/LA (including using partnership and trading principals), etc., or may find that a monitoring study may be useful to identify the causes and effects of water quality problems.

The Site-Specific Objectives Task Force made the following recommendation regarding incorporation of a "Decision Tree" into the proposed Policy:

> "While the task force recognizes that SSOs should be an integral part of the revised plans, we recognize that other regulatory options may be appropriate in some cases. The Decision Tree and supporting narrative discussion are intended to encourage constructive dialogue among stakeholders attempting to select the most appropriate regulatory option (e.g., Total Maximum Daily Load, Use Attainability Analysis, SSO, or permit relief). The decision tree is designed to guide users through a series of questions which may help to determine: (1) if there is a current or potential water quality issue requiring action; (2) the nature of the identified water quality issues; (3) the most likely regulatory action. The decision tree is intended for guidance only--it is not intended as a prescriptive regulatory tool."

While there are many types of special studies, there are, nonetheless, elements common to how each of them should be conducted.

In providing guidance regarding studies for the development of site-specific objectives, the Los Angeles Basin Plan states that "[e]arly planning and coordination with Regional Board staff will be critical to the development of a successful plan for developing SSOs." The basin plan goes on to provide that "[a] detailed workplan will be developed with Regional Board staff and other agencies (if appropriate)" ... and that "State Board staff and the USEPA will participate in the development of the studies so that there is agreement on the process from the beginning of the study." The Los Angeles Basin Plan also includes specific factors that should be addressed when considering site-specific objectives.

Three of the public advisory task forces made recommendations regarding the need for a policy for conducting special studies. These three task forces identified the following issues, that are applicable to common elements of organizing and conducting special studies, that should be considered:

- Procedures for identifying and developing water quality issues and solutions to ensure that they are developed in an appropriate manner which is both efficient and consistent with applicable regulations;

- Identification of responsible parties for funding, managing, and executing the study;
- The propriety of conducting the studies on a water body or watershed basis;

- The necessity for interim permit limits during the special studies process;

- Development of an agreement among all parties before the process begins and a procedure to review the agreement if necessary;

- Development of a process that is both legally and scientifically defensible;

- Formalization of the peer review process; and

- Development of a dynamic process that encourages interest based, collaborative problem solving.

The Site-Specific Objectives Task Force made recommendations for policy language to establish a "framework for the development of SSOs." As a part of these recommendations, the task force made some recommendations that could be applicable to many types of special studies. These recommendations are outlined below.

<u>Compliance Schedules and Interim Limits</u>
"...During the period when site-specific objectives studies are being conducted, the Regional Board shall place effluent limits based upon the statewide water quality objectives into NPDES permits and waste discharge requirements only in conjunction with an appropriate compliance schedule. The compliance schedule shall allow sufficient time for collection of data, completion of SSO studies, and determination of compliance measures. While SSO studies are being conducted, interim effluent limits may be established by the Regional Board as provided in the Plan. Following final adoption of a site-specific objective, existing effluent limits shall be replaced with effluent limits consistent with the adopted site-specific objective. In the event that, for reasons beyond the control of the permittee, a decision whether or not to adopt site specific objectives has not been made before the end of the compliance schedule, the compliance schedule shall be extended for an additional period to allow time for a decision whether or not to adopt an SSO. However, in no event may a compliance schedule exceed the time period allowed for compliance with the statewide water quality objectives in the Plan, unless a variance has been granted."

<u>Memorandum of Understanding (MOU)/Management Agency Agreement (MAA)</u>
"...Prior to proceeding with site-specific objectives studies, the Regional Board shall enter into an MOU/MAA with interested parties, including, but not limited to, U.S. EPA Region IX, the SWRCB, and the affected dischargers.

(a) The MOU/MAA shall include the following elements: Formation of a project team, including the signatories to the MOU/MAA, the State Department of Fish and Game, the U.S. Fish and Wildlife Service, and public interest groups.
(b) Responsibilities of the parties.
(c) Budget and cost-sharing plan.
(d) Administrative policies and procedures to govern oversight of the SSO process.
(e) Project schedule.
(f) A process for conflict resolution.
(g) Development of an SSO work plan."

Peer Review Panel
"...If, during the data interpretation phase of technical site-specific studies, the Regional Board, State Board, EPA Region IX, and/or other interested parties have differing opinions with regard to the interpretation of data collected in establishing the scientifically defensible potential objective(s), the Regional Board shall seek the advice of an independent scientific review panel consisting of at least three scientists with expertise in the field of aquatic toxicology and water quality criteria development methodology. The method of selecting the panel and other details regarding the conflict resolution process shall be included in the MOU. The findings of the scientific review panel shall be provided to the parties to the MOU, and made available to the members of the Regional Board in the event a scientific dispute remains unresolved at the time the scientifically defensible potential objective(s) is presented to the Regional Board for consideration."

Environmental and Economic Review
"...To ensure that economic and environmental impacts are adequately addressed, the Regional Board staff shall, as part of the SSO work plan:

(i) Direct the preparation of an economic analysis documenting the economic impacts from one or more of the scientifically defensible potential objective(s) and the projected effluent limits derived from the objective(s) and present the economic analysis to the Regional Board;
(ii) Comply with the California Environmental Quality Act."

Following are Permitting and Compliance Issues Task Force recommendations regarding special studies.

"...Many studies, e.g., studies necessary to develop TMDLs, would logically be done on a water body or watershed basis rather than on an individual discharger basis and would logically be funded by the State or jointly funded by multiple dischargers. But there are often not institutional structures in place that would facilitate joint funding of water body or watershed studies.

A. CONCERN
1. A number of the monitoring and other studies required in conjunction with the Statewide Plan implementation will involve considerable expenditures.

2. The State Board, Regional Boards, and local agencies in many cases will not have money budgeted to perform any significant studies. Smaller dischargers may be especially hard-pressed to fund significant studies.

B. RECOMMENDATION
1. The Statewide Plans need to contain a policy on who is responsible for designing, funding, managing, and approving the various types of special studies that may be necessary during plan implementation.

2. The policy must be fair and not just pass on to local agencies or private parties responsibilities and costs that are the responsibilities of the State.

3. The policy must address the reality that many small and medium-sized dischargers may not have the resources necessary to perform studies on their own.

4. The Statewide Plans need to encourage and facilitate water body and watershed studies where appropriate...

...For all of these studies, responsible parties for funding, managing, and executing need to be identified..."

The Watershed Task Force expressed that the SWRCB should implement their ISWP and EBEP in a manner that promotes a coordinated and comprehensive approach to addressing all factors affecting water quality. In addition, this task force recommended flexibility in compliance schedules when stakeholders are involved in watershed efforts; interest based, collaborative problem solving; and an equitable sharing of costs. The Watershed Task Force made the following statement in support of the benefits of grass roots organization and control.

"...The bottom-up or grass roots approach has often consisted of voluntary efforts taken by local watershed stakeholders to control nonpoint sources and enhance beneficial uses via collaborative problem-solving. Because participants in these efforts have seen their interests effectively addressed, commitments have remained strong, and lasting, on-the-ground results have been achieved. In contrast, the top-down or regulatory approach consists of command-and-control specification of procedures, products, schedules, participants, etc., et. If regulators focus too heavily on procedural concerns, local stakeholder interests risk being neither identified nor addressed, commitment may be lacking, and improvements in beneficial uses may be nonexistent. A straightforward indication of the lack of attention to local stakeholders' real interests will be the development of watershed management plans that are never implemented. The regulatory approach can be useful in fostering the participation of stakeholders; however, it will usually be of more importance to focus on a grass roots watershed management approach."

III. ALTERNATIVES FOR SWRCB ACTION

Alternative 1. No action. Under this alternative, there would be no statewide guidance to help RWQCBs or stakeholders organize and conduct special studies in an efficient manner that is consistent with applicable regulations.

Alternative 2. Adopt the recommendations of the Site-Specific Objectives Task Force. The recommendations of the this task force were developed for site-specific objectives studies; however, some of the concepts could be applied to other types of studies.

This task force's recommendations regarding compliance schedules and use of a scientific review panel should be included in statewide guidance for special studies; however, SWRCB staff recommend that they be incorporated as advisory, rather than mandatory, for two reasons.

First, a special studies policy will be used to help RWQCBs and other stakeholders develop many types of studies. (The recommendations of the Site-Specific Objectives Task Force addressed only that specific type of study; however most concepts can be applied to other types of studies.) Some studies will be very simple and involve few interested persons. Others may take longer and be more complex; involving numerous other regulatory agencies and stakeholders with various roles and interests regarding the purpose of the study. SWRCB staff do not believe it is appropriate to impose mandates for studies that may be appropriate for some, but overly burdensome and bureaucratic for other studies.

Second, stakeholders should be allowed to develop flexible and innovative solutions for water quality problems in their watershed. If the specific process of a special study is developed by a consensus process, there will be more cohesion between stakeholder groups and they will remain more committed to the project's goals. In addition, the recommendations of the Watershed Task Force emphasizes the importance of allowing stakeholders to take a grass roots approach to water quality issues instead of a regulatory approach.

Rather than requiring formal MOUs or MAAs for special studies, there is a need for a workplan to plan and coordinate study activties with RWQCB staff and other interested persons. The Site-Specific Objectives Task Force's recommendations regarding consideration of economic impacts and the California Environmental Quality Act should be incorporated in any statewide guidelines.

Language specifically addressing the development of site-specific objectives and amendment of waste discharge requirements or permits should not be included in statewide guidance for special studies, because the guidance should address many types of studies. The development of site-specific objectives should be addressed separately.

The Decision Tree and associated narrative discussion recommended by the Site-Specific Objectives Task Force could be incorporated into a statewide guidance document on special studies if a few modifications are made. These modifications will ensure that the guidance is applicable to many types of studies

Alternative 3. Adopt the recommendation of the Permitting and Compliance Issues Task Force. The SWRCB recognizes the concerns of the Permitting and Compliance Issues Task Force that agencies and/or dischargers may not have the resources to perform studies on their own. However, the SWRCB cannot set policy which provides formulas for cost-sharing or requires interested parties to contribute designated portions of the costs of a study. Agencies (including the SWRCB and RWQCBs) and/or dischargers must also obtain funding through their respective budgetary processes. There is a shortage of funds for special studies, and, where appropriate (e.g., a watershed study), the sharing of costs among those who support the overall goals of the study should be encouraged. Such cost sharing clearly depends on availability of funds.

The proposed Policy recognizes the importance of determining who is responsible for funding, managing, and executing the study. These issues must, however, be determined on a case-by-case basis considering who is involved in the study, the roles the stakeholders wish to play, and availability of funding. The proposed Policy recommends that the stakeholders define these roles and responsibilities early in the process of the study.

Alternative 4. Adopt the Recommendations of the Watershed Task Force. The proposed special studies Policy both encourages and allows for this watershed approach to solving water quality problems. The proposed Policy for special studies is flexible and avoids specification of procedural requirements so that stakeholders can find solutions to water quality problems that also address their own interests.

IV. STAFF RECOMMENDATION

Adopt a combination of Alternatives 2 through 4.