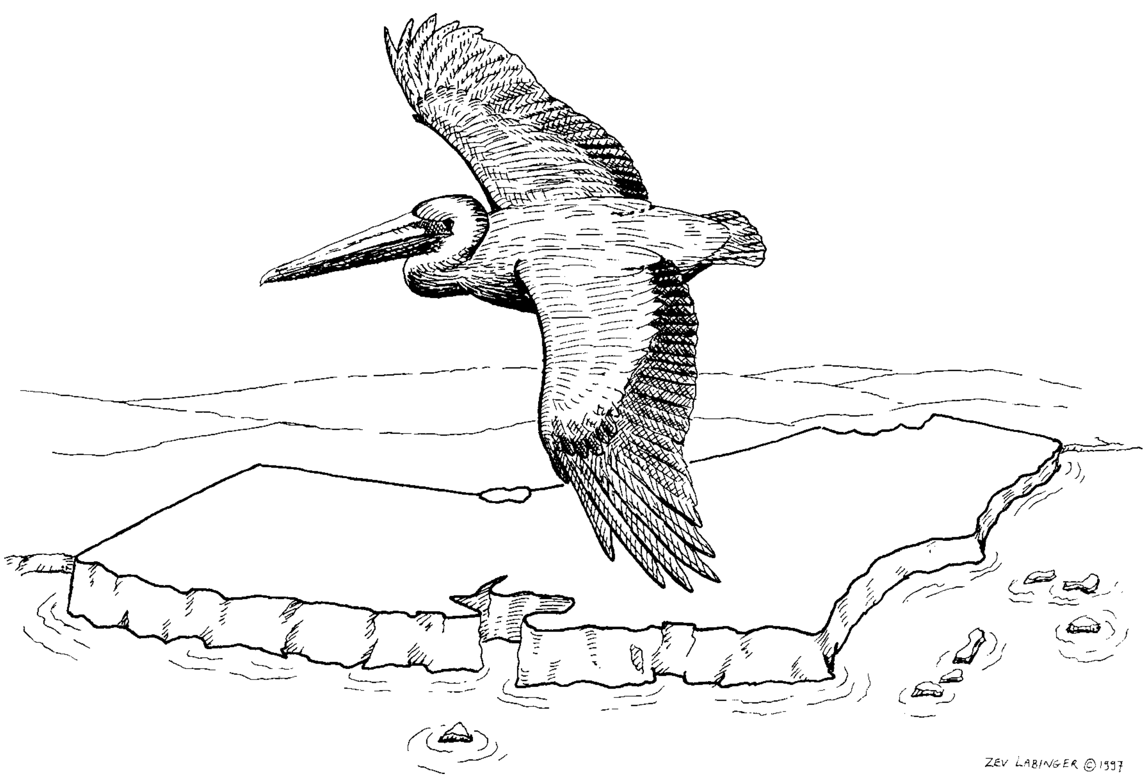
DRAFT

FUNCTIONAL EQUIVALENT DOCUMENT

AMENDMENT OF
THE WATER QUALITY CONTROL PLAN
OCEAN WATERS OF CALIFORNIA

CALIFORNIA OCEAN PLAN



August 2004

STATE WATER RESOURCES CONTROL BOARD
CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

STATE WATER RESOURCES CONTROL BOARD
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STATE WATER RESOURCES CONTROL BOARD
DIVISION OF WATER QUALITY

DRAFT FUNCTIONAL EQUIVALENT DOCUMENT

AMENDMENT OF THE WATER QUALITY CONTROL PLAN FOR OCEAN WATERS OF CALIFORNIA

CALIFORNIA OCEAN PLAN

AUGUST 2004

Terry Tamminen
Secretary for Environmental Protection

State Water Resources Control Board

Division of Water Quality

1001 I Street • Sacramento, California 95814 • (916) 341-5379
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Arnold Schwarzenegger
Governor

NOTICE OF FILING

To: Any Interested Person

From: State Water Resources Control Board
P.O. Box 100
Sacramento, CA 95812-0100

Subject: Notice of Filing submitted under Section 21080.5 of the Public Resources Code

Project Proponent: State Water Resources Control Board

Project Title: Water Quality Control Plan for Ocean Waters of California

Contact Person: Frank Roddy; Telephone: (916) 341-5379
Email: roddf@dwq.swrcb.ca.gov

Project Location: The Coastal Waters of California

Project Description: This is to advise that amendments to the Water Quality Control Plan for Ocean Waters of California have been filed. Amendments are proposed for: (1) Choice of indicator organisms for water-contact bacterial standards, and (2) Reasonable Potential: Determining when California Ocean Plan water quality-based effluent limitations are required.

Action on this amendment will be taken in accordance with Section 21080.5 of the Public Resources Code. The State Water Resources Control Board's planning program qualifies as a regulatory program exempt from the requirement to prepare an environmental impact report or negative declaration under the California Environmental Quality Act (Public Resources Code, §21000 *et seq.*)

Copies of the Functional Equivalent Document (which includes the draft California Ocean Plan and discussion of the proposed amendments) may be obtained from the contact person above, or on the internet at http://www.swrcb.ca.gov/plnspols/oplans/.

John L. Ladd for
Stan Martinson, Chief
Division of Water Quality

8/6/04
Date

Terry Tamminen
Secretary for Environmental Protection

State Water Resources Control Board

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Arnold Schwarzenegger
Governor

NOTICE OF PUBLIC HEARING

CALIFORNIA OCEAN PLAN AMENDMENTS

Wednesday, October 6, 2004 – 10:00 a.m.
Coastal Hearing Room – Second Floor
Joe Serna, Jr. Cal/EPA Headquarters Building
1001 "I" Street, Sacramento, CA 95814

NOTICE IS HEREBY GIVEN that the State Water Resources Control Board (SWRCB) will hold a public hearing to seek comments on proposed amendments to the 2001 Water Quality Control Plan for Ocean Waters of California (California Ocean Plan). An audio broadcast will be available at http://www.calepa.ca.gov/broadcast/.

BACKGROUND

The SWRCB held a public scoping meeting regarding four potential California Ocean Plan amendments on January 23, 2004. The scoping meeting was continued on February 3, 2004 at the SWRCB workshop.

During the February SWRCB workshop, the Board directed staff to conduct a new Triennial Review to determine if there are additional issues that should be reviewed for potential revision of the California Ocean Plan. A public hearing was held for the Triennial Review on May 24, 2004.

Based on comments received during the scoping meetings and public hearing, the SWRCB proposes to consider the following amendments to the California Ocean Plan as the first set of issues to be undertaken by this Triennial Review:

Issue 1 - Choice of Indicator Organisms for Water-Contact Bacterial Standards; and

Issue 2 - Reasonable Potential: Determining when California Ocean Plan Water Quality-based Effluent Limitations are required.

Additional issues will be considered for California Ocean Plan amendments later.

AVAILABLILITY OF DOCUMENTS

In compliance with the California Environmental Quality Act, the SWRCB has prepared a draft Functional Equivalent Document (FED) describing the proposed California Ocean Plan amendments. A downloadable version of the draft FED may be obtained on the SWRCB web site at http://www.swrcb.ca.gov/plnspols/oplans/. You may also receive copies by writing or calling: Jan Hisao, Division of Water Quality, State Water Resources Control Board, P.O. Box 100, Sacramento, CA 95812-0100; (916) 341-5568, FAX (916) 341-5584; or by email at hisaj@dwq.swrcb.ca.gov.

SUBMISSION OF COMMENTS

Persons wishing to comment or make recommendations on the proposed amendments at the public hearing should submit written comments, or a summary of their comments, in advance of the hearing. All comments and recommendations received will be considered by the SWRCB before taking action on the amendments. Written comments are due by 5:00 p.m., September 17, 2004 and should be submitted to:

Debbie Irvin, Clerk to the Board
Executive Office
State Water Resources Control Board
P.O. Box 100
Sacramento, CA 95812-0100
dirvin@swrcb.ca.gov

PARKING AND ACCESSIBILITY

There is a parking garage across from the Joe Serna, Jr. Cal/EPA Building with entrances on 10th and 11th Streets between "I" and "J" Streets, and metered parking spaces are in the vicinity of the building. For a map, see our web site at http://www.calepa.ca.gov/EPABldg/location.htm. The facilities are accessible to persons with disabilities. Individuals who require special accommodations are requested to contact Adrian Perez at (916) 341-5880 at least five working days prior to the public hearing date. Persons with hearing or speech impairments can contact us by using the California Relay Service Telecommunications Device for the Deaf (TDD). TDD is reachable only from phones equipped with a TDD Device. HEARING IMPAIRED RELAY SERVICE: TDD to voice 1-800-735-2929, Voice to TDD 1-800-735-2922.

All visitors are required to sign in and receive a badge prior to attending any meeting in the building. The Visitor and Environmental Services Center is located just inside and to the left of the Cal/EPA Building's public entrance. Valid picture identification may be required due to the security level. Please allow up to 15 minutes for this process.

Debbie Irvin
Clerk to the Board

August 5, 2004

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LIST OF ABBREVIATIONS

AB	Assembly Bill
ASBS	Areas of Special Biological Significance
BMP	best management practices
CCCW	California Coalition for Clean Water
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CV	coefficient of variance
CWA	Clean Water Act
CWC	California Water Code
DFED	Draft Functional Equivalent Document
DHS	Department of Health Services
DNQ	detected but not quantified
EIR	Environmental Impact Report
FED	Functional Equivalent Document
FFED	Final Functional Equivalent Document
GLS	Great Lakes System
MAC	Microbiological Advisory Committee
ml	milliliter
MLE	maximum likelihood estimator
MPN	most probable number
ND	non-detect
NPDES	National Pollutant Discharge Elimination System
NTAC	National Technical Advisory Committee of the Department of the Interior
POTW	publicly-owned treatment works
ROS	regression on order statistics
RWQCB	Regional Water Quality Control Board
SCCWRP	Southern California Coastal Water Research Project
SSM	single sample maximum
SWQPAs	State Water Quality Protection Areas
SWRCB	State Water Resources Control Board
TSD	Technical Support Document for Water Quality-based Toxics Control
UC	University of California
UCB	upper confidence bound
UCBN	Upper Confidence Bound for a population percentile when the data are Normally distributed
UCLB	Upper Confidence Bound for a population percentile when the data are Lognormally distributed
UCBLOS	Upper c100% Confidence Bound for the p100th percentile based on Lognormal Order Statistics
USEPA	United States Environmental Protection Agency

SUMMARY

The State Water Resources Control Board (SWRCB) staff has prepared this draft Functional Equivalent Document to consider two amendments to the California Ocean Plan. The report contains a description of the sections proposed for amendment.

Issues Proposed as Amendments

1. Choice of Indicator Organisms for Water-Contact Bacterial Standards: Staff proposes to add an enterococcus water-contact standard; delete the single sample standard currently in the California Ocean Plan and change it to a trigger for additional monitoring; and, require monitoring for total coliform at offshore stations.

2. Reasonable Potential: Determining when California Ocean Plan Water Quality-based Effluent Limitations are Required: Staff proposes to remove existing language that allows dischargers to certify that Table B pollutants are not present in their effluent *in lieu* of monitoring, and add general "reasonable potential" language to Chapter III (Program of Implementation) of the California Ocean Plan. Additional reasonable potential procedures will be added in the new Appendix VI of the California Ocean Plan.

INTRODUCTION

In July 1999, the State Water Resources Control Board (SWRCB) adopted Resolution No. 99-073 directing staff to review a series of high priority issues identified in the 1999-2002 Triennial Review Workplan (SWRCB 1999). Staff was further authorized to make recommendations to the SWRCB for any necessary changes to the California Ocean Plan. The SWRCB further resolved that the California Ocean Plan may be amended annually or as each major issue analysis is completed. The purpose of this report is to present staff recommendations for modification of some parts of the California Ocean Plan.

The SWRCB held a public scoping meeting, pursuant to Section 21083.9 of the Public Resources Code, on January 23, 2004 seeking input on the scope and content of the environmental information which should be included in this Draft Functional Equivalent Document (DFED). The following four issues were presented for discussion at the scoping meeting:

- Choice of Indicator Organisms for Water-Contact Bacterial Standards
- Establishing a Fecal Coliform Standard for Shellfish Harvesting Areas
- Reclassifying “Areas of Special Biological Significance (ASBS)” to “State Water Quality Protection Areas (SWQPAs)” and establishing implementation provisions for discharges into SWQPAs
- “Reasonable Potential:” Determining the likelihood that the concentration of a pollutant would cause or contribute to an exceedance of water quality standards

Fifteen written comments were received dealing predominately with agreement or disagreement with the proposals rather than discussing the environmental information which should be included in the DFED. Approximately 50 people attended the scoping meeting of which 18 gave oral testimony reiterating the written comments received.

At the request of Board members, the scoping meeting was continued at the February SWRCB Workshop on February 3, 2004. Eight people presented oral testimony. At the workshop, the SWRCB directed staff to suspend work on the proposed amendments and conduct a triennial review of the California Ocean Plan.

The SWRCB held a hearing for the triennial review of the California Ocean Plan on May 24, 2004. Written comments were received from 10 entities, the majority of which generally encouraged the SWRCB to continue with the proposed amendments. Based on the specific comments received and time constraints, the shellfish and ASBS issues will be addressed in future amendments.

Recommendations are made for resolving the following two issues:

Issue 1 - Choice of Indicator Organisms for Water-Contact Bacterial Standards; and

Issue 2 - Reasonable Potential: Determining when California Ocean Plan Water Quality-based Effluent Limitations are Required.

Background

The California Ocean Plan establishes water quality objectives for California's ocean waters and provides the basis for regulation of wastes discharged into the State's coastal waters. It applies to point and nonpoint source discharges. The SWRCB adopts the California Ocean Plan, and both the SWRCB and the six coastal Regional Water Quality Control Boards (RWQCBs) implement and interpret the California Ocean Plan.

Currently, the 2001 California Ocean Plan contains three chapters that describe beneficial uses to be protected, water quality objectives, and a program of implementation needed for achieving water quality objectives.

Chapter One of the California Ocean Plan identifies the applicable beneficial uses of marine waters. These uses include preservation and enhancement of designated Areas of Special Biological Significance (ASBS), rare and endangered species, marine habitat, fish migration, fish spawning, shellfish harvesting, recreation, commercial and sport fishing, mariculture, industrial water supply, aesthetic enjoyment, and navigation.

Chapter Two establishes a set of narrative and numerical water quality objectives designed to protect beneficial uses. These objectives are based on bacterial, physical, chemical, and biological characteristics as well as radioactivity. The water quality objectives in Table B apply to all receiving waters under the jurisdiction of the California Ocean Plan and are established for protection of aquatic life and for protection of human health from both carcinogens and noncarcinogens. Within Table B there are 21 objectives for protecting aquatic life, 20 for protecting human health from noncarcinogens, and 42 for protecting human health from exposure to carcinogens.

Chapter Three is divided into nine sections: (A) General Provisions; (B) Table A Effluent Limitations; (C) Implementation Provisions for Table B; (D) Implementation Provisions for Bacterial Assessment and Remedial Action Requirements; (E) Implementation Provisions for ASBS; (F) Revision of Waste Discharge Requirements; (G) Monitoring Program; (H) Discharge Prohibitions; and, (I) State Board Exceptions to Plan Requirements. Section A provides the guidance needed to design systems for discharges into marine waters by listing the considerations a discharger must address before a new discharge is permitted. Section A also identifies how ASBS are designated and the application of U.S. Environmental Protection Agency's (USEPA's) Combined Sewer Overflow Policy.

Section B contains effluent limitations for the protection of marine waters. The effluent limitations listed in Table A apply to all publicly owned treatment works (POTWs) and to industries that do not have effluent limitation guidelines established by the USEPA.

When a discharge permit is written, the water quality objectives for the receiving water are converted into effluent limitations that apply to discharges into State ocean waters. These effluent limitations are established on a discharge-specific basis depending on the initial dilution calculated for each outfall and the Table B objectives. Section C describes how Table B is to be implemented, including: calculation of effluent limitations; determination of mixing zones for acute toxicity objectives; toxicity testing requirements; selection of, deviations from, and use of minimum levels; sample reporting protocols; compliance determination; pollutant minimization program; and, toxicity reduction requirements.

Section D provides implementation provisions for bacterial assessment and remedial action requirements. The requirements provide a basis for determining the occurrence and extent of any impairment of beneficial use due to bacterial contamination, generate information which can be used to develop an enterococcus standard, and provide the basis for remedial actions necessary to minimize or eliminate any impairment of a beneficial use.

Sections E through I contain general provisions and sections on discharge prohibitions (e.g., municipal or industrial sludges, bypassing, discharges into ASBS, and others). The provisions mandate that the RWQCBs require dischargers to monitor their discharges. The provisions also provide mechanisms for allowing exceptions to the California Ocean Plan under special circumstances, provided that beneficial uses are protected and that the public interest is served.

History of the California Ocean Plan

The California Ocean Plan was first formulated by the SWRCB as part of the State Policy for Water Quality Control. Changes in the California Water Code (CWC) in 1972 required the SWRCB to redraft its proposed Policy as a Water Quality Control Plan. At that time, it was the intent of the SWRCB to "…determine…the need for revising the Plan to assure that it reflects current knowledge…" (SWRCB 1972). The California Ocean Plan was reviewed and amended in 1978 to fulfill the intent of the SWRCB and the requirements of State and Federal law for periodic review (SWRCB 1978). In 1983, a second review and revision were completed (SWRCB 1983a). Major changes to the California Ocean Plan in 1983 included the addition of several chemicals to the receiving water limitations, modification of the bacterial standards, and incorporation of parts of the 1972 and 1978 guideline documents.

In 1986, the CWC was amended to require the SWRCB to review the California Ocean Plan at least once every three years and to develop toxicity bioassays for use in compliance monitoring of toxicity in whole effluents. The next triennial review was performed in 1987 and resulted in California Ocean Plan amendments in 1988 and 1990. The 1988 amendments (SWRCB 1988) changed several beneficial use designations to be consistent with the SWRCB's standard list, revised water quality objectives in Table B, established a uniform procedure for granting exceptions to California Ocean Plan objectives, and made several relatively minor changes.

The 1990 amendments (SWRCB 1990a; 1990b) added the following: (1) an appendix for standard monitoring procedures to implement California Ocean Plan requirements; (2) a bacterial monitoring requirement for enterococcus; (3) now and/or revised water quality objectives to Table B for protection of aquatic life and human health; (4) definitions of acute and chronic toxicity to replace previous definitions; (5) a chronic toxicity objective to Table B; (6) a section on measuring toxicity to the appendix for implementing the acute toxicity requirement in Table A and the chronic toxicity receiving water objective in Table B; and (7) a list of seven critical life stage test protocols for use in measuring chronic toxicity.

Based on the 1992 Triennial Review, the SWRCB adopted a workplan that identified 24 high priority issues to be addressed (SWRCB 1992). The high priority issues fall into seven categories: (1) water quality objectives and regulatory implementation; (2) toxicity objectives and regulatory implementation; (3) bacterial standards; (4) administrative cleanup of California Ocean Plan format and terminology; (5) sediment quality objectives; (6) suspended solids regulation; and (7) nonpoint source control. A detailed description of the issues is contained in the 1992 document *California Ocean Plan: Triennial Review and Workplan 1991-1994*.

In 1997, the SWRCB adopted two California Ocean Plan amendments relating to issues raised during the 1992 Triennial Review: (1) the list in Appendix II of test protocols used to measure compliance with chronic toxicity objective was revised to reflect advances in conducting these tests, and (2) a number of minor changes were made to clarify and standardize terminology referring to water quality objectives and effluent limitations (SWRCB 1997a; 1997b).

Staff analysis and evaluation of the remaining high priority issues from the 1992 Triennial Review were carried over into the 1998-1999 Triennial Review, which also incorporated other issues. The SWRCB completed the 1998-1999 Triennial Review upon approval of the *California Ocean Plan 1999-2000 Triennial Review Workplan*. The 1999-2000 Triennial Review identified 22 high priority issues to be addressed, which fall into five categories: (1) applicability of the California Ocean Plan; (2) beneficial uses; (3) water quality objectives; (4) implementation; and (5) format and organization of the California Ocean Plan (SWRCB 1999).

In 2000, the SWRCB adopted six California Ocean Plan amendments relating to issues raised during the 1999-2000 Triennial Review and incorporated them into the 2001 California Ocean Plan (SWRCB 2001). These issues include: (1) replacement of the acute toxicity effluent limit in Table A with an acute toxicity water quality objective; (2) revision of chemical water quality objectives for protection of marine life and human health; (3) compliance determination for chemical water quality objectives; (4) change the format of the California Ocean Plan; (5) development of special protection for water quality and designated uses in ocean waters of California; and (6) administrative changes to the California Ocean Plan (SWRCB 2000; 2001). The 2001 California Ocean Plan became effective December 3, 2001 when it was approved by the USEPA (USEPA 2001).

Scientific Peer Review of the Proposed Amendments

In 1997, Section 57004 was added to the California Health and Safety Code (Senate Bill 1320-Sher) which calls for external scientific peer review of the scientific basis for any rule proposed by any board, office, or department within California Environmental Protection Agency (Cal/EPA). Scientific peer review also helps strengthen regulatory activities, establishes credibility with stakeholders, and ensures that public resources are managed effectively.

Since the proposed objectives for bacterial indicators have been scientifically peer reviewed by USEPA and the Department of Health Services through their processes, SWRCB staff did not repeat this procedure for Issue 1. Issue 2 (reasonable potential) relies on USEPA regulations which have also been previously peer reviewed.

California Environmental Quality Act (CEQA) Analysis and Impact of the Proposed Amendments

State agencies are subject to the environmental impact assessment requirements of the CEQA (Public Resource Code, §21000 *et seq*.). However, CEQA authorizes the Secretary of the Resources Agency to exempt specific State regulatory programs from the requirements to prepare Environmental Impact Reports (EIRs), Negative Declarations, and Initial Studies, if certain conditions are met (Public Resources Code, §21080.5). The Water Quality Control (Basin)/208 Planning Program of the SWRCB has been certified by the Secretary for Resources [California Code of Regulations (CCR), Title 14, §15251(g)]. As such, the plan, with supporting documentation, may be submitted in lieu of an EIR as long as the appropriate environmental information is contained therein (Public Resources Code, §21080.5(a)). Accordingly, the SWRCB prepares Functional Equivalent Documents (FEDs) in lieu of the more commonly used EIR. A Draft Functional Equivalent Document (DFED) is prepared by the agency and circulated for public review and comment. Responses to comments and consequent revisions to the information in the DFED are subsequently presented in a draft Final Functional Equivalent Document (draft FFED) for consideration by the SWRCB. After the SWRCB has certified the document as adequate, the title of the document becomes the Final FED (FFED).

If the SWRCB adopts the two recommended amendments, there will be no significant adverse environmental impacts from the proposed California Ocean Plan amendments. The purpose of the California Ocean Plan is to protect the quality of California's coastal waters for the use of the people of the State. Since no significant adverse effects are expected, mitigation measures are not warranted.

The proposed California Ocean Plan amendments do not alter the State's existing regulatory framework for controlling storm water and nonpoint sources of discharge. The USEPA and the SWRCB have determined that numeric effluent limits are infeasible for storm water permits. Municipal storm water dischargers are required to reduce the discharge of pollutants "to the maximum extent practicable" utilizing " best management practices" (BMPs) in lieu of numeric limits. If the implemented BMPs do not result in the attainment of water quality standards, dischargers are required to utilize additional BMPs to achieve the standards.

Industrial storm water dischargers are required to control discharges using "best available technology" and "best conventional pollutant control technology" in lieu of numeric limits. Industrial storm water dischargers must also implement additional BMPs if the technology-based controls are not adequate to achieve water quality standards.

Nonpoint dischargers are regulated by the State according to the three-tiered management approach listed below (in order of increasing stringency):

1. Self determined implementation of BMPs;
2. Regulatory-based encouragement of BMPs; and

3. Establishment of effluent limitations in waste discharge requirements.

The scarcity of monitoring activities in downstream ocean receiving waters has not permitted a comprehensive analysis of the degree to which the implementation of BMPs are effective in attaining California Ocean Plan water quality objectives.

Project Description

The CWC (§13170.2) requires that the California Ocean Plan be reviewed at least every three years to guarantee that the current standards are adequate and are not allowing degradation to indigenous marine species or posing a threat to human health.

This project, if approved by the SWRCB, will amend the 2001 California Ocean Plan. The following amendments are proposed for adoption:

Issue 1: Choice of Indicator Organisms for Water-Contact Bacterial Standards

Issue 2: Reasonable Potential: Determining when California Ocean Plan Water Quality-based Effluent Limitations are Required

Statement of Goals

To amend the California Ocean Plan by addressing certain high priority concerns introduced to the SWRCB in the 1999-2002 Triennial Review Workplan of the California Ocean Plan;

To update the California Ocean Plan based on a review of currently used methods and the best available scientific information; and

To improve the California Ocean Plan by providing added clarification in definitions and terminology, without proposing changes in water quality objectives or waste discharge requirements.

Proposed Project

The proposed project is the SWRCB adoption of the proposed amendments to the California Ocean Plan listed (above) in the Project Description.

Format Used in Issue Presentation

Each issue description and analysis contains the following sections:

Issue: A brief description of the issue.

Present California Ocean Plan: A summary of the current California Ocean Plan provisions related to the issue.

Issue Description: A detailed description of the issue, plus the historical development of the current California Ocean Plan approach, and, if appropriate, a description of what led the SWRCB to establish the current provisions.

Alternatives for SWRCB Action and Staff Recommendation: For each issue, staff has prepared at least two alternatives for SWRCB action and a suggestion is made for which alternative should be adopted by the SWRCB.

Proposed California Ocean Plan: If appropriate, the wording of the proposed amendment is provided to indicate the exact change to the 2001 California Ocean Plan.

Presented in Appendix A is the proposed California Ocean Plan as the document would appear if all the proposed changes presented in this document are approved by the SWRCB and the USEPA.

Issue 1: Choice of Indicator Organisms for Water-Contact Bacterial Standards

I. Summary of Proposed California Ocean Plan Amendment

Add an enterococcus water-contact standard, delete the single sample standard currently in the California Ocean Plan, and change it to a trigger for additional monitoring. Require monitoring for total coliform at offshore stations.

II. Present California Ocean Plan

Chapter II of the 2001 California Ocean Plan contains a total and fecal coliform water-contact standard, and a bacterial assessment and remedial action requirement that requires the measurement of enterococcus at all stations where total and fecal coliforms are sampled.

III. Issue Description

A. Background

In 1986, the U.S. Environmental Protection Agency (USEPA) published Clean Water Act (CWA) section 304(a) criteria guidance that recommended that states adopt an enterococcus standard for marine waters, based on epidemiological studies conducted in east coast waters (USEPA 1986). These studies supported enterococcus as a superior indicator of adverse human health effects as compared to total and fecal coliform bacteria. Like the coliform bacteria, enterococcus bacteria are a group of bacteria that are normally found in the gastrointestinal tract of warm-blooded animals. In 2000, the CWA was amended to require states with coastal recreation waters to adopt water quality standards for pathogens and pathogen indicators for which USEPA has section 304(a) criteria guidance. In its 2000 Draft Implementation Guidance for Ambient Water Quality Criteria for Bacteria, the USEPA strongly encourages states that have not already done so to adopt its 1986 recommendations and to make the transition to its recommended indicator organisms during triennial review cycles occurring in FY 2000-2002 (USEPA 2000).

USEPA published a proposed rule on July 9, 2004 (Proposed Rule) in which it proposed to establish water quality criteria for bacteria for coastal recreation waters in specified States and Territories that have not adopted its 304(a) criteria guidance (USEPA 2004). Of the 35 states and territories that have coastal or Great Lakes recreational waters, 10 have adopted USEPA's recommended criteria. California, with the exception of coastal waters under the jurisdiction of the Los Angeles Regional Water Quality Control Board, is included in the Proposed Rule. If the State Water Resources Control Board (SWRCB) adopts criteria that USEPA approves as meeting CWA section 303(i) requirements before publication of the final rulemaking, California will not be included in the final rulemaking.

1. <u>Indicator Organisms and the Development of Water Quality Criteria</u>

Because routine monitoring for all possible human disease-causing agents is impractical, indicator bacteria are used as an alternative to the measurement of pathogens with the assumption that high levels of the indicators imply the presence of fecal contamination. These indicators are not human specific; total coliform bacteria can exist on soil particles and plant surfaces, and fecal coliform and enterococci bacteria are normally found in the gastrointestinal tracts of warm-blooded animals. The adequacy of total and fecal coliform bacteria as indicators of human disease-causing organisms has been questioned for a number of years, especially with regard to their usefulness as predictors of non-bacterial pathogens, such as enteric viruses or protozoans. However, at this time there is no better alternative that can be routinely used.

Federal water quality criteria recommendations were first proposed in 1968 by the National Technical Advisory Committee (NTAC) of the Department of the Interior. The recommendations were based on a series of fresh water epidemiological studies conducted in Chicago and Kentucky, and two marine water epidemiological studies conducted in New York. The results of the studies, particularly the Ohio River study in Kentucky, indicated that persons who swam in water with a median total coliform density of 2300 coliforms per 100 milliliters (ml) had an excess of gastrointestinal illness when compared to an expected rate calculated from the total population. This total coliform index was translated into a fecal coliform index in the mid-1960’s by using the ratio of fecal coliforms to total coliforms at the location on the Ohio River where the original study had been conduced 20 years earlier. About 18 percent of the coliforms were found to be fecal coliforms. Using this proportion, the equivalent fecal coliform density was calculated to be 400 per 100 ml, which was determined to be the density at which a statistically significant swimming-associated gastrointestinal illness was observed. The NTAC suggested that a detectable risk was undesirable, so one-half of the density at which a health risk occurred (200 fecal coliform per 100 ml) was proposed (USEPA 1986).

The original studies had deficiencies and weaknesses, so the USEPA initiated a series of studies in 1972 designed to correct these problems. The first study focused on marine beaches, pairing two beaches at each of four sites; one beach received very little or no treated sewage, and the other had barely acceptable water quality. Multiple indicators were used to monitor the water. The results of these studies have been discussed extensively in the literature. But in general, significant swimming-associated rates for gastroenteritis were always observed at the more polluted of the paired beaches at each study site. Symptoms unrelated to gastroenteritis usually did not show a significant excess of illnesses at either of the paired beaches of each study location. The occurrence of a statistically significant excess of swimming-associated gastroenteritis in swimmers at more polluted beaches indicated that there is an increased risk of illness from swimming in water contaminated with treated sewage. Further, enterococci showed the strongest relationship to gastroenteritis, with all other indicators (including total and fecal coliform) showing very weak correlations to gastroenteritis.

From these data, USEPA established a quantitative relationship between the illness rates and enterococcus. This quantitative relationship was determined by pairing the geometric mean indicator density for the summer bathing season at each beach with the corresponding swimming-associated gastrointestinal illness rate for that same summer. Its evaluation of the data indicated that using the fecal coliform indicator group at the maximum geometric mean of 200 per 100 ml would cause an estimated 8 illnesses per 1,000 swimmers at fresh water beaches and 19 illnesses per 1,000 swimmers at marine beaches. Using this illness rate, USEPA determined *E. coli* and enterococci criteria. Then USEPA determined single sample maximum (SSM) values. These values correspond to probabilities of getting a particular single sample result when the true mean meets the geometric mean criteria. For example, the SSM values adopted by Assembly Bill 411 (AB 411) (Chapter 765, Statutes of 1997) regulations use the 75 percent upper confidence level value. This corresponds to the level above which individual sample values would occur only 25 percent of the time if the mean level in the water body still meets the geometric mean standard. Statisticians say that a single sample reading at this level indicates, with 75 percent confidence, that the geometric mean standard is not being met (USEPA 2004).

2. <u>Review of the USEPA Draft Guidance Documents</u>

In January 2000 and again in June 2002, USEPA published Draft Implementation Guidance for Ambient Water Quality Criteria for Bacteria – 1986. The purpose of the document is to provide guidance for implementation of bacterial water quality criteria once the states adopt the USEPA criteria into standards. In this document, USEPA reaffirms its conclusion that enterococcus demonstrates better correlation between swimming-associated illnesses in marine waters. USEPA reviewed the original studies supporting its 1986 recommended water quality criteria as well as epidemiological studies conducted since 1984 (Table 1). In all, nine marine water epidemiological studies were reviewed. Of these, only four concluded that enterococcus provided the best correlation with gastrointestinal illness. One study (Cheung, *et al*. 1990) found *E. coli* to be the best indicator, another study (Balarajan, *et al*. 1991) did not specify what microorganisms were evaluated, and a third study (Von Schirnding, *et al*. 1992) did not find a statistically significant increase in the rate of illness between swimmers and non-swimmers. Corbett, *et al*. (1993) concluded that counts of fecal streptococci (of which enterococcus is a subset) were worse predictors of swimming-associated illness than fecal coliforms. The final study (Kueh, *et al*. 1995) did not analyze for enterococcus. As a result of this review, the USEPA concluded that "USEPA has no new scientific information or data justifying a revision of the Agency's recommended 1986 water quality criteria for bacteria at this time."

The Implementation Guidance document has not been finalized.

B. <u>State Water Resources Control Board Activity</u>

SWRCB staff had concerns that the correlations developed in the USEPA studies would not be applicable to the cooler California waters. To resolve the issue of which bacterial group would be a better indicator organism, the California Ocean Plan was amended in 1990 to require dischargers to measure enterococcus density at all stations where total and fecal coliform monitoring are required. Also, if a shore station consistently exceeded a coliform objective or exceeded a geometric mean enterococcus density of 24 organisms per 100 ml for a 30-day period or 12 organisms per 100 ml for a six-month period, the Regional Water Quality Control Board (RWQCB) was to require the appropriate agency to conduct sanitary surveys. The intent of the 1990 amendment was twofold: the first goal was to determine what levels of enterococci could be expected in California marine waters, and the second was to develop a data base with all three indicators measured concurrently. This information, in conjunction with the sanitary surveys, would illustrate which organism (and its associated numerical level), was a superior indicator of wastewater contamination for California use. Unfortunately, no sanitary surveys were conducted. This approach has resulted in controversy because it was not uniformly enforced by the RWQCBs and because dischargers were required to bear the expense of monitoring for an additional indicator organism.

1. <u>Review of Discharger Data</u>

An independent technical group, the Microbiological Advisory Committee (MAC) was formed in 1992 to advise SWRCB staff on the indicator organism issue. As a starting point, the MAC recommended a statistical analysis of two data sets which included concurrent measurement of all three indicators. A contract was initiated with the University of California, Berkeley (UC Berkeley) in 1993, stipulating the following:

a. at each monitoring station, for each month and for each individual indicator organism, the number of times the measured level exceeded the allowable value contained in the California Ocean Plan was determined; and,

b. for each monitoring station, the density of indicator organisms were compared against each other and to physical parameters measured at the same time (water temperature, salinity, dissolved oxygen, etc.).

The contract also required that recent epidemiological studies be reviewed, summarized, and related (if possible) to the discharger data analyses. Based on review of both discharger monitoring data and results of recent epidemiological studies, UC Berkeley was: (1) to make recommendations for possible revision of the California Ocean Plan water contact bacterial standards, and (2) to identify areas in which additional research is necessary.

Because there was interest in the environmental fate of indicator organisms based on monitoring data taken over a time course of several years and under diverse environmental conditions, data from the City of San Diego and the City and County of San Francisco were analyzed. The study concluded that:

- when fecal contamination is present, all three indicators respond similarly;
- during less polluted periods, this relationship breaks down and the three indicator organisms vary independently;
- from a risk management perspective, the measurement of enterococcus levels seems to add little to the information provided by total and fecal coliform data;

- where there is increased likelihood of fecal contamination, enterococcus levels are well predicted by the fecal coliform measurement; and
- based on these findings, the California Ocean Plan could revert to the pre-1990 bacterial monitoring requirements calling for total and fecal coliform only (Spear, *et al*. 1998).

2. <u>Review of Recent Epidemiological Studies</u>

As part of the UC Berkeley contract, five recent epidemiological studies were reviewed (Table 2). In general, these five studies consistently show that bathing at beaches where the water is contaminated by urban runoff, domestic wastewater discharges, or other swimmers can lead to an increased risk of gastrointestinal and respiratory disorders, as well as ear, eye, and skin infections in some circumstances. However, there is no consistent relationship between any one indicator and health endpoints. In a recent report, Fleisher, *et al*. (1996) concluded that even within a single study, different indicators predict different health endpoints and that "these findings argue against the use of a single illness or indicator organism in the establishment of marine standards for recreational water quality."

The Santa Monica Bay epidemiological study provides staff with critical information under local environmental conditions. This cohort study was conducted at three popular bathing beaches to investigate the possible adverse health effects of bathing in Santa Monica Bay and whether there are ill health effects associated with urban runoff from storm drains. Persons who bathed and immersed their heads in the ocean water were potential subjects. On the same days that subjects were recruited, morning water samples were collected at ankle depth at 0, 100 yards north and south of the storm drain, and 400 yards north or south of the drain, depending on current flow (the latter sample served as a control). Samples were analyzed for total and fecal coliforms, enterococci, and *E. coli*. In addition, one sample each Friday, Saturday, and Sunday was collected in the storm drain at each study beach and analyzed for enteric viruses.

The study was designed to investigate the following questions:

a. what are the relative risks of specific adverse health outcomes in subjects bathing at 0, 1-50, and 51-100 yards from a storm drain compared to subjects bathing at the same beach?

b. are risks of specific outcomes (*e.g.*, highly credible gastrointestinal illness; ear, eye, and sinus infections; upper respiratory infections; skin rashes and lesions) among subjects associated with levels of the bacterial or viral indicators?

Bacterial indicator results showed that:

- indicator counts were higher than in previous years;
- indicator counts were highly variable from day to day;
- for a substantial portion of the days, the counts exceeded the established cutoffs;
- the counts were generally higher in front of the drain and then dropped off with increasing distance from the drain; and

- water samples taken at 400 yards were not always “clean,” occasionally exceeding the established cutoffs.

The study concluded that distance from the storm drain, particularly swimming in front of the storm drains studied, is associated with an increased risk for a broad range of adverse health effects. A number of bacterial indicators, particularly the total to fecal coliform ratio when total coliform are above 1,000 organisms/100 ml, and enterococcus at levels above 104/100 ml, are associated with increased risk of adverse health effects.

Some of the criticism of this study focused on the finding that the total to fecal coliform ratio proved to be a good indicator to adverse health effects. Critics stated that this was a site-specific finding only and that the relationship would only hold true for samples taken directly in front of the drains. SWRCB staff asked for additional analysis in order to investigate if there were days when the ratio indicated adverse health affects but enterococcus did not (and conversely, when enterococcus indicated an adverse health affect, but the ratio did not). To address some of these questions, SWRCB staff asked the principal investigator three additional questions:

a. determine if the total to fecal ratio is an informative indicator of risk only in front of the storm drain;

b. determine if there are days that enterococcus is a better predictor of adverse health risk than the total to fecal ratio; and

c. determine if the total to fecal ratio and the enterococcus densities move independently or do they correlate.

The answers to these questions are as follows:

a. The total to fecal coliform ratio (when restricted to days when the total coliforms exceeded 1,000 or 5,000) is still a useful predictor of risk even beyond the area in front of the drain.

b. The answer to this question is variable, depending on what cutpoint is used. Basically, there were days within the study when the total to fecal ratio predicted an adverse health problem, but enterococcus levels did not. The converse was also true.

c. Enterococcus was associated with increased risk of at least one health outcome (diarrhea with blood) independent of the total to fecal ratio. Even though this is a rare adverse health effect, it is one of the more severe effects looked for in the study.

3. Effect of AB 411 on the California Ocean Plan Bacterial Standard Revision

Results from the Santa Monica Bay epidemiological study motivated the development of AB 411. This legislation required the Department of Health Services (DHS), in consultation with local health officers and the public, to establish minimum standards for the sanitation of public beaches. The regulation requires:

- testing of waters adjacent to all public beaches for total coliform, fecal coliform, and enterococci bacteria;
- standards to be set for total coliform, fecal coliform, and enterococci;
- establishment of sampling protocols; and
- weekly bacterial testing between April 1 and October 31 for any beach visited annually by more than 50,000 people which also has a storm drain outlet that flows in the summer.

The DHS developed regulations implementing AB 411, which were adopted in 1999. Although AB 411 and the resulting regulation pertain to county health agencies and not to the publicly-owned treatment works (POTW) dischargers covered under the California Ocean Plan, there is a common link. The California Ocean Plan's bacterial water contact standards and the DHS's regulation implementing AB 411 (AB 411 regulations) are intended to protect the health of persons engaged in water contact recreational activities. Also, some County Environmental Health agencies use the results of POTW sampling sites to assist in their beach water quality assessments. Because of this overlap, the SWRCB and the DHS agreed that monitoring requirements for beach stations should be the same.

C. Summary of Comments from the 1995 Public Hearings

The revision of the California Ocean Plan bacterial standards was identified as a high priority issue during the 1992 Triennial Review. Staff received comments on this issue during a series of three public hearings held in 1995. The consensus of comments was that the SWRCB should make a choice as to which indicator organism(s) should be included in the California Ocean Plan for bathing water protection and that this issue should remain a high priority. Most of the commenters felt that the SWRCB should not make a decision regarding indicator organism choices and standards until the DHS promulgates the AB 411 regulations and that whatever decision the SWRCB makes should be consistent with the DHS regulations.

One commenter felt that we should remove the total and fecal coliform water-contact bacterial standards from the California Ocean Plan, and adopt enterococcus as the sole standard.

Four commenters recommended that the California Ocean Plan require monitoring for total and fecal coliform organisms only. After years of monitoring for total and fecal coliform, these groups strongly believe that enterococcus has never been helpful in terms of evaluating a problematic situation. Also, since most monitoring agencies test for total and fecal coliform, there is also a regional perspective for these indicator organisms. The Santa Monica Bay epidemiology study found the total coliform to fecal coliform ratio to be one of the better indicators for predicting health risks associated with swimming in ocean waters contaminated by urban runoff and that enterococcus data add no further information. The total to fecal coliform ratio is also indicative of sewage contamination and is used to monitor sewage spills. Sampling and testing for enterococcus is cost prohibitive; it requires twice the testing media and almost twice the technician time of the other tests. A 48-hour waiting period is not conducive to making public health decisions regarding recreational water quality.

One discharger stated that, after collecting total and fecal coliform and enterococcus data for a number of years, it has found that its monitoring stations virtually never show significant contamination except from storm water runoff. It also believes that the California Ocean Plan is an inappropriate device to mandate a data gathering effort and that only a focused effort (such as an epidemiological study) can lead to a conclusion of which indicator is the best suited for ocean water-contact recreation standards.

Six commenters recommended that the SWRCB add an enterococcus standard to the total and fecal coliform water-contact bacterial standards contained in the California Ocean Plan. One concern is that wastewater from Tijuana contains pathogens and that fecal coliform is an inadequate indicator of pathogens. The SWRCB should make an effort to find superior alternate indicator organisms.

Another commenter stated that, in spite of the fact that dischargers feel that their effluent plumes do not make it back to shore, it would be a false economy to eliminate the enterococcus monitoring requirement. Approximately 80 percent of the beach monitoring programs in the Southern California Bight are done by National Pollutant Discharge Elimination System (NPDES) dischargers. POTW monitoring programs are providing the public with critical information on beach water quality and have become far more than effluent plume tracking efforts. They have become essential to the public right to know effort for water quality at California beaches. Further, the Santa Monica Bay epidemiology study demonstrated that enterococci densities greater than 104 most probable number (MPN)/100 ml were associated with incidences of diarrhea with blood. This association was completely independent from the total coliform to fecal coliform ratios. The risk of diarrhea with blood is approximately one in 175. At the public hearing held in Irvine, some dischargers used the results of the Spear, *et al.* (1998) study as rationale to eliminate the California Ocean Plan's enterococcus monitoring requirements. This commenter is concerned that the correlations used in determining the dependence of enterococcus densities on fecal and total coliform densities were misinterpreted. Also, the study was designed to focus on monitoring locations near POTW discharges. The results of this study should not be extrapolated to include analyses of beaches impacted by either dry or wet weather runoff. The SWRCB is asking the wrong question about indicator standards; we should be focusing on what standards would be most protective of public health. An enterococcus standard of 104 MPN/100 ml would be a health based standard.

The USEPA recommended that resolving the indicator organism question should be the highest priority for the 1998 Triennial Review and strongly encouraged the SWRCB to adopt enterococcus as its primary bacterial water quality object for contact recreational areas.

Several commenters stated that the California Water Code (CWC) §13170.2(b) requires that the California Ocean Plan standards must not "pos[e] a threat to human health." Because enterococcus has been associated with human health effects not necessarily identified by total and fecal coliform, excluding enterococcus from the California Ocean Plan would constitute a threat to human health.

One commenter stated that the recent studies "strongly suggest that there is a possibility that there is no single indicator organism for a water-contact bacterial standard, or that the choice of an appropriate indicator organism may be site-specific"... and that the SWRCB should not relax bacterial water quality numerical limits or reduce the selection of indicator organisms until such time as there is a clear consensus of scientific opinion regarding the most appropriate indicator organism for marine water-contact areas. Another commenter wrote that all three indicator organism groups have an appropriate place in assessing health risks to bathers in ocean water-contact areas. Consequently, monitoring programs should include analyses for all three bacterial groups.

One commenter further added that the wording in the California Ocean Plan regarding water-contact bacterial standards monitoring necessitates five sampling surveys each month. This caused logistical problems. To simplify sampling operations with little or no compromise on information, the California Ocean Plan should be changed to require sampling on a weekly basis, "...and not more than 20 percent of the samples at any sampling station, in any 5 consecutive week period, may exceed..." For weekly programs, this would result in 52 data values each year at each sampling site, eight less than if 60 surveys (five per month) were performed. This would still provide excellent information on trends of indicator bacteria and adherence to water quality objectives, while better utilizing monitoring resources.

Several comments pertained to the DHS's 1992 suggestion that the fecal coliform standard be lowered to 200 MPN/100 ml. All commenters were opposed to this suggestion. One person wrote that, based on the Santa Monica Bay epidemiological study, fecal coliform bacterial levels alone did not correlate with illness. As a result, the fecal coliform standard should not be lowered. Another commenter stated that this issue should be deferred until a decision is made on which is the best indicator for bacterial contamination.

A suggestion was made that an epidemiological study and risk-analysis be done for the Monterey Bay region, patterned after the Santa Monica Bay study. This would better characterize the region and assist in the determination of an appropriate state-wide bacterial standard.

One commenter asked two questions: 1) will the SWRCB ever provide guidance on a sanitary survey methodology? and 2) will the SWRCB ever require the completion of a sanitary survey?

D. Summary of Public Scoping Meeting Comments

Staff received seven comments relating to the proposed bacterial standards during the Scoping Hearing.

The California Department of Transportation supports the replacement of a single sample standard with a trigger for additional monitoring, stating that the occasional presence of elevated bacteria levels from unknown sources during periods of no discharge indicates that single sample standards are inappropriate for regulatory purposes.

Both the County of Los Angeles Department of Public Works and the California Coalition for Clean Water (CCCW) strongly support the deletion of the single sample standards and evaluation of compliance using long-term averages of indicator bacterial densities. They also believe that retaining total and fecal coliform as part of the water-contact recreation standards, while consistent with AB 411 regulations, may not be prudent and may not be protective of public health. Retaining all three coliform bacteria as standards could potentially be very expensive. And because of the expense, they request that the SWRCB conduct the analyses required pursuant to Porter-Cologne Sections 13241 and 13242, with particular emphasis on the costs of compliance and the actions to be taken by each entity (public and private) to achieve compliance. Both the County and the CCCW suggest that we consider the alternatives suggested by USEPA in its draft Implementation Guidance.

The California Stormwater Quality Association supports the deletion of the single sample standards and the use of a trigger for additional monitoring. It also recommends that the SWRCB forgo the adoption of total and fecal coliform standards and adopt only an enterococcus standard. Because of the potential costs associated with complying with the bacterial water quality objectives contained in the proposed amendment, it suggests that the SWRCB consider the alternatives suggested by USEPA in its draft Implementation Guidance.

The Coalition for Practical Regulation supports the deletion of the single sample standards. It questions the continued use of total coliform as an indicator for water-contact recreation and suggested that the SWRCB instead focus on enterococcus. The results of AB 411 monitoring by local jurisdictions and POTWs are available for use in assessing water quality and need not be duplicated by California Ocean Plan requirements.

Heal the Bay opposed the deletion of the sanitary survey requirement currently in the California Ocean Plan. It also opposed the elimination of the single sample standard for fecal bacteria. It supported the proposal to require additional monitoring when the single sample value is exceeded and also supported the addition of an enterococcus standard. It also suggested that the SWRCB should consider proposing a sanitary survey triggering criteria for the geometric mean standard and recommended the implementation of a sanitary survey when the 30-day geometric mean standards are exceeded more than 75 percent of the time in a 60 day period.

The County Sanitation Districts of Los Angeles County support the deletion of the single sample standards and evaluation of compliance using long-term averages of indicator bacteria densities. They request that the proposed amendment clarify how the geometric means are to be calculated. They also request that the SWRCB include language in the amendment that encourages RWQCBs to assess data from existing monitoring programs and to use specially developed guidance documents such as the Southern California Coastal Water Research Project's (SCCWRP) Model Monitoring Program for determination of bacterial monitoring frequency for specific beaches.

IV. Alternatives for Board Actions and Staff Recommendations

1. Minimum Effort

   Revert to the pre-1990 California Ocean Plan bacterial monitoring requirements. Keep the same values for the total and fecal coliform as currently contained in the California Ocean Plan, but delete the enterococcus montoring requirement.

   Estimated Staff Effort: 0.1 PY (over a three-year period).

2. Baseline Effort

   a. add an enterococcus standard to the California Ocean Plan;
   b. delete the single sample standards currently in the California Ocean Plan and change it to a trigger for additional monitoring;
   c. require monitoring for total coliform at offshore stations;
   d. require total and fecal coliform and enterococcus monitoring at all shoreline stations, and at stations determined by the RWQCBs to be used for water-contact recreation, including all kelp beds. It is a violation of bacterial standards at these stations if any of the four standards are exceeded;
   e. amend Chapter II, section B (Bacterial Assessment and Remedial Action Requirements).

Staff Recommendation: Adopt Alternative 2 (Baseline Effort)

Staff sent an earlier draft of this amendment to coastal RWQCBs and USEPA for comment. The original draft proposed that areas outside the defined water-contact recreation area be monitored either for total and fecal coliform or enterococcus. USEPA stated that they would not approve this language; these areas must be monitored for enterococcus. However, the Proposed Rule applies only to those Great Lakes and marine waters designated by a State or Territory for water-contact activities. Therefore, SWRCB staff proposes that all areas outside areas defined by RWQCB staff as water-contact recreation areas be monitored for total coliform only. The purpose of offshore monitoring is for plume tracking. Offshore microbiological data analyses should focus on comparisons to historic data. Total coliform is the most appropriate indicator to use, as it is the most concentrated of the three currently measured indicators. The use of total coliform is also supported by the 2002 SCCWRP document "Model Monitoring Program for Large Ocean Discharges in Southern California" (Schiff, *et al*. 2002).

SWRCB Staff is also proposing that SSM values be changed from a standard to a trigger for additional monitoring. Staff realizes that using single sample standards must be used for beach posting and closure decisions. However, because of the inherent variability in bacterial water quality samples and sampling, staff proposes that it is inappropriate to use these values to determine attainment of water quality standards. Leecaster and Weisberg (2001) found that with daily water sampling (five days per week), 80 percent of water quality threshold exceedances were observed. This dropped to 55 percent detection from samples collected three times per week, 25 percent for samples collected once a week, and 5 percent for monthly sampling. Nearly 70 percent of the water quality exceedances were single day events.

USEPA acknowledges that the 1986 bacteria criteria document did not interpret the meaning of the term SSM. The Proposed Rule offers the interpretation that the SSM is a single value never to be exceeded, and is soliciting comment on this interpretation, but also offers several alternative options. The first option would have the SSMs as part of the water quality criteria, but would only be used for making beach closure and opening decisions. States and Territories would use only the geometric mean for other Clean Water Act (CWA) purposes, such as NPDES permitting, water body assessments, and Total Maximum Daily Loads (TMDLs). As a second option, USEPA proposes that an unacceptably high value for any given individual sample be used to trigger a beach advisory, beach closure, or additional monitoring. The high result can also be evaluated with other sample results but would not necessarily be used alone to determine non-attainment of the water quality standards. A third option allows SSMs to be available for use as an implementation tool for making beach opening and closure decisions but would not be part of the applicable water quality standards. USEPA further acknowledges that the geometric mean has the most direct relationship to illness rates. This is because, in its original epidemiological studies, USEPA calculated the geometric mean of the summer bacterial density and correlated this with the summer average gastrointestinal illness rate. USEPA used this correlation as the basis of its geometric mean criterion and derived SSM values from the geometric mean (USEPA 2004).

If the proposed California Ocean Plan amendment is adopted, beaches would still be monitored by the POTWs and local environmental health agencies. Environmental health agencies would make beach posting and closure decisions based on SSM value exceedances, using DHS's AB 411 SSM values as their benchmark. If a POTW sample is above the AB 411 SSM (which is the same value as the California Ocean Plan trigger for additional monitoring), POTW staff would be required to take additional samples until the sample result falls below the single sample trigger value, or until the source of fecal contamination is identified by a sanitary survey.

V. Environmental Impact Analyses

Based on the Environmental Checklist (Appendix C), SWRCB staff concludes that there would be no potentially significant adverse impacts on the environment caused by adoption of this proposed amendment.

The objectives for total and fecal coliform will not change. An enterococcus and the ratio of fecal-to-total coliform objectives are proposed to be added to the California Ocean Plan. These objectives are consistent with those established by the DHS for public beaches and ocean water-contact sports areas. The enterococcus objective also complies with the CWA section 303(i) requirement that the states adopt standards for those pathogen indicators for which USEPA has published section 304(a) criteria guidance. These objectives are designed to protect human health, and the SWRCB does not expect any adverse environmental impacts as a result of their adoption.

The addition of bacterial objectives will not cause any environmental impacts. However, the new objectives may be exceeded more frequently than the existing total and fecal coliform objectives. The current California Ocean Plan requires that enterococcus density shall be measured at all stations where measurement of total and fecal coliforms are required (SWRCB 2001). The California Ocean Plan further requires that if there is an exceedance of the coliform objectives or an exceedance of a geometric mean enterococcus density of 24 organisms per 100 ml for a 30-day period (which is lower than the proposed 35 organisms per 100 ml), then the RWQCB is to direct the appropriate agency to conduct a sanitary survey to determine if the discharge is the source of the contamination. If the survey identifies a controllable source of indicator organisms associated with a discharge of sewage, then the RWQCB is required to take action to control the source.

Establishing the proposed objectives will have the same potential effects as exist currently with the existing California Ocean Plan. If a bacterial objective is exceeded, a survey will need to be conducted to identify the source, and controls taken by the discharger if the discharge is determined to be the source of contamination. The control methods that are required to comply with the existing California Ocean Plan are the same methods that would be needed with the proposed amendment. Therefore, adoption of the proposed amendment will not have any potential environmental impacts beyond those that currently exist under the current California Ocean Plan

VI. Compliance with Section 13421 of the California Water Code

Section 13241 of the CWC requires that the following factors be considered when new or revised water quality objectives are proposed:

A. Past, Present, and Probable Future Beneficial Uses of Water.

The proposed bacterial standards are equal to or more restrictive than those under the current California Ocean Plan. Therefore, these revised standards would be more protective of all beneficial uses listed in Chapter I of the California Ocean Plan.

B. Environmental Characteristics of the Hydrographic Unit Under Consideration, Including the Quality of Water Thereto.

The proposed standards, if adopted, will be used to develop numeric effluent limits in NPDES permits that discharge to the Pacific Ocean. Each permit is issued with consideration to the specifics of the hydrographic area where the discharge will occur. These standards are expected to maintain or enhance the water quality of the coastal ocean waters.

C. Economic Considerations

Since 1992, the California Ocean Plan has required that enterococcus density shall be measured at all stations where measurement of fecal and total coliforms is required. There has been sufficient time since then for at least two permit cycles where all dischargers required to monitor for coliforms should also be monitoring for enterococcus. Therefore, there should be no additional costs associated with the addition of enterococcus monitoring. Additionally, monitoring for all three indicators is currently required at all stations; under the proposed amendment, monitoring of all three indicators will only be required for stations where water-contact recreation occurs. Total monitoring costs should decline.

Disinfection methods (*i.e*., chlorination, ozone, etc.) and associated costs to achieve compliance with the objectives are not expected to be different from those necessary to achieve the existing objectives for total and fecal coliform. Further, the current California Ocean Plan requires dischargers to control the discharge of contamination if they are found to be the source of contamination, including enterococcus. The potential for increased treatment costs due to enterococcus contamination will be no greater under the proposed amendment than is currently possible under existing regulations.

The addition of these objectives may increase the costs of monitoring slightly for those dischargers not monitoring for enterococcus as required. The increased analytical cost per sample is approximately $25.00 for enterococcus. However, the benefits of improved public health warnings and reduced illness are expected to far outweigh the additional analytical costs. Furthermore, many dischargers are already monitoring for the proposed bacterial indicators during much of the time as a result of state law (California Code of Regulations, Title 17, section 7958), which went into effect in 1999.

D. <u>The Need for Developing Housing within the Region</u>

No change in current end-of-pipe wastewater treatment is needed to meet the proposed standards. Therefore, adoption of the proposed standards should not have either a direct or indirect impact on the development of new housing.

E. <u>The Need to Develop and Use Recycled Water.</u>

Since the proposed standards will be attainable using current wastewater treatment technology, the proposed standards will not limit expanded use of recycled water.

VII. Proposed Ocean Plan Amendment

Presented below are the proposed changes to the 2001 California Ocean Plan that will result if *only* the changes proposed in Issue 1 are approved. Presented in Appendix A are the combined changes to the 2001 California Ocean Plan that will occur if both amendments are approved.

1. Chapter II, B. <u>Bacterial Characteristics</u>, 1. Water-Contact Standards, page 4, revise water quality objectives.

<u>B. Bacterial Characteristics</u>

1. <u>Water-Contact Standards</u>

a. Within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board, but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column:

~~(1) Samples of water from each sampling station shall have a density of total coliform organisms less than 1,000 per 100 ml (10 per ml); provided that not more than 20 percent of the samples at any sampling station, in any 30-day~~

~~period, may exceed 1,000 per 100 ml (10 per ml), and provided further that no single sample when verified by a repeat sample taken within 48 hours shall exceed 10,000 per 100 ml (100 per ml).~~

~~(2) The fecal coliform density based on a minimum of not less than five samples for any 30 day period, shall not exceed a geometric mean of 200 per ml nor shall more than 10 percent of the total samples during any 60-day period exceed 400 per ml.~~

Geometric Mean - Samples shall be collected from each station at least weekly, with the five most recent sample results used to calculate the geometric mean:

i. Total coliform density shall not exceed 1,000 per 100 ml;
ii. Fecal coliform density shall not exceed 200 per 100 ml; and,
iii. Enterococcus density shall not exceed 35 per 100 ml.

2. Chapter III, D. Implementation Provisions for Bacterial Assessment and Remedial Action Requirements, page 19, delete the section and add the following section:

~~D. Implementation Provisions for Bacterial Assessment and Remedial Action Requirements~~

~~1. The requirements listed below shall be used to determine the occurrence and extent of any impairment of a beneficial use due to bacterial contamination, generate information which can be used in the development of an enterococcus standard, and provide the basis for remedial actions necessary to minimize or eliminate any impairment of a beneficial use.~~

~~a. Measurement of enterococcus density shall be conducted at all stations where measurement of total and fecal coliforms are required. In addition to the requirements of Chapter II.B.1, if a shore station consistently exceeds a coliform objective or exceeds a geometric mean enterococcus density of 24 organisms per 100 ml for a 30-day period or 12 organisms per 100 ml for a six-month period, the Regional Board shall require the appropriate agency to conduct a survey to determine if that agency's discharge is the source of the contamination. The geometric mean shall be a moving average based on no less than five samples per month, spaced evenly over the time interval. When a sanitary survey identifies a controllable source of indicator organisms associated with a discharge of sewage, the Regional Board shall take action to control the source.~~

~~b. Waste discharge requirements shall require the discharger to conduct sanitary surveys when so directed by the Regional Board. Waste discharge requirements shall contain provisions requiring the discharger to control any controllable discharges identified in a sanitary survey.~~

D. Implementation Provisions for Bacterial Characteristics

1. Water-Contact Monitoring

   a. Samples should be collected at least weekly from each site during each 30-day period, with sampling intervals evenly spaced. The geometric mean shall be calculated using the five most recent sample results.

   b. If a single sample exceeds any of the following densities, repeat sampling at that location will be conducted daily to determine the extent and persistence of the exceedence. Repeat sampling will be conducted until the sample result is less than the following densities, or until a sanitary survey is conducted to determine the source of the high bacterial densities :

      i) Total coliform density will not exceed 10,000 per 100 ml; or
      ii) Fecal coliform density will not exceed 400 per 100 ml; or
      iii) Total coliform density will not exceed 1,000 per 100 ml when the ratio of fecal/total coliform exceeds 0.1;
      iv) enterococcus density will not exceed 104 per 100 ml.

      When repeat sampling is required because of an exceedance of any one single sample density, values from all samples collected during that 30-day period will be used to calculate the geometric mean.

   c. For monitoring stations outside of the defined water-contact recreation zone but in areas determined by the Regional Board to be used for water-contact recreation, samples will be analyzed for total coliform.

Table 1: Studies conducted since 1984 reviewed by the USEPA in support of its 1986 recommended water quality criteria (taken from USEPA (2000))

Researcher	Year	Location	Microorganisms Evaluated	Relevant Findings
Fattal *et al*.	1987	Israel	Fecal coliforms Enterococci *E. Coli*	• Enterococci were the most predictive indicator for enteric disease symptoms.
Cheung *et al*.	1990	Hong Kong	Fecal coliforms *E. Coli* *Klebsiella* spp Enterococci Fecal streptococci Staphylococci *Pseudomonas aeruginosa* *Candida albicans* Total fungi	• Best relationship between a microbial indicator and swimming-associated health effects was between *E. coli* and highly credible gastrointestinal illness.
Balarajan *et al*.	1991	United Kingdom	Unknown	• Risk of illness increased with degree of exposure. If the non-exposed population risk ranked at 1, risk increased to 1.25 for waders, 1.31 for swimmers, and 1.81 for surfers or divers.
Von Schirnding *et al*.	1992	South Africa (Atlantic coast)	Enterococci Fecal coliforms Coliphages Staphylococci F-male-specific bacteriophages	• Uncertainty in sources of fecal contamination may explain lack of statistically significant rates of illness between swimmers and non-swimmers.
Corbett *et al*.	1993	Sydney, Australia	Fecal coliforms Fecal streptococci	• Gastrointestinal symptoms in swimmers did not increase with increasing counts of fecal bacteria. • Counts of fecal streptococci were worse predictors of swimming-associated illness than fecal coliforms.
Kay *et al*.	1994	United Kingdom	Total coliforms Fecal coliforms Fecal streptococci *Pseudomonas aeruginosa* Total staphylococci	• Only fecal streptococci were associated with increased rates of gastroenteritis. • Risk of gastroenteritis did not increase until bathers were exposed to about 40 fecal streptococci per 100 ml.

Table 1 (Cont.)

Kueh *et al*.	1995	Hong Kong	*E. coli* Fecal coliforms Staphylococci *Aeromonas* spp *Clostridium perfringens* *Vibrio cholera* *Vibrio parahemotylicus* *Salmonella* spp *Shigella* spp	• Also analyzed stool specimens for rotavirus, Salmonella spp, Shigella spp, Vibrio spp, and Aeromonas spp; throat swabs for Influenza A and B; Parainfluenza Virus types 1, 2, and 3; and Respiratory Syncytial Virus, and Adenovirus. • Did not find a relationship between *E. coli* and swimming-associated illness [possibly due to low number of beaches sampled (only two)].
McBride *et al*	1998	New Zealand	Fecal coliforms *E. coli* Enterococci	• Enterococci were most strongly and consistently associated with illness risk for the exposed groups. • Risk differences significantly greater between swimmers and non-swimmers if swimmers remained in water more than 30 minutes.
Haile *et al*.	1996	California, USA	Total coliforms Fecal coliforms Enterococci *E. coli*	• Results for enterococci indicate positive associations with fever, skin rash, nausea, diarrhea, stomach pain, coughing, runny nose, and highly credible gastrointestinal illness. • Association of symptoms with both *E. coli* and fecal coliforms were very weak. • Total coliform to fecal coliform ratio very informative -–below the cutpoint of 5.0, diarrhea and highly credible gastrointestinal illness were associated with a lower ratio regardless of the absolute level of fecal coliforms.

Table 2: Recent epidemiological studies of disease outcomes and bacterial risk indices among individuals exposed to marine waters during recreational activity

Reference	Location	Water Sampling	Bacterial Indicators Measured	Indicator Correlation	Time of Follow-up	Health Endpoint(s)	Best Risk Predictor
Cheung *et al* 1990	Hong Kong	3 fixed sample pts every 2 hrs on interview days, 1 m depth	Fecal Coliform Fecal strep *E. coli* *Klebsiella* Enterococci Staphylococci *Pseudomonas* *Candida*	High (≈0.5-0.9) for fecal coliform, fecal strep, *E. coli* and enterococci	7-10 days	GI, HCGI, eye, ear, respiratory, skin	*E. coli* for HCGI and skin; dose-response Staph for ear and throat
Corbett *et al*. 1993	Australia	Day swam AM-PM Beach Center	Fecal coliform Fecal strep	Not reported	7-10 days	GI, respiratory, eye, ear	Fecal coliform (except GI)
Kay *et al*. 1994, Fleisher *et al*. 1993	Britain	3 depths at bather location, within 10 min. of exposure	Total coliform Fecal coliform Fecal strep *Pseudomonas* Total staph (partial)	Not reported	7 days (medical exam) and 21 days (questionnaire)	GI	Fecal strep dose-response
Fleisher *et al*. 1996 (Same data set as Kay *et al*. used to study different health endpoints)	Britain	3 depths at bather location, within 10 min. of exposure	Total coliform Fecal coliform Fecal strep *Pseudomonas* Total staph (partial)	Not reported	7 days (medical exam) and 21 days (questionnaire)	Respiratory, eye, ear, skin	Fecal strep for respiratory; fecal coliform for ear; dose-response
Haile *et al*. 1996	Santa Monica	Daily at 3 locations per beach; ankle depth, 8-11 AM	Total coliform Fecal coliform *E. coli* Enterococci	Not reported	9-14 days	GI, HCGI, eye, ear, respiratory, skin	Each indicator for different symptom complex

Issue 2: Reasonable Potential: Determining when California Ocean Plan Water Quality-based Effluent Limitations are Required

I. Summary of Proposed California Ocean Plan Amendment

Remove existing language that allows dischargers to certify that Table B pollutants are not present in their effluent *in lieu* of monitoring, and add general "reasonable potential" language to Chapter III (Program of Implementation) of the California Ocean Plan. Additional reasonable potential procedures will be added in the new Appendix VI of the California Ocean Plan.

II. Present California Ocean Plan

Dischargers are currently allowed to certify that Table B pollutants are not present in their effluent *in lieu* of monitoring. The California Ocean Plan does not currently specify when effluent limitations are required.

III. Issue Description

A. Regulatory Background

1. California Ocean Plan

Table B of the 2001 California Ocean Plan contains numeric water quality objectives for the protection of beneficial uses in receiving waters. These water quality objectives are used to derive effluent limitations in National Pollutant Discharge Elimination System (NPDES) permits.

The California Ocean Plan also contains Implementation Provisions in Chapter III for the management of wastes discharged to the ocean. The following paragraph appears on p. 21 of the California Ocean Plan (SWRCB 2001) under the Monitoring Program:

> Where the Regional Board is satisfied that any substance(s) of Table B will not significantly occur in a discharger's effluent, the Regional Board may elect not to require monitoring for such substance(s), provided the discharger submits periodic certification that such substance(s) is not added to the waste stream, and that no change has occurred in activities that could cause such substance(s) to be present in the waste stream. Such election does not relieve the discharger from the requirement to meet the objectives of Table B.

This language first appeared in the 1983 California Ocean Plan (SWRCB 1983a). The Final Environmental Impact Report (EIR) for the 1983 California Ocean Plan (Volume 1, Section II, p. 31-32) explained the rationale for the addition (SWRCB 1983b). Comments received in 1983 expressed the view that "there should be a mechanism in the Ocean Plan for reducing or removing limits and monitoring requirements when the discharger either does not discharge a substance or consistently meets Table B requirements." The EIR explains further that "allowing dischargers relief in these instances would reduce unnecessary monitoring costs." This 1983 addition to the California Ocean Plan was expected to reduce monitoring requirements for such dischargers as marine aquaria or aquaculture operations and was "not expected to apply to municipal dischargers."

The underlying motive for this language, therefore, was to reduce monitoring costs when discharges have a high likelihood of being free of Table B pollutants. The language was not intended to allow the removal of effluent limitations. The original comments were valid in that the California Ocean Plan, then as now, does not contain guidance for determining which Table B pollutants should be translated into numeric effluent limits.

A literal reading of the 2001 California Ocean Plan would lead one to believe that effluent limitations are required for <u>all</u> Table B pollutants. Indeed, many existing ocean discharge permits routinely contain effluent limits for *every* pollutant listed in Table B. For example, p. 12 of the 2001 California Ocean Plan reads as follows (emphasis added):

> Effluent limitations for water quality objectives listed in Table B, with the exception of acute toxicity and radioactivity, **shall** be determined through the use of the following equation:
>
> $$C_e = C_o + D_m (C_o - C_s) \qquad \text{(Equation 1)}$$
>
> where C_e = the effluent concentration limitation in μg/L,
> C_o = the concentration in μg/L to be met at the completion of initial dilution (*i.e.*, the Table B Water Quality Objective),
> C_s = the background seawater concentration in μg/L [from the Ocean Plan Table C],
> D_m = minimum probable initial dilution expressed as parts seawater per part wastewater.

Equation 1 was derived by consideration of mass balance relationships.

The periodic discharger certification effectively replaces actual analytical monitoring. Appendix III of the California Ocean Plan, however, requires periodic monitoring of Table B pollutants, the monitoring frequency being based on the discharger's flow rate.

The net effect of using the 1983 "relaxation of monitoring" language is the possibility of having effluent limitations in ocean discharge permits without adequately monitoring for the regulated pollutant. The California Ocean Plan would be amended by deleting the 1983 language.

2. <u>NPDES Federal Regulations</u>

In contrast, NPDES Federal Regulations provide procedures for permitting authorities to determine when water quality-based effluent limitations are needed [40 Code of Federal Regulations (CFR) 122.44 (d)(1)(ii)]:

> When determining whether a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above a narrative or numeric criteria within a State water quality standard, the permitting authority shall use procedures which account for existing controls on point and nonpoint sources of pollution, the variability of the pollutant or pollutant parameter in the effluent, the sensitivity of the species to toxicity testing (when evaluating whole effluent toxicity), and where appropriate, the dilution of effluent in the receiving water.

Note that water quality *criteria* in federal regulations are equivalent to water quality *objectives* in the California Ocean Plan. In addition, 40 CFR 122.44 (d)(1)(iii) reads (emphasis added):

> When the permitting authority determines, using the procedures in paragraph (d)(1)(ii) of this section, that a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above the allowable ambient concentration of a State numeric criteria within a State water quality standard for an individual pollutant, **the permit must contain effluent limits for that pollutant**.

Because effluent limitations are developed only for those pollutants actually exceeding or having a "reasonable potential" to exceed a water quality criterion, the net effect of a reasonable potential analysis may be a reduction in the number of effluent limitations incorporated into a permit. The NPDES discharger, however, is responsible for attaining, monitoring, and maintaining compliance with those effluent limitations in the NPDES permit. Under Section 308 of the Clean Water Act (CWA) dischargers are required to sample effluents and make monitoring reports to determine, in part, any violations of effluent limitations.

In summary, NPDES Federal Regulations require that NPDES permits contain water quality-based effluent limitations only for those pollutants that cause, or may cause or contribute to, an exceedance of the State water quality criteria. Accordingly, effluent monitoring is required to ensure compliance with those effluent limitations given.

B. <u>Statistical Procedures to Determine the Need for an Effluent Limitation</u>

Various procedures are used to assist NPDES permit writers when deciding whether a water quality-based effluent limitation is needed. Conceptually, this is a yes-or-no dichotomous decision. Statistical methods of data analysis are often employed in order to produce a scientifically defensible decision. All statistical procedures, however, require representative effluent samples and an examination of the assumptions underlying the statistical model employed. Presented below are procedures that are currently being used, or could be used, to determine the need for an effluent limitation.

1. U. S. Environmental Protection Agency's (USEPA) Technical Support Document (TSD) Reasonable Potential Procedure

In 1991, the USEPA published the *Technical Support Document for Water Quality-based Toxics Control* (USEPA 1991). This document, abbreviated as TSD, contains guidance for characterizing an effluent discharge and for conducting a reasonable potential analysis (TSD, Chapter 3, Effluent Characterization). USEPA developed this statistical approach to characterize effluent variability and reduce uncertainty when deciding whether to require an effluent limit:

> EPA recommends finding that a permittee has "reasonable potential" to exceed a receiving water quality standard if it cannot be demonstrated with a high confidence level that the upper bound of the lognormal distribution of effluent concentrations is below the receiving water criteria at specified low-flow conditions (TSD Box 3-2, p.53).

The TSD procedure estimates an upper one-sided confidence bound for an upper percentile of the pollutant distribution under a lognormal distribution assumption.

The TSD procedure multiplies an order statistic $X_{(n)}$, the maximum observed sample value, by a reasonable potential multiplying factor k. USEPA derived these multiplying factors by consideration, initially, of non-parametric tolerance interval theory (Murphy 1948), then subsequently applying the non-parametric theory to a parametric lognormal model (Aitchison and Brown 1957). The TSD procedure, thus, produces a semi-parametric one-sided upper c100 percent confidence bound for the p100th percentile:

$$\mathrm{TSD}_{(c,\,p)} = X_{(\mathrm{n})}\ k_{(c,\,p,\,n,\,\sigma \mathrm{L})},$$

where $X_{(n)}$ is the observed sample maximum and $k_{(c,\,p,\,n,\,\sigma \mathrm{L})}$ is the reasonable potential multiplying factor for the 100pth percentile calculated with c100 percent confidence for n samples drawn from a lognormal distribution with shape parameter σ_L.

USEPA reasonable potential multiplying factors are calculated using the following equation:

$$k_{(c,\,p,\,n,\,\sigma \mathrm{L})} = \exp(\sigma_L \{\Phi^{-1}[p] - \Phi^{-1}[(1-c)^{1/n}]\}),$$

Where, σ_L is the lognormal distribution shape parameter, $\Phi^{-1}[\ ]$ indicates the Z-score obtained from a percentile of the standard normal distribution (for example, $\Phi^{-1}[0.95]$ = 1.645), and n is the sample size. The quantity $\{\Phi^{-1}[0.95] - \Phi^{-1}[(1-0.95)^{1/n}]\}$ is less than zero for $n > 59$ and is tabulated in Table 5 for $1 \le n < 38$.

A "method of moments" estimate of the shape parameter σ_L is obtained by using the sample standard deviation divided by the sample arithmetic mean to find the sample coefficient of variation CV and applying the following equation:

$$\sigma_L = \sqrt{\ln\left(CV^2 + 1\right)}.$$

The TSD procedure does not require a minimum sample size, but for small data sets ($n \le 9$) USEPA advises to use a default *CV* value of 0.6 which corresponds to $\sigma_L = 0.5545$. This allows upper bound estimates with as little as one effluent measurement!

Two tables of Reasonable Potential Multiplying Factors are given in the TSD: the 99 percent confidence level with 99 percent probability basis and the 95 percent confidence level with 95 percent probability basis. For example $k_{(.95,\ .95,\ 10,\ 0.5545)} = 1.7$. The guidance allows for other probability basis percentiles to be selected by regulatory agencies but is silent on other acceptable upper confidence levels.

If the discharger is allowed a mixing zone, then the upper bound effluent concentration is adjusted to the upper bound concentration expected at the edge of the mixing zone after complete mixing. Solving the mass balance Equation 1 for C_o produces an estimate of the effluent concentration after mixing. An effluent limitation is required if the upper bound concentration, upon complete mixing, is greater than the water quality objective.

An example of effluent limitations established using the TSD reasonable potential procedure is the current City of San Francisco Westside wastewater treatment plant NPDES permit (City and County of San Francisco 1996).

2. <u>USEPA's Great Lakes Reasonable Potential Procedure</u>

In 1995, the USEPA promulgated the Final Water Quality Guidance for the Great Lakes System (GLS) in the Federal Register (USEPA 1995). This guidance was added to the Code of Federal Regulations at 40 CFR Part 132. The GLS reasonable potential procedure, Procedure 5, is found in Appendix F of the GLS and is very similar to the reasonable potential procedures found in the TSD. The *projected effluent quality* is specified as...

> the 95 percent confidence level of the 95th percentile based on a lognormal distribution <u>or</u> the maximum observed effluent concentration, whichever is greater.

Alternatively, the permit writer may define the *projected effluent quality* as...

> the 95th percentile of the distribution of the projected population of daily [weekly or monthly] values of the facility-specific effluent monitoring data projected using a scientifically defensible statistical method that accounts for and captures the long-term daily [weekly or monthly] variability of the effluent quality, accounts for limitations associated with sparse data sets and, unless otherwise shown by the effluent data set, assumes a lognormal distribution of the facility-specific effluent data.

The GLS also requires the calculation of a *preliminary effluent limitation*, which incorporates the water quality criterion, effluent dilution, and background pollutant concentrations. Mixing zones for bioaccumulative chemicals are not allowed for some GLS dischargers.

A water quality-based effluent limitation is required if the *projected effluent quality* exceeds the *preliminary effluent limitation*.

3. Ohio's Reasonable Potential Procedure

The alternative GLS reasonable potential definition above allows Great Lakes States more flexibility when determining the need for effluent limits. For example, the State of Ohio has recommended comparing the *projected effluent quality* with 75 percent of the *preliminary effluent limitation*. This revised definition results in a reasonable potential procedure that is more protective than the GLS and was thought to provide a necessary buffer against inaccurate reasonable potential determinations (Ohio 1996).

4. Colorado's Reasonable Potential Procedure

The State of Colorado recently issued guidance for determining reasonable potential (Colorado 2003). Colorado's procedure is similar to the USEPA TSD procedure. The 99^{th} percentile of the effluent distribution (calculated with 99 percent confidence) or the sample maximum, whichever is higher, is compared to the numeric water quality criterion.

At least ten effluent samples collected over a period of one year are required for reasonable potential assessments. Finally, the procedure provides guidance for estimating the effluent variability when some of the observations are below the analytical detection limit or suspected of being statistical outliers.

5. Procedures Using a Statistical Confidence Interval for a Distribution Percentile

All of the above procedures are similar in that they use the maximum observed sample value and a reasonable potential multiplying factor. Standard statistical methods, however, are readily available to estimate the upper percentile of a statistical distribution with a given high level of confidence; statisticians call this a *tolerance interval* and the resulting estimate is called an *upper confidence bound,* UCB (Hahn and Meeker 1991; Gibbons and Coleman 2001). Upper confidence bounds can be calculated for data believed to come from a normal distribution, a lognormal distribution, or any distribution (*i.e.*, a distribution-free tolerance interval).

Hahn and Meeker (1991) tabulated parametric normal tolerance factors for the construction of an Upper Confidence Bound for a population percentile when the data are Normally distributed:

$$\mathrm{UCBN}_{(c,p)} = \mathrm{M} + \mathrm{S}\ \mathrm{g}'_{(c,p,n)},$$

where, M is the sample mean, S is the sample standard deviation and g' is the normal tolerance factor for the one-sided upper c100 percent confidence bound of the p100th percentile for a sample of size n. Table 3 lists 95 percent tolerance factors obtained from Hahn and Meeker (1991, Table 12d, p.315) for the 95^{th} percentile.

This statistical confidence interval for percentiles accounts for long-term variability; highly variable data produce a larger upper confidence bound. In addition, this method produces larger confidence bounds when increased uncertainty is present due to small sample sizes (sparse data sets). As the sample size increases the upper confidence bound decreases and ultimately converges on the true population percentile.

The same normal tolerance factors can be applied to lognormal distributions by a logarithmic transformation of the effluent data. Ott (1990) demonstrated that lognormal distributions of concentrations of environmental pollutants can arise naturally from certain physical processes, especially after a series of independent random dilutions. Along these lines, USEPA suggests that "a lognormal distribution is generally more appropriate as a default statistical model than the normal distribution" (USEPA 1992, p.2).

The Upper Confidence Bound for a population percentile when the data are Lognormally distributed (Gibbons and Coleman 2001, p.244) is obtained from the following equation:

$$\mathrm{UCBL}_{(c,p)} = \exp(M_L + S_L\, g'_{(c,p,n)}),$$

where, M_L and S_L are the mean and standard deviation of the natural logarithm transformed data, respectively (i.e., maximum likelihood estimates), and g' is the normal tolerance factor for the one-sided upper c100 percent confidence bound of the p100th percentile for a sample of size n.

A minimum sample size of two is required to construct confidence intervals on a percentile of a normal or lognormal distribution.

In situations where no assumption can be made about the effluent distribution, non-parametric methods are available to construct confidence intervals on the upper percentile of any continuous statistical distribution (Hahn and Meeker 1991). These non-parametric estimates of a percentile are based on the larger observed values (i.e., order statistics) in the data set and generally require a large number of observations. For example, at least 59 samples are required in order to construct the upper 95 percent confidence bound on the 95^{th} percentile of a distribution.

In certain regulatory situations, a one-sided, upper confidence bound on an upper percentile is used to compare a set of environmental samples to a fixed regulatory standard (Gibbons and Coleman 2001, Chapter 19, *Corrective Action Monitoring*). When applied to a reasonable potential analysis, the null hypothesis is that the true upper percentile is greater than or equal to the water quality objective. We reject this null hypothesis if sufficient evidence is provided through the discharger's pollutant monitoring program; in other words, we reject the null hypothesis if the one-sided, upper confidence bound on the upper percentile is below the water quality objective. If we cannot reject this null hypothesis then we conclude that the pollutant discharge has the reasonable potential to exceed the water quality objective and an effluent limitation is required.

6. Lognormal Tolerance Bounds Using Order Statistics

A reasonable potential multiplying factor analogous the TSD procedure can be derived using a combination of the completely parametric lognormal upper tolerance bound and expected values of normal order statistics. Begin with the upper confidence bound for a lognormal distribution:

$$\mathrm{UCBL}_{(c,p)} = \exp(\mathrm{M_L} + \mathrm{S_L}\, g'_{(c,p,n)}).$$

Set the right hand side equal to the sample maximum multiplied by a reasonable potential multiplying factor k:

$$\exp(\mathrm{M_L} + \mathrm{S_L}\, g'_{(c,p,n)}) = X_{(n)}\ k.$$

Solve for k,

$$k = \exp(\mathrm{M_L} + \mathrm{S_L}\, g'_{(c,p,n)})\ /\ X_{(n)}\ .$$

Substitute $X_{(n)}$ with the expected value of the largest observation in a sample of n from a lognormal distribution:

$$k = \exp(\mathrm{M_L} + \mathrm{S_L}\, g'_{(c,p,n)})\ /\ \exp(\mathrm{M_L} + \mathrm{S_L}\, \mathrm{E}[X_{(n)}]),$$

where, $\mathrm{E}[X_{(n)}]$ is the expected value of the largest observation taken from a standard normal distribution. Tabulated values of $\mathrm{E}[X_{(n)}]$ are in Harter (1961) and Kokoska & Zwillinger (2000).

Upon simplification the $\mathrm{M_L}$ terms cancel, giving an expression for fully parametric lognormal reasonable potential multiplying factors:

$$k_{(c,\,p,\,n,\,\mathrm{SL})} = \exp(\mathrm{S_L}\, (g'_{(c,p,n)} - \mathrm{E}[X_{(n)}])).$$

Finally, the fully parametric Upper c100 percent Confidence Bound for the p100th percentile based on Lognormal Order Statistics, UCBLOS, is:

$$\mathrm{UCBLOS}_{(c,\,p)} = X_{(\mathrm{n})} \exp(\mathrm{S_L}\, (g'_{(c,p,n)} - \mathrm{E}[X_{(n)}])),$$

Where, $X_{(n)}$ is the observed sample maximum, $\mathrm{S_L}$ is the standard deviation of the natural logarithm transformed data, g' is the tabulated normal tolerance factor for the one-sided upper c100 percent confidence bound of the p100th percentile for a sample of size n, and $\mathrm{E}[X_{(n)}]$ is the tabulated expected value of the largest observation taken from a standard normal distribution.

As an example, consider the UCBLOS for the 95th percentile calculated with 95 percent confidence when using 12 effluent samples randomly collected from a lognormal distribution with a CV = 0.3. From Table 3, $g'_{(.95,.95,12)} = 2.736$, and from Harter's (1961) table $E[X_{(12)}] = 1.629$, and from above $\sigma_L = 0.294$. Therefore,

$$
\begin{aligned}
UCBLOS_{(.95,\,.95)} &= X_{(12)} \exp(S_L\,(g'_{(.95,.95,12)} - E[X_{(12)}])) \\
&= X_{(12)} \exp(0.294\ (2.736 - 1.629)) \\
&= X_{(12)} \exp(0.294\ (2.736 - 1.629)) \\
&= X_{(12)} \exp(0.294\ (1.107)) \\
&= X_{(12)}\ 1.385
\end{aligned}
$$

The quantity ($g'_{(.95,.95,n)} - E[X_{(n)}]$) is less than zero for $n > 38$ and is tabulated in Table 5 for $2 \leq n \leq 38$. Using this procedure will result in a higher confidence bound as compared to the TSD procedure when $n \leq 19$.

7. Censored Data Statistical Considerations

Any reasonable potential analysis will be complicated by the presence of monitoring data below the analytical detection limit. Gibbons and Coleman (2001, Chapter 13) presented an extensive review of statistical techniques useful for analyzing environmental data that include results not completely quantified. Such data are *censored* by a limit of detection or by a limit of quantification, or both, usually on the left tail of the population distribution.

Sample results below the limit of detection (*i.e.*, the USEPA Method Detection Limit) are *non-detects* (ND). Monitoring samples at or above the limit of detection but below the limit of quantification (i.e., the California Ocean Plan Minimum Level) are *detected but not quantified* (DNQ). Various combinations of data types (NDs, DNQs, or quantified) are theoretically possible depending on the effluent distribution, the limit of detection, and the limit of quantification.

Gibbons and Coleman suggest applying Cohen's Maximum Likelihood Estimator, MLE (Cohen 1961) for censored data sets. Cohen's MLE technique adjusts the uncensored sample mean and uncensored sample standard deviation by a factor derived from the proportion of NDs and the censoring point. Cohen's MLE "appears to work best for small normally distributed samples, and lognormal versions of the estimator can be obtained simply by taking natural logarithms of the data and censoring point." Cohen's MLE is also recommended by the USEPA when 15 - 50 percent of the samples are censored (USEPA 1992; USEPA 1998). Use of Cohen's MLE requires at least two quantified sample measurements (Gibbons and Coleman 2001, Sec 13.4).

The TSD presented a *delta lognormal* technique to account for effluent data censored by a single detection limit (USEPA 1991, Appendix E). Hinton (1993) concluded, however, that this technique vastly overestimates the mean compared to Cohen's MLE technique, especially when censoring is >60 percent.

Recent water quality data simulations by Shumway *et al*. (2002) indicate that the *Regression on Order Statistics* technique (ROS) of Helsel and Gilliom (1986) is robust, unbiased, and has a smaller variance than the MLE technique under the lognormal distribution.

Unfortunately, the majority of censored data statistical techniques assume that only one detection limit or censoring level is present in the data; however, effluent data often contain several analytical detection limit thresholds within the same data set. A refinement of the ROS technique is available for water quality data having multiple detection limits or censoring levels (Helsel and Cohn 1988).

8. Comparison of Reasonable Potential Procedures

SWRCB staff developed a set of criteria for comparing reasonable potential procedures by adopting essential elements from the NPDES Federal Regulations and desirable elements from other State's reasonable potential procedures. Table 4 compares the TSD procedure with the tolerance bound procedure in relation to these desirable criteria. Table 5 compares the TSD procedure with the lognormal tolerance bound procedure using order statistics for any CV. Table 6 compares the TSD procedure with the lognormal order statistic procedure for a CV of 0.6.

Appendix 4-1 further illustrates the reasonable potential conclusions that would be made under the two procedures using actual effluent data from a major ocean discharger. In this example, the upper confidence bounds calculated using the tolerance bound procedure produce a more realistic estimate of the upper population percentile as compared to the TSD procedure, especially with smaller sample sizes.

C. Determining the Need for an Effluent Limitation with Insufficient Monitoring Data

A scientifically defensible, statistically based, reasonable potential procedure allows an objective characterization of effluent discharges and is to be preferred. A statistical analysis of actual facility-specific monitoring data will lead to a more objective reasonable potential decision. In most cases, a minimum of two quantified samples above the limit of quantification are required to use these statistical methods.

If facility-specific monitoring data are insufficient to use the statistical procedures, then permit writers must use professional judgments similar to situations where effluent monitoring data are lacking, that is, a non-statistically-based reasonable potential decision. These situations include facilities having no effluent data or a single effluent sample or a highly censored effluent data set having less than two quantified samples, thereby precluding the use of censored data statistical techniques.

In the absence of facility-specific monitoring data or if insufficient facility-specific monitoring data exists to use statistical procedures, the permit writer must provide adequate justification for any effluent limits included in the permit. The TSD lists several factors to consider in addition to effluent monitoring data when determining whether a discharge causes, has the reasonable potential to cause, or contributes to an excursion of a State water quality criterion. These factors include facility dilution, type of industry or publicly-owned treatment works (POTW), other existing data (including the NPDES application), history of compliance, and type of receiving water.

If the permit writer is unable to decide whether the discharge would exceed the water quality criterion the TSD recommends that whole effluent toxicity testing or additional chemical-specific testing be added as a permit condition. This includes 100 percent censored data sets when all limits of detection are greater than the water quality criterion.

IV. Alternatives for Board Action and Staff Recommendations

Because a tolerance bound procedure more appropriately utilizes facility-specific effluent data, SWRCB staff recommend the use of a lognormal tolerance interval-based procedure, as outlined in this section, for reasonable potential determinations rather than the TSD-based procedures. The water quality objective should be compared to the one sided, upper 95 percent confidence bound of the 95th percentile of a lognormal distribution. A lognormal distribution is appropriate as a default statistical model when conducting a reasonable potential analysis. Furthermore, when dilution is allowed, the one-sided upper confidence bound on the upper percentile should be adjusted by the mass balance equation (Equation 1 solved for C_o) prior to comparison with the water quality objective.

SWRCB staff recommend the Helsel and Cohn (1988) method as a general approach for accounting for censored data when assessing reasonable potential. This technique is also recommended in the Colorado Reasonable Potential Procedure (2003).

Eventually, data censoring may be so severe that a statistically based decision of reasonable potential cannot be made. This may happen when the water quality objective is far below the limit of quantification or when the sample size is small. Under these conditions, the permit writer must use guidance for determining the need for an effluent limit using insufficient monitoring data (see Determining the Need for an Effluent Limitation with Insufficient Monitoring Data above).

Using the criteria in Table 4, SWRCB staff composed the reasonable potential language in the proposed amendment. A general reasonable potential paragraph will be added to Chapter III of the California Ocean Plan. Additional clarifying language will be added to a new appendix of the California Ocean Plan. This new appendix will cover factors to consider when assessing the need for an effluent limitation, the recommended statistically-based analysis procedure, and how to account for uncertainty produced by small sample sizes and censored data values.

Staff in the Ocean Standards Unit, have simultaneously developed a computer software program (RPCalc) that will perform the statistically based reasonable potential calculations recommended and presented in this section (Saiz 2003). This reasonable potential "calculator" can be used as a tool by permit writers to easily compare an effluent data set with the California Ocean Plan Table B water quality objective using the procedures identified in the proposed amendment. The software will follow the procedures specified in the new California Ocean Plan Reasonable Potential Appendix.

V. Environmental Impact Analyses

No adverse environmental effects are expected from the proposed amendment. The amendment provides a method for determining when effluent limits are required and there is no change to the water quality objectives of the California Ocean Plan.

VI. Compliance with Section 13421 of the California Water Code

Staff is not proposing the adoption of water quality objectives; therefore, we are not required to consider Section 13241 of the California Water Code for this proposed amendment to the California Ocean Plan.

VII. Proposed California Ocean Plan Amendment

Presented below are the proposed changes to the 2001 California Ocean Plan that will result if *only* the changes proposed in Issue 2 are approved. Presented in Appendix A are the combined changes to the 2001 California Ocean Plan that will occur if this amendment and the other proposed amendment is also approved.

1. Chapter III, G. Monitoring Program, 2, page 21, delete subsection 2 and renumber subsection 3.

G. Monitoring Program

2. ~~Where the Regional Board is satisfied that any substance(s) of Table B will not significantly occur in a discharger's effluent, the Regional Board may elect not to require monitoring for such substance(s), provided the discharger submits periodic certification that such substance(s) is not added to the waste* stream, and that no change has occurred in activities that could cause such substance(s) to be present in the waste* stream. Such election does not relieve the discharger from the requirement to meet the objectives of Table B.~~

~~3~~2. The Regional Board may require monitoring of bioaccumulation of toxicants in the discharge zone. Organisms and techniques for such monitoring shall be chosen by the Regional Board on the basis of demonstrated value in waste* discharge monitoring.

2. Chapter III, C. Implementation Provisions for Table B, page 12, add new subsection 2 on reasonable potential and renumber subsequent subsections.

C. Implementation Provisions for Table B

2. If the RWQCB determines, using the procedures in Appendix VI, that a pollutant is discharged into Ocean Waters at levels which will cause, have the reasonable potential

to cause, or contribute to an excursion above any Table B water quality objective, the RWQCB shall incorporate a water quality-based effluent limitation in the Waste Discharge Requirement for the discharge of that pollutant.

~~2~~3. Effluent limitations shall be imposed in a manner prescribed by the SWRCB such that the concentrations set forth below as water quality objectives shall not be exceeded in the receiving water upon completion of initial* dilution, except that objectives indicated for radioactivity shall apply directly to the undiluted waste* effluent.

~~3~~4. Calculation of Effluent Limitations

~~4~~5. Minimum* Levels

~~5~~6. Use of Minimum* Levels

~~6~~7. Sample Reporting Protocols

~~7~~8. Compliance Determination

~~8~~9. Pollutant Minimization Program

910. Toxicity Reduction Requirements

3. Add Appendix VI to the California Ocean Plan to provide reasonable potential analysis procedures

Appendix VI
Reasonable Potential Analysis Procedure for determining which Table B Objectives require effluent limitations

An effluent discharge, after accounting for dilution and background seawater concentrations, has the reasonable potential to exceed a Table B water quality objective if the one-sided, upper 95 percent confidence bound on the 95th percentile of the pollutant discharge distribution, or the maximum observed pollutant concentration, is above the Table B water quality objective.

In determining the need for an effluent limitation, the RWQCB shall use all representative information to characterize the pollutant discharge using a scientifically defensible statistical method that accounts for and captures the long-term variability of the pollutant in the effluent, accounts for limitations associated with sparse data sets, accounts for uncertainty associated with censored data sets, and (unless otherwise shown by the effluent data set) assumes a lognormal distribution of the facility-specific effluent data.

If insufficient information precludes the use of a statistical method to characterize the pollutant discharge or if the pollutant data consist entirely of results below the MDL or ML (or a combination of both), then the RWQCB may require whole effluent chronic toxicity testing or additional pollutant-specific monitoring as a condition of the Waste Discharge Requirement.

If the following reasonable potential analysis (see also Figure VI-1) indicates that a limitation is required for a Table B substance, the RWQCB shall establish the limitation using Equation 1.

Step 1: Identify C_o, the applicable water quality objective from Table B for the pollutant.

Step 2: Does information about the receiving water body or the discharge support a reasonable potential assessment (RPA) without characterizing facility-specific effluent monitoring data? If yes, go to *Step 14* to conduct an RPA based on best professional judgement (BPJ). Otherwise, proceed to *Step 3*.

Step 3: Is facility-specific effluent monitoring data available? If yes, proceed to *Step 4.* Otherwise, go to *Step 14.*

Step 4: Adjust all effluent monitoring data C_e, including non-detected values, to the concentration C expected after complete mixing. For Table B pollutants use $C = (C_e + D_m C_s) / (D_m + 1)$; for acute toxicity use $C = C_e / (0.1 D_m + 1)$; where D_m is the minimum probable initial dilution expressed as parts seawater per part wastewater and C_s is the background seawater concentration from Table C. Go to *Step 5*.

Step 5. Find $X_{(n)}$, the maximum detected pollutant concentration. Is $X_{(n)}$ greater than C_o? If yes, an effluent limitation must be developed. Otherwise, proceed to *Step 6*.

Step 6: Does the effluent monitoring data contain two or more detected observations? If yes, proceed to *Step 7* to conduct a statistically-based RPA. Otherwise, go to *Step 9* to conduct a sparse data RPA.

Step 7: Conduct a Statistically-based RPA.

- Calculate lnSDev, the standard deviation of the natural logarithm transformed effluent data expected after complete mixing. If needed, use censored data analysis methods such as Helsel and Cohn (1988).
- Obtain the factor, f_n, from the table below based on n, the total number of samples including non-detected values.
- Calculate the UCB i.e., the one-sided, upper 95 percent confidence bound for the 95th percentile of the effluent distribution after mixing, $UCB = X_{(n)} \exp(\text{lnSDev}\, f_n)$.
- Proceed to *Step 8*.

Step 8: Is UCB greater than C_o? If yes, an effluent limitation must be developed. Otherwise, an effluent limitation is not required.

Step 9: Conduct a Sparse data RPA. Assume effluent data are lognormally distributed with a CV = 0.6 and lnSDev = 0.5545. Proceed to *Step 10.*

<u>Step 10:</u> Is the data 100 percent censored by having all non-detects or DNQs or a combination of both? If yes, go to *Step 13*. Otherwise, go to *Step 11*.

<u>Step 11:</u> Adjust the sample size, n, to the total number of observations less than or equal to the single detected value. Let $X_{(n)}$ = the single detected observation. Obtain the reasonable potential multiplying factor k from the table below based on n. Calculate the UCB i.e., the one-sided, upper 95 percent confidence bound for the 95^{th} percentile of the effluent distribution after mixing, UCB = $X_{(n)}\ k$. Proceed to *Step 12*.

<u>Step 12:</u> Is the UCB greater than C_o? If yes, an effluent limitation must be developed. Otherwise, an effluent limitation is not required.

<u>Step 13:</u> Is the lowest non-detected value greater than C_o? If yes, go to *Step 15*. Otherwise, an effluent limitation is not required.

<u>Step 14</u>*:* Conduct an RPA based on BPJ. Review all available information to determine if a water quality-based effluent limitation is required, notwithstanding the above analysis in *Steps 1* through *13*, 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, the presence of endangered or threatened species or critical habitat, and other information.

Is data or other information unavailable or insufficient to determine if a water quality-based effluent limitation is required? If yes, proceed with *Step 15.* Otherwise, an effluent limitation must be developed.

<u>Step 15</u>*:* If data are unavailable or insufficient to conduct the above analysis for the pollutant, or if all reported after dilution detection limits of the pollutant in the effluent are greater than C_o, the RWQCB shall establish interim requirements that require additional monitoring for the pollutant in place of a water quality-based effluent limitation.

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Table VI-1. Factors used to calculate UCB, the upper 95 percent confidence bound for the 95th percentile of a lognormal distribution using the maximum detected observation $X_{(n)}$. g' are normal tolerance factors from Hahn & Meeker (1991) and $E[X_{(n)}]$ are expected values of the largest observation taken from a standard normal distribution from Harter (1961).

Number of Samples, n	For any CV $UCB_{(.95,\ .95,\ n,\ \sigma L)} = X_{(n)} \exp(\sigma_L f_n)$ where $f_n = (g'_{(.95,.95,n)} - E[X_{(n)}])$ f_n	For CV = 0.6 $UCB_{(.95,\ .95,\ n,\ 0.5545)} = X_{(n)}\ k$ *where* $k = \exp(0.5545\, f_n)$ k
1	25.696*	>1000000.000*
2	25.696	>1000000.000
3	6.810	43.644
4	4.115	9.792
5	3.040	5.396
6	2.441	3.871
7	2.047	3.111
8	1.763	2.659
9	1.546	2.357
10	1.372	2.140
11	1.229	1.976
12	1.107	1.847
13	1.003	1.744
14	0.911	1.657
15	0.830	1.585
16	0.758	1.522
17	0.692	1.468
18	0.633	1.420
19	0.579	1.378
20	0.528	1.341
21	0.479	1.304
22	0.434	1.272
23	0.392	1.243
24	0.354	1.217
25	0.319	1.194
26	0.286	1.172
27	0.256	1.153
28	0.228	1.135
29	0.201	1.118
30	0.177	1.103
31	0.151	1.087
32	0.127	1.073
33	0.102	1.058
34	0.080	1.045
35	0.057	1.032
36	0.038	1.021
37	0.018	1.010
38 or more	0.000	1.000

* Values shown are for $n = 2$

Figure VI-1: Reasonable potential analysis flow chart

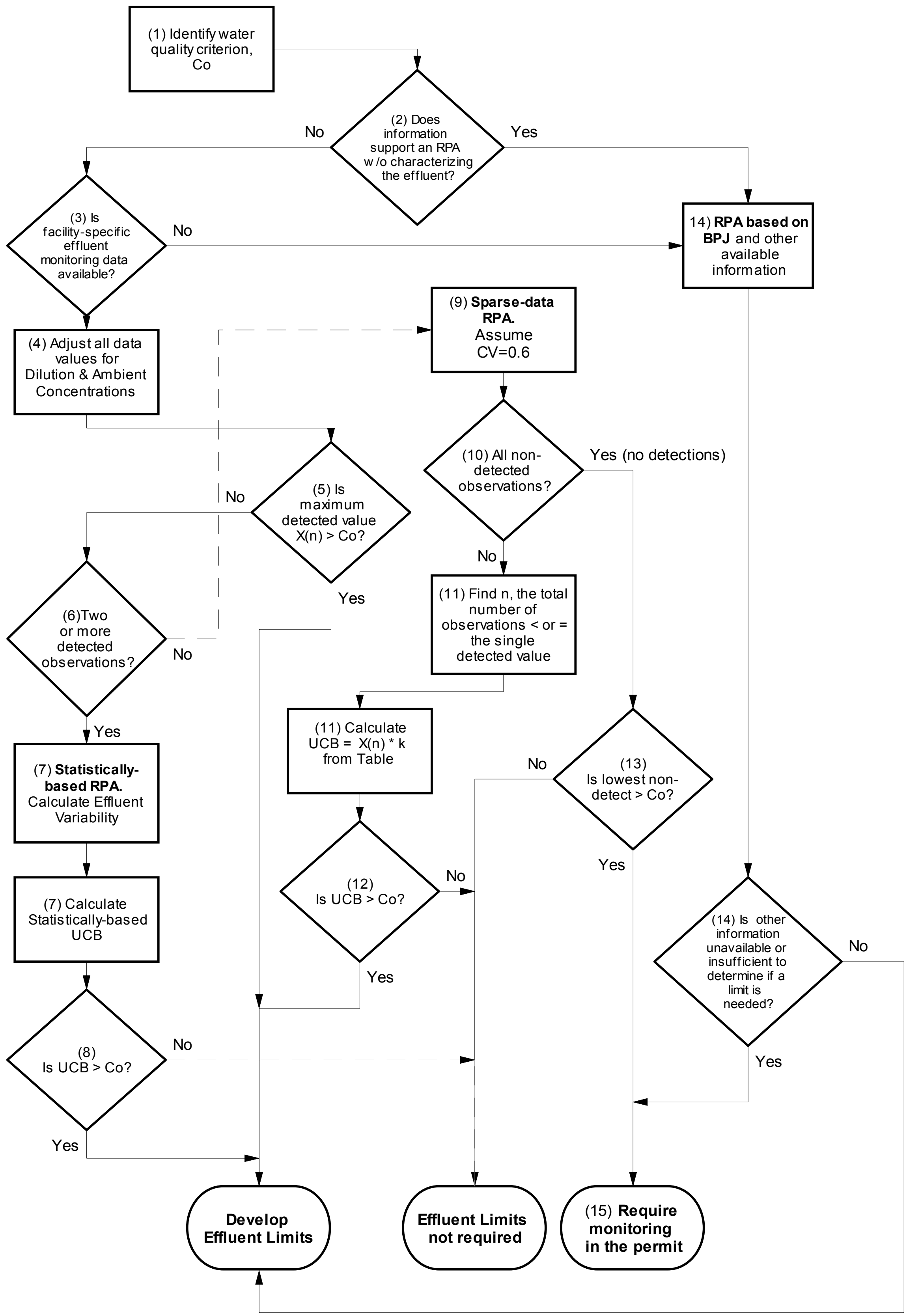

Table 3. Tolerance factors $g'_{.95,.95,n}$ for calculating normal distribution one-sided upper 95 percent tolerance bounds for the 95th percentile (from Hahn & Meeker 1991).

n	$g'_{.95,.95,n}$	***n***	$g'_{.95,.95,n}$	***n***	$g'_{.95,.95,n}$	***n***	$g'_{.95,.95,n}$
2	26.260	11	2.815	21	2.371	35	2.167
3	7.656	12	2.736	22	2.349	40	2.125
4	5.144	13	2.671	23	2.328	50	2.065
5	4.203	14	2.614	24	2.309	60	2.022
6	3.708	15	2.566	25	2.292	120	1.899
7	3.399	16	2.524	26	2.275	240	1.819
8	3.187	17	2.486	27	2.260	480	1.766
9	3.031	18	2.453	28	2.246	∞	1.645
10	2.911	19	2.423	29	2.232		
		20	2.396	30	2.220		

Table 4. Comparison of reasonable potential procedures in relation to desirable criteria.

Desirable Criterion	TSD Procedure	Lognormal Tolerance Bound Procedure
Incorporates a scientifically defensible statistical method.	True. An upper percentile estimated with high confidence is compared to the Water Quality Objective	True. The 95th percentile estimated with 95 percent confidence is compared to the Water Quality Objective.
Accounts for and captures the long-term variability of the pollutant in the effluent.	True for 10 or more samples. False for less than 10 samples.	True. Effluent variability is estimated from the samples for all sample sizes.
Accounts for limitations associated with censored data sets.	True. Delta lognormal technique assumes one censoring threshold.	True. The Helsel and Cohn (1988) technique accounts for multiple censoring thresholds and performs better than the Delta lognormal technique.
Accounts for limitations associated with sparse data sets.	True. Small data sets produce a larger upper confidence bound. Large data sets converge on the true population percentile.	True. Small data sets produce a larger upper confidence bound. Large data sets converge on the true population percentile faster than the TSD procedure.
Incorporates dilution of the effluent in the receiving water.	True.	True.
Is not unduly affected by outliers or extreme data values.	False. Sample maximum will be a prime outlier suspect.	True. Sample mean and standard deviation are derived from all data and are not unduly influenced by a single observation.
Assumes effluent data is lognormally distributed, unless otherwise shown by the data	True.	True.

Table 5. Comparison of factors f_n used to calculate the upper 95 percent confidence bound for the 95th percentile of a lognormal distribution using the equation:

$$UCBL_{(.95,\ .95,\ n,\ \sigma L)} = X_{(n)} \exp(\sigma_L f_n)$$

where, $X_{(n)}$ = maximum value of n observed samples,
σ_L = Standard Deviation for the natural logarithm transformed data
(If $n \leq 9$, use σ_L= 0.5545 for the TSD procedure)
f_n = selected from table below based on sample size and procedure.

Number of Samples, n	TSD semi-parametric lognormal procedure, $f_{n,TSD} = \{\Phi^{-1}[0.95] - \Phi^{-1}[(1-0.95)^{1/n}]\}$	Parametric lognormal order statistic procedure, $f_{n,OS} = (g'_{(.95,.95,n)} - E[X_{(n)}])$
1	3.290	n/a
2	2.405	25.696
3	1.981	6.810
4	1.713	4.115
5	1.521	3.040
6	1.373	2.441
7	1.255	2.047
8	1.156	1.763
9	1.071	1.546
10	0.998	1.372
11	0.933	1.229
12	0.876	1.107
13	0.824	1.003
14	0.777	0.911
15	0.733	0.830
16	0.694	0.758
17	0.657	0.692
18	0.623	0.633
19	0.591	0.579
20	0.561	0.528
21	0.532	0.479
22	0.506	0.434
23	0.480	0.392
24	0.456	0.354
25	0.434	0.319
26	0.412	0.286
27	0.391	0.256
28	0.372	0.228
29	0.353	0.201
30	0.334	0.177
31	0.317	0.151
32	0.300	0.127
33	0.284	0.102
34	0.268	0.080
35	0.253	0.057
36	0.239	0.038
37	0.225	0.018
38	0.211	0.000

Table 6. Comparison of reasonable potential multiplying factors k used to calculate the upper 95 percent confidence bound for the 95th percentile of a lognormal distribution having a CV = 0.6 and f_n from Table 5:

$$UCBL_{(.95,\ .95,\ n,\ \sigma L)} = X_{(n)} \exp(0.5545\ f_n) = X_{(n)}\ k$$

where, $X_{(n)}$ = maximum value of n observed samples, and k = reasonable potential multiplying factor selected from the table below based on sample size and procedure type.

Number of Samples, n	TSD semi-parametric lognormal procedure, k	Parametric lognormal order statistic procedure, k
1	6.195	n/a
2	3.795	>1000000.000
3	3.000	43.644
4	2.585	9.792
5	2.324	5.396
6	2.141	3.871
7	2.004	3.111
8	1.897	2.659
9	1.811	2.357
10	1.739	2.140
11	1.678	1.976
12	1.624	1.847
13	1.578	1.744
14	1.538	1.657
15	1.501	1.585
16	1.469	1.522
17	1.439	1.468
18	1.412	1.420
19	1.387	1.378
20	1.364	1.341
21	1.343	1.304
22	1.323	1.272
23	1.305	1.243
24	1.288	1.217
25	1.271	1.194
26	1.257	1.172
27	1.242	1.153
28	1.228	1.135
29	1.216	1.118
30	1.203	1.103
31	1.192	1.087
32	1.181	1.073
33	1.171	1.058
34	1.160	1.045
35	1.151	1.032
36	1.141	1.021
37	1.132	1.010
38	1.124	1.000

CALIFORNIA ENVIRONMENTAL QUALITY ACT

Introduction

In California, protection of the quality of waters of the State is entrusted by law to the State Water Resources Control Board (SWRCB) and the nine Regional Water Quality Control Boards (RWQCBs). As authorized by the California Water Code (CWC), the SWRCB has adopted statewide water quality control plans, such as the California Ocean Plan and the Thermal Plan. Consistent with and complementary to these statewide plans, each RWQCB has adopted a regional water quality control plan (basin plan) that contains specific water quality standards and implementation provisions for its region. (Water quality standards consist of a water body's designated uses and water quality objectives to protect those uses and antidegradation.) Basin plans must be approved by the SWRCB and by the State Office of Administrative Law (OAL). The RWQCBs are primarily responsible for implementing both statewide water quality control plans and basin plans.

Both the federal Clean Water Act (CWA) and the CWC require periodic review of the State's water quality standards. The purpose of such review is to determine, with public input, whether any changes are needed in the standards. Follow-up actions by the SWRCB or RWQCBs ensure that needed changes identified in the review process will be made as amendments to the water quality control plan under review.

Under provisions of the California Environmental Quality Act (CEQA), certified State regulatory programs are exempt from certain aspects of the CEQA process. As noted below:

> *Section 21080.5 of the Public Resources Code provides that a regulatory program of a state agency shall be certified by the Secretary for Resources as being exempt from the requirements for preparing EIRs, Negative Declarations, and Initial Studies if the Secretary finds that the program meets the criteria contained in that code section. A certified program remains subject to other provisions in CEQA such as the policy of avoiding significant adverse effects on the environment where feasible. This article provides information concerning certified programs.* [California Code of Regulations (CCR), Title 14, §15250]

The water quality planning process of the SWRCB and RWQCBs, by which the boards prepare, adopt, review, and amend the statewide and regional water quality control plans, is certified by the Secretary for Resources as "functionally equivalent" to the CEQA process. This means that the SWRCB's and RWQCBs' process of public hearings, responsiveness to public comments, preparation of environmental documentation, and public decision-making serves as an approved alternative to the CEQA process, substituting this "functionally equivalent" procedure for some CEQA requirements. The current review process for the California Ocean Plan follows the approved procedure for review of water quality control plans.

This section summarizes the CEQA compliance provided by the SWRCB through preparation and circulation of this draft Functional Equivalent Document (FED) and the following Final FED, including the growth inducing and cumulative impact descriptions.

Growth-Inducing Impacts

The CEQA Guidelines (CCR, Title 14, Chapter 3) provide the following direction for the examination of growth-inducing impacts:

> *(d) Growth-Inducing Impact of the Proposed Project. Discuss the ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Included in this are projects which would remove obstacles to population growth (a major expansion of a waste water treatment plant might, for example, allow for more construction in service areas). Increases in the population may tax existing community service facilities, requiring construction of new facilities that could cause significant environmental effects. Also discuss the characteristic of some projects which may encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively. It must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment.* (CCR, Title 14, §15126.2(d))

The proposed actions contemplated by this FED include:

Issue 1: Choice of Indicator Organisms for Water-Contact Bacterial Standards

Issue 2: Reasonable Potential: Determining when California Ocean Plan Water Quality-based Effluent Limitations are Required

Implementation of either issue is not expected to induce additional growth as a result of perceived lessening of water quality protection requirements.

Cumulative Impacts

The CEQA Guidelines provide the following definition of cumulative impacts:

> *"Cumulative impacts" refers to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts.*
>
> *(a) The individual effects may be changes resulting from a single project or a number of separate projects.*
>
> *(b) The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time.* (CCR, Title 14, §15355)

The fundamental purpose of the cumulative impact analysis is to ensure that the potential environmental impacts of any individual project are not considered in isolation. Impacts that are individually less than significant on a project-by-project basis, could pose a potentially significant impact when considered with the impacts of other projects. The cumulative impact analysis need not be performed at the same level of detail as a "project level" analysis but must be sufficient to disclose potential combined effects that could constitute a significant adverse impact.

Implementation of the proposed amendments to the California Ocean Plan would alter the manner in which water quality is assessed and monitored. However, the required frequency of sampling and the number of analyses would not be substantially changed from existing requirements, and consequently the proposed changes would not require a significant change in sampling personnel, vehicle trips, field equipment, or other parameters of the sampling process. Further, implementation of the proposed amendments is not expected to contribute to a significant environmental impact.

Resolution of Environmental Checklist Items

Pursuant to Section 3777(a), Title 23, CCR, an environmental checklist (see Appendix C) was completed for evaluating potential environmental effects due to implementation of the proposed amendments. Staff found that there would be no adverse environmental impacts resulting from the actions proposed in the amendments.

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Appendix A
Draft Ocean Plan with Proposed Amendments

CALIFORNIA OCEAN PLAN

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LIST OF TABLES

CALIFORNIA OCEAN PLAN

WATER QUALITY CONTROL PLAN FOR OCEAN WATERS OF CALIFORNIA

INTRODUCTION

A. Purpose and Authority

1. In furtherance of legislative policy set forth in Section 13000 of Division 7 of the California Water Code (CWC) (Stats. 1969, Chap. 482) pursuant to the authority contained in Section 13170 and 13170.2 (Stats. 1971, Chap. 1288) the State Water Resources Control Board hereby finds and declares that protection of the quality of the ocean* waters for use and enjoyment by the people of the State requires control of the discharge of waste* to ocean* waters in accordance with the provisions contained herein. The Board finds further that this plan shall be reviewed at least every three years to guarantee that the current standards are adequate and are not allowing degradation* to marine species or posing a threat to public health.

B. Principles

1. Harmony Among Water Quality Control Plans and Policies.

   a. In the adoption and amendment of water quality control plans, it is the intent of this Board that each plan will provide for the attainment and maintenance of the water quality standards of downstream waters.

   b. To the extent there is a conflict between a provision of this plan and a provision of another statewide plan or policy, or a regional water quality control plan (basin plan), the more stringent provision shall apply except where pursuant to Chap. III.I of this Plan, the SWRCB has approved an exception to the Plan requirements.

C. Applicability

1. This plan is applicable, in its entirety, to point source discharges to the ocean*. Nonpoint sources of waste* discharges to the ocean* are subject to Chapter I Beneficial Uses, Chapter II - WATER QUALITY OBJECTIVES (wherein compliance with water quality objectives shall, in all cases, be determined by direct measurements in the receiving waters) and Chapter III - PROGRAM OF IMPLEMENTATION Parts A.2, D, E, and H.

2. This plan is not applicable to discharges to enclosed* bays and estuaries* or inland waters, nor is it applicable to vessel wastes, or the control of dredged* material.

3. Provisions regulating the thermal aspects of waste* discharged to the ocean* are set forth in the Water Quality Control Plan for the Control of Temperature in the Coastal and Interstate Waters and Enclosed* Bays and Estuaries* of California.

* See Appendix I for definition of terms.

4. Within this Plan, references to the State Board or SWRCB shall mean the State Water Resources Control Board. References to a Regional Board or RWQCB shall mean a California Regional Water Quality Control Board. References to the Environmental Protection Agency, US EPA, or EPA shall mean the federal Environmental Protection Agency.

* See Appendix I for definition of terms.

I. BENEFICIAL USES

A. The beneficial uses of the ocean* waters of the State that shall be protected include industrial water supply; water contact and non-contact recreation, including aesthetic enjoyment; navigation; commercial and sport fishing; mariculture*; preservation and enhancement of designated Areas* of Special Biological Significance (ASBS); rare and endangered species; marine habitat; fish migration; fish spawning and shellfish* harvesting.

* See Appendix I for definition of terms.

II. WATER QUALITY OBJECTIVES

A. General Provisions

1. This chapter sets forth limits or levels of water quality characteristics for ocean* waters to ensure the reasonable protection of beneficial uses and the prevention of nuisance. The discharge of waste* shall not cause violation of these objectives.

2. The Water Quality Objectives and Effluent Limitations are defined by a statistical distribution when appropriate. This method recognizes the normally occurring variations in treatment efficiency and sampling and analytical techniques and does not condone poor operating practices.

3. Compliance with the water quality objectives of this chapter shall be determined from samples collected at stations representative of the area within the waste field where initial* dilution is completed.

B. Bacterial Characteristics

1. Water-Contact Standards

   a. Within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board, but including all kelp* beds, the following bacterial objectives shall be maintained throughout the water column:

      ~~(1) Samples of water from each sampling station shall have a density of total coliform organisms less than 1,000 per 100 ml (10 per ml); provided that not more than 20 percent of the samples at any sampling station, in any 30-day period, may exceed 1,000 per 100 ml (10 per ml), and provided further that no single sample when verified by a repeat sample taken within 48 hours shall exceed 10,000 per 100 ml (100 per ml).~~

      ~~(2) The fecal coliform density based on a minimum of not less than five samples for any 30-day period, shall not exceed a geometric mean of 200 per 100 ml nor shall more than 10 percent of the total samples during any 60-day period exceed 400 per 100 ml.~~

      Geometric Mean – Samples shall be collected from each station at least weekly, with the five most recent sample results used to calculate the geometric mean:

      i. Total coliform density shall not exceed 1,000 per 100 ml;
      ii. Fecal coliform density shall not exceed 200 per 100 ml; and,
      iii. Enterococcus density shall not exceed 35 per 100 ml.

   b. The "Initial* Dilution Zone" of wastewater outfalls shall be excluded from designation as "kelp* beds" for purposes of bacterial standards, and Regional Boards should recommend extension of such exclusion zone where warranted to the SWRCB (for consideration under Chapter III.H.). Adventitious assemblages of

* See Appendix I for definition of terms.

kelp plants on waste discharge structures (e.g., outfall pipes and diffusers) do not constitute kelp* beds for purposes of bacterial standards.

2. Shellfish* Harvesting Standards

a. At all areas where shellfish* may be harvested for human consumption, as determined by the Regional Board, the following bacterial objectives shall be maintained throughout the water column:

(1) The median total coliform density shall not exceed 70 per 100 ml, and not more than 10 percent of the samples shall exceed 230 per 100 ml.

C. Physical Characteristics

1. Floating particulates and grease and oil shall not be visible.

2. The discharge of waste* shall not cause aesthetically undesirable discoloration of the ocean* surface.

3. Natural* light shall not be significantly* reduced at any point outside the initial* dilution zone as the result of the discharge of waste*.

4. The rate of deposition of inert solids and the characteristics of inert solids in ocean* sediments shall not be changed such that benthic communities are degraded*.

D. Chemical Characteristics

1. The dissolved oxygen concentration shall not at any time be depressed more than 10 percent from that which occurs naturally, as the result of the discharge of oxygen demanding waste* materials.

2. The pH shall not be changed at any time more than 0.2 units from that which occurs naturally.

3. The dissolved sulfide concentration of waters in and near sediments shall not be significantly* increased above that present under natural conditions.

4. The concentration of substances set forth in Chapter II, Table B, in marine sediments shall not be increased to levels which would degrade* indigenous biota.

5. The concentration of organic materials in marine sediments shall not be increased to levels that would degrade* marine life.

6. Nutrient materials shall not cause objectionable aquatic growths or degrade* indigenous biota.

7. Numerical Water Quality Objectives

a. Table B water quality objectives apply to all discharges within the jurisdiction of this Plan.

b. Table B Water Quality Objectives

* See Appendix I for definition of terms.

TABLE B
WATER QUALITY OBJECTIVES

	Units of Measurement	Limiting Concentrations: 6-Month Median	Daily Maximum	Instantaneous Maximum
OBJECTIVES FOR PROTECTION OF MARINE AQUATIC LIFE				
Arsenic	ug/l	8.	32.	80.
Cadmium	ug/l	1.	4.	10.
Chromium (Hexavalent) (see below, a)	ug/l	2.	8.	20.
Copper	ug/l	3.	12.	30.
Lead	ug/l	2.	8.	20.
Mercury	ug/l	0.04	0.16	0.4
Nickel	ug/l	5.	20.	50.
Selenium	ug/l	15.	60.	150.
Silver	ug/l	0.7	2.8	7.
Zinc	ug/l	20.	80.	200.
Cyanide (see below, b)	ug/l	1.	4.	10.
Total Chlorine Residual (For intermittent chlorine sources see below, c)	ug/l	2.	8.	60.
Ammonia (expressed as nitrogen)	ug/l	600.	2400.	6000.
Acute* Toxicity	TUa	N/A	0.3	N/A
Chronic* Toxicity	TUc	N/A	1.	N/A
Phenolic Compounds (non-chlorinated)	ug/l	30.	120.	300.
Chlorinated Phenolics	ug/l	1.	4.	10.
Endosulfan	ug/l	0.009	0.018	0.027
Endrin	ug/l	0.002	0.004	0.006
HCH*	ug/l	0.004	0.008	0.012
Radioactivity	Not to exceed limits specified in Title 17, Division 1, Chapter 5, Subchapter 4, Group 3, Article 3, Section 30253 of the California Code of Regulations. Reference to Section 30253 is prospective, including future changes to any incorporated provisions of federal law, as the changes take effect.			

* See Appendix I for definition of terms.

Table B Continued

Chemical	30-day Average (ug/l) Decimal Notation	Scientific Notation
OBJECTIVES FOR PROTECTION OF HUMAN HEALTH – NONCARCINOGENS		
acrolein	220.	2.2×10^{2}
antimony	1,200.	1.2×10^{3}
bis(2-chloroethoxy) methane	4.4	4.4×10^{0}
bis(2-chloroisopropyl) ether	1,200.	1.2×10^{3}
chlorobenzene	570.	5.7×10^{2}
chromium (III)	190,000.	1.9×10^{5}
di-n-butyl phthalate	3,500.	3.5×10^{3}
dichlorobenzenes*	5,100.	5.1×10^{3}
diethyl phthalate	33,000.	3.3×10^{4}
dimethyl phthalate	820,000.	8.2×10^{5}
4,6-dinitro-2-methylphenol	220.	2.2×10^{2}
2,4-dinitrophenol	4.0	4.0×10^{0}
ethylbenzene	4,100.	4.1×10^{3}
fluoranthene	15.	1.5×10^{1}
hexachlorocyclopentadiene	58.	5.8×10^{1}
nitrobenzene	4.9	4.9×10^{0}
thallium	2.	$2. \times 10^{0}$
toluene	85,000.	8.5×10^{4}
tributyltin	0.0014	1.4×10^{-3}
1,1,1-trichloroethane	540,000.	5.4×10^{5}
OBJECTIVES FOR PROTECTION OF HUMAN HEALTH – CARCINOGENS		
acrylonitrile	0.10	1.0×10^{-1}
aldrin	0.000022	2.2×10^{-5}
benzene	5.9	5.9×10^{0}
benzidine	0.000069	6.9×10^{-5}
beryllium	0.033	3.3×10^{-2}
bis(2-chloroethyl) ether	0.045	4.5×10^{-2}
bis(2-ethylhexyl) phthalate	3.5	3.5×10^{0}
carbon tetrachloride	0.90	9.0×10^{-1}
chlordane*	0.000023	2.3×10^{-5}
chlorodibromomethane	8.6	8.6×10^{0}

* See Appendix I for definition of terms.

Table B Continued

Chemical	30-day Average (ug/l) Decimal Notation	Scientific Notation
OBJECTIVES FOR PROTECTION OF HUMAN HEALTH – CARCINOGENS		
chloroform	130.	1.3×10^{2}
DDT*	0.00017	1.7×10^{-4}
1,4-dichlorobenzene	18.	1.8×10^{1}
3,3'-dichlorobenzidine	0.0081	8.1×10^{-3}
1,2-dichloroethane	28.	2.8×10^{1}
1,1-dichloroethylene	0.9	9×10^{-1}
dichlorobromomethane	6.2	6.2×10^{0}
dichloromethane	450.	4.5×10^{2}
1,3-dichloropropene	8.9	8.9×10^{0}
dieldrin	0.00004	4.0×10^{-5}
2,4-dinitrotoluene	2.6	2.6×10^{0}
1,2-diphenylhydrazine	0.16	1.6×10^{-1}
halomethanes*	130.	1.3×10^{2}
heptachlor	0.00005	5×10^{-5}
heptachlor epoxide	0.00002	2×10^{-5}
hexachlorobenzene	0.00021	2.1×10^{-4}
hexachlorobutadiene	14.	1.4×10^{1}
hexachloroethane	2.5	2.5×10^{0}
isophorone	730.	7.3×10^{2}
N-nitrosodimethylamine	7.3	7.3×10^{0}
N-nitrosodi-N-propylamine	0.38	3.8×10^{-1}
N-nitrosodiphenylamine	2.5	2.5×10^{0}
PAHs*	0.0088	8.8×10^{-3}
PCBs*	0.000019	1.9×10^{-5}
TCDD equivalents*	0.0000000039	3.9×10^{-9}
1,1,2,2-tetrachloroethane	2.3	2.3×10^{0}
tetrachloroethylene	2.0	2.0×10^{0}
toxaphene	0.00021	2.1×10^{-4}
trichloroethylene	27.	2.7×10^{1}
1,1,2-trichloroethane	9.4	9.4×10^{0}
2,4,6-trichlorophenol	0.29	2.9×10^{-1}
vinyl chloride	36.	3.6×10^{1}

* See Appendix I for definition of terms.

Table B Notes:

a) Dischargers may at their option meet this objective as a total chromium objective.

b) If a discharger can demonstrate to the satisfaction of the Regional Board (subject to EPA approval) that an analytical method is available to reliably distinguish between strongly and weakly complexed cyanide, effluent limitations for cyanide may be met by the combined measurement of free cyanide, simple alkali metal cyanides, and weakly complexed organometallic cyanide complexes. In order for the analytical method to be acceptable, the recovery of free cyanide from metal complexes must be comparable to that achieved by the approved method in 40 CFR PART 136, as revised May 14, 1999.

c) Water quality objectives for total chlorine residual applying to intermittent discharges not exceeding two hours, shall be determined through the use of the following equation:

$$\log y = -0.43 (\log x) + 1.8$$

where: y = the water quality objective (in ug/l) to apply when chlorine is being discharged;
x = the duration of uninterrupted chlorine discharge in minutes.

E. Biological Characteristics

1. Marine communities, including vertebrate, invertebrate, and plant species, shall not be degraded*.

2. The natural taste, odor, and color of fish, shellfish*, or other marine resources used for human consumption shall not be altered.

3. The concentration of organic materials in fish, shellfish* or other marine resources used for human consumption shall not bioaccumulate to levels that are harmful to human health.

F. Radioactivity

1. Discharge of radioactive waste* shall not degrade* marine life.

* See Appendix I for definition of terms.

III. PROGRAM OF IMPLEMENTATION

A. General Provisions

1. Effective Date

   a. The *Water Quality Control Plan, Ocean Waters of California, California Ocean Plan* was adopted and has been effective since 1972. There have been multiple amendments of the Ocean Plan since its adoption.

      This document includes the most recent amendments of the Ocean Plan as approved by the SWRCB on November 16, 2000. However, amendments in this version of the Ocean Plan do not become effective until approved by the US EPA. Persons using the Ocean Plan prior to US EPA approval of this version should reference the 1997 Ocean Plan. Once approved by the US EPA, this document (the 2001 Ocean Plan) will supercede the 1997 Ocean Plan.

2. General Requirements For Management Of Waste Discharge To The Ocean*

   a. Waste* management systems that discharge to the ocean* must be designed and operated in a manner that will maintain the indigenous marine life and a healthy and diverse marine community.

   b. Waste discharged* to the ocean* must be essentially free of:

      (1) Material that is floatable or will become floatable upon discharge.

      (2) Settleable material or substances that may form sediments which will degrade* benthic communities or other aquatic life.

      (3) Substances which will accumulate to toxic levels in marine waters, sediments or biota.

      (4) Substances that significantly* decrease the natural* light to benthic communities and other marine life.

      (5) Materials that result in aesthetically undesirable discoloration of the ocean* surface.

   c. Waste* effluents shall be discharged in a manner which provides sufficient initial* dilution to minimize the concentrations of substances not removed in the treatment.

   d. Location of waste* discharges must be determined after a detailed assessment of the oceanographic characteristics and current patterns to assure that:

      (1) Pathogenic organisms and viruses are not present in areas where shellfish* are harvested for human consumption or in areas used for swimming or other body-contact sports.

      (2) Natural water quality conditions are not altered in areas designated as being of special biological significance or areas that existing marine laboratories use as a source of seawater.

      (3) Maximum protection is provided to the marine environment.

* See Appendix I for definition of terms.

e. Waste* that contains pathogenic organisms or viruses should be discharged a sufficient distance from shellfishing* and water-contact sports areas to maintain applicable bacterial standards without disinfection. Where conditions are such that an adequate distance cannot be attained, reliable disinfection in conjunction with a reasonable separation of the discharge point from the area of use must be provided. Disinfection procedures that do not increase effluent toxicity and that constitute the least environmental and human hazard should be used.

3. Areas of Special Biological Significance

a. ASBS* shall be designated by the SWRCB following the procedures provided in Appendix IV. A list of ASBS* is available in Appendix V.

4. Combined Sewer Overflow: Not withstanding any other provisions in this plan, discharges from the City of San Francisco's combined sewer system are subject to the US EPA's Combined Sewer Overflow Policy.

B. Table A Effluent Limitations

TABLE A
EFFLUENT LIMITATIONS

		Limiting Concentrations		
	Unit of Measurement	Monthly (30-day Average)	Weekly (7-day Average)	Maximum at any time
Grease and Oil	mg/l	25.	40.	75.
Suspended Solids			See below +	
Settleable Solids	Ml/l	1.0	1.5	3.0
Turbidity	NTU	75.	100.	225.
PH	Units		Within limit of 6.0 to 9.0 at all times	

Table A Notes:

\+ Suspended Solids: Dischargers shall, as a 30-day average, remove 75% of suspended solids from the influent stream before discharging wastewaters to the ocean*, except that the effluent limitation to be met shall not be lower than 60 mg/l. Regional Boards may recommend that the SWRCB (Chapter IIIJ), with the concurrence of the Environmental Protection Agency, adjust the lower effluent concentration limit (the 60 mg/l above) to suit the environmental and effluent characteristics of the discharge. As a further consideration in making such recommendation for adjustment, Regional Boards should evaluate effects on existing and potential water* reclamation projects.

If the lower effluent concentration limit is adjusted, the discharger shall remove 75% of suspended solids from the influent stream at any time the influent concentration exceeds four times such adjusted effluent limit.

1. Table A effluent limitations apply only to publicly owned treatment works and industrial discharges for which Effluent Limitations Guidelines have not been established pursuant to Sections 301, 302, 304, or 306 of the Federal Clean Water Act.

* See Appendix I for definition of terms.

2. Table A effluent limitations shall apply to a discharger's total effluent, of whatever origin (i.e., gross, not net, discharge), except where otherwise specified in this Plan.

3. The SWRCB is authorized to administer and enforce effluent limitations established pursuant to the Federal Clean Water Act. Effluent limitations established under Sections 301, 302, 306, 307, 316, 403, and 405 of the aforementioned Federal Act and administrative procedures pertaining thereto are included in this plan by reference. Compliance with Table A effluent limitations, or Environmental Protection Agency Effluent Limitations Guidelines for industrial discharges, based on Best Practicable Control Technology, shall be the minimum level of treatment acceptable under this plan, and shall define reasonable treatment and waste control technology.

C. Implementation Provisions for Table B

1. Effluent concentrations calculated from Table B water quality objectives shall apply to a discharger's total effluent, of whatever origin (i.e., gross, not net, discharge), except where otherwise specified in this Plan.

2. If the RWQCB determines, using the procedures in Appendix VI, that a pollutant is discharged into Ocean Waters at levels which will cause, have the reasonable potential to cause, or contribute to an excursion above any Table B water quality objective, the RWQCB shall incorporate a water quality-based effluent limitation in the Waste Discharge Requirement for the discharge of that pollutant.

~~2~~3. Effluent limitations shall be imposed in a manner prescribed by the SWRCB such that the concentrations set forth below as water quality objectives shall not be exceeded in the receiving water upon completion of initial* dilution, except that objectives indicated for radioactivity shall apply directly to the undiluted waste* effluent.

~~3~~4. Calculation of Effluent Limitations

a. Effluent limitations for water quality objectives listed in Table B, with the exception of acute* toxicity and radioactivity, shall be determined through the use of the following equation:

Equation 1: $Ce = Co + Dm (Co - Cs)$

where:

Ce = the effluent concentration limit, ug/l

Co = the concentration (water quality objective) to be met at the completion of initial* dilution, ug/l

Cs = background seawater concentration (see Table C below), ug/l

Dm = minimum probable initial* dilution expressed as parts seawater per part wastewater.

TABLE C
BACKGROUND SEAWATER CONCENTRATIONS (Cs)

Waste Constituent	Cs (ug/l)
Arsenic	3.
Copper	2.
Mercury	0.0005

* See Appendix I for definition of terms.

Silver	0.16
Zinc	8.
For all other Table B parameters, Cs = 0.	

* See Appendix I for definition of terms.

b. Determining a Mixing Zone for the Acute* Toxicity Objective

The mixing zone for the acute* toxicity objective shall be ten percent (10%) of the distance from the edge of the outfall structure to the edge of the chronic mixing zone (zone of initial dilution). There is no vertical limitation on this zone. The effluent limitation for the acute* toxicity objective listed in Table B shall be determined through the use of the following equation:

Equation 2: Ce = Ca + (0.1) Dm (Ca)

where:

Ca = the concentration (water quality objective) to be met at the edge of the acute mixing zone.

Dm = minimum probable initial* dilution expressed as parts seawater per part wastewater (This equation applies only when Dm > 24).

c. Toxicity Testing Requirements based on the Minimum Initial* Dilution Factor for Ocean Waste Discharges

(1) Dischargers shall conduct acute* toxicity testing if the minimum initial* dilution of the effluent is greater than 1,000:1 at the edge of the mixing zone.

(2) Dischargers shall conduct either acute* or chronic* toxicity testing if the minimum initial* dilution ranges from 350:1 to 1,000:1 depending on the specific discharge conditions. The RWQCB shall make this determination.

(3) Dischargers shall conduct chronic* toxicity testing for ocean waste discharges with minimum initial* dilution factors ranging from 100:1 to 350:1. The RWQCBs may require that acute toxicity testing be conducted in addition to chronic as necessary for the protection of beneficial uses of ocean waters.

(4) Dischargers shall conduct chronic toxicity testing if the minimum initial* dilution of the effluent falls below 100:1 at the edge of the mixing zone.

d. For the purpose of this Plan, minimum initial* dilution is the lowest average initial* dilution within any single month of the year. Dilution estimates shall be 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.

e. The Executive Director of the SWRCB shall identify standard dilution models for use in determining Dm, and shall assist the Regional Board in evaluating Dm for specific waste discharges. Dischargers may propose alternative methods of calculating Dm, and the Regional Board may accept such methods upon verification of its accuracy and applicability.

* See Appendix I for definition of terms.

f. The six-month median shall apply as a moving median of daily values for any 180-day period in which daily values represent flow weighted average concentrations within a 24-hour period. For intermittent discharges, the daily value shall be considered to equal zero for days on which no discharge occurred.

g. The daily maximum shall apply to flow weighted 24 hour composite samples.

h. The instantaneous maximum shall apply to grab sample determinations.

i. If only one sample is collected during the time period associated with the water quality objective (e.g., 30-day average or 6-month median), the single measurement shall be used to determine compliance with the effluent limitation for the entire time period.

j. Discharge requirements shall also specify effluent limitations in terms of mass emission rate limits utilizing the general formula:

Equation 3: lbs/day = 0.00834 x Ce x Q

where:

Ce = the effluent concentration limit, ug/l

Q = flow rate, million gallons per day (MGD)

k. The six-month median limit on daily mass emissions shall be determined using the six-month median effluent concentration as Ce and the observed flow rate Q in millions of gallons per day. The daily maximum mass emission shall be determined using the daily maximum effluent concentration limit as Ce and the observed flow rate Q in millions of gallons per day.

l. Any significant change in waste* flow shall be cause for reevaluating effluent limitations.

45. Minimum* Levels

For each numeric effluent limitation, the Regional Board must select one or more Minimum* Levels (and their associated analytical methods) for inclusion in the permit. The "reported" Minimum* Level is the Minimum* Level (and its associated analytical method) chosen by the discharger for reporting and compliance determination from the Minimum* Levels included in their permit.

a. Selection of Minimum* Levels from Appendix II

The Regional Board must select all Minimum* Levels from Appendix II that are below the effluent limitation. If the effluent limitation is lower than all the Minimum* Levels in Appendix II, the Regional Board must select the lowest Minimum* Level from Appendix II.

* See Appendix I for definition of terms.

b. Deviations from Minimum* Levels in Appendix II

The Regional Board, in consultation with the State Water Board's Quality Assurance Program, must establish a Minimum* Level to be included in the permit in any of the following situations:

1. A pollutant is not listed in Appendix II.
2. The discharger agrees to use a test method that is more sensitive than those described in 40 CFR 136 (revised May 14, 1999).
3. The discharger agrees to use a Minimum* Level lower than those listed in Appendix II.
4. The discharger demonstrates that their calibration standard matrix is sufficiently different from that used to establish the Minimum* Level in Appendix II and proposes an appropriate Minimum* Level for their matrix.
5. A discharger uses an analytical method having a quantification practice that is not consistent with the definition of Minimum* Level (e.g., US EPA methods 1613, 1624, 1625).

~~5~~6. Use of Minimum* Levels

a. Minimum* Levels in Appendix II represent the lowest quantifiable concentration in a sample based on the proper application of method-specific analytical procedures and the absence of matrix interferences. Minimum* Levels also represent the lowest standard concentration in the calibration curve for a specific analytical technique after the application of appropriate method-specific factors.

Common analytical practices may require different treatment of the sample relative to the calibration standard. Some examples are given below:

Substance or Grouping	Method-Specific Treatment	Most Common Factor
Volatile Organics	No differential treatment	1
Semi-Volatile Organics	Samples concentrated by extraction	1000
Metals	Samples diluted or concentrated	½ , 2 , and 4
Pesticides	Samples concentrated by extraction	100

b. Other factors may be applied to the Minimum* Level depending on the specific sample preparation steps employed. For example, the treatment typically applied when there are matrix effects is to dilute the sample or sample aliquot by a factor of ten. In such cases, this additional factor must be applied during the computation of the reporting limit. Application of such factors will alter the reported Minimum* Level.

c. Dischargers are to instruct their laboratories to establish calibration standards so that the Minimum* Level (or its equivalent if there is differential treatment of samples relative to calibration standards) is the lowest calibration standard. At no time is the discharger to use analytical data derived from *extrapolation* beyond the lowest point of the calibration curve. In accordance with Section 4b, above, the discharger's laboratory may employ a calibration standard lower than the Minimum* Level in Appendix II.

* See Appendix I for definition of terms.

~~6~~7. Sample Reporting Protocols

a. Dischargers must report with each sample result the reported Minimum* Level (selected in accordance with Section 4, above) and the laboratory's current MDL*.

b. Dischargers must also report the results of analytical determinations for the presence of chemical constituents in a sample using the following reporting protocols:

(1) Sample results greater than or equal to the reported Minimum* Level must be reported "as measured" by the laboratory (i.e., the measured chemical concentration in the sample).

(2) Sample results less than the reported Minimum* Level, but greater than or equal to the laboratory's MDL*, must be reported as "Detected, but Not Quantified", or DNQ. The laboratory must write the estimated chemical concentration of the sample next to DNQ as well as the words "Estimated Concentration" (may be shortened to "Est. Conc.").

(3) Sample results less than the laboratory's MDL* must be reported as "Not Detected", or ND.

~~7~~8. Compliance Determination

Sufficient sampling and analysis shall be required to determine compliance with the effluent limitation.

a. Compliance with Single-Constituent Effluent Limitations

Dischargers are out of compliance with the effluent limitation if the concentration of the pollutant (see Section 7c, below) in the monitoring sample is greater than the effluent limitation and greater than or equal to the reported Minimum* Level.

b. Compliance with Effluent Limitations expressed as a Sum of Several Constituents

Dischargers are out of compliance with an effluent limitation which applies to the sum of a group of chemicals (e.g., PCB's) if the sum of the individual pollutant concentrations is greater than the effluent limitation. Individual pollutants of the group will be considered to have a concentration of zero if the constituent is reported as ND or DNQ.

c. Multiple Sample Data Reduction

The concentration of the pollutant in the effluent may be estimated from the result of a single sample analysis or by a measure of central tendency (arithmetic mean, geometric mean, median, etc.) of multiple sample analyses when all sample results are quantifiable (i.e., greater than or equal to the reported Minimum* Level). When one or more sample results are reported as ND or DNQ, the central tendency concentration of the pollutant shall be the median (middle) value of the multiple samples. If, in an even number of samples, one or both of the middle values is ND or DNQ, the median will be the lower of the two middle values.

* See Appendix I for definition of terms.

d. Powerplants and Heat Exchange Dischargers

Due to the large total volume of powerplant and other heat exchange discharges, special procedures must be applied for determining compliance with Table B objectives on a routine basis. Effluent concentration values (Ce) shall be determined through the use of equation 1 considering the minimal probable initial* dilution of the combined effluent (in-plant waste streams plus cooling water flow). These concentration values shall then be converted to mass emission limitations as indicated in equation 3. The mass emission limits will then serve as requirements applied to all inplant waste* streams taken together which discharge into the cooling water flow, except that limits for total chlorine residual, acute* (if applicable per Section (3)(c)) and chronic* toxicity and instantaneous maximum concentrations in Table B shall apply to, and be measured in, the combined final effluent, as adjusted for dilution with ocean water. The Table B objective for radioactivity shall apply to the undiluted combined final effluent.

~~8~~9. Pollutant Minimization Program

a. Pollutant Minimization Program Goal

The goal of the Pollutant Minimization Program is to reduce all potential sources of a pollutant through pollutant minimization (control) strategies, including pollution prevention measures, in order to maintain the effluent concentration at or below the effluent limitation.

Pollution prevention measures may be particularly appropriate for persistent bioaccumulative priority pollutants where there is evidence that beneficial uses are being impacted. The completion and implementation of a Pollution Prevention Plan, required in accordance with CA Water Code Section 13263.3 (d) will fulfill the Pollution Minimization Program requirements in this section.

b. Determining the need for a Pollutant Minimization Program

1. The discharger must develop and conduct a Pollutant Minimization Program if all of the following conditions are true:

   (a) The calculated effluent limitation is less than the reported Minimum* Level

   (b) The concentration of the pollutant is reported as DNQ

   (c) There is evidence showing that the pollutant is present in the effluent above the calculated effluent limitation.

2. Alternatively, the discharger must develop and conduct a Pollutant Minimization Program if all of the following conditions are true:

   (a) The calculated effluent limitation is less than the Method Detection Limit*.

   (b) The concentration of the pollutant is reported as ND.

   (c) There is evidence showing that the pollutant is present in the effluent above the calculated effluent limitation.

* See Appendix I for definition of terms.

c. Regional Boards may include special provisions in the discharge requirements to require the gathering of evidence to determine whether the pollutant is present in the effluent at levels above the calculated effluent limitation. Examples of evidence may include:

   1. health advisories for fish consumption,
   2. presence of whole effluent toxicity,
   3. results of benthic or aquatic organism tissue sampling,
   4. sample results from analytical methods more sensitive than methods included in the permit (in accordance with Section 4b, above).
   5. the concentration of the pollutant is reported as DNQ and the effluent limitation is less than the MDL

d. Elements of a Pollutant Minimization Program

   The Regional Board may consider cost-effectiveness when establishing the requirements of a Pollutant Minimization Program. The program shall include actions and submittals acceptable to the Regional Board including, but not limited to, the following:

   1. An annual review and semi-annual monitoring of potential sources of the reportable pollutant, which may include fish tissue monitoring and other bio-uptake sampling;
   2. Quarterly monitoring for the reportable pollutant in the influent to the wastewater treatment system;
   3. Submittal of a control strategy designed to proceed toward the goal of maintaining concentrations of the reportable pollutant in the effluent at or below the calculated effluent limitation;
   4. Implementation of appropriate cost-effective control measures for the pollutant, consistent with the control strategy; and,
   5. An annual status report that shall be sent to the Regional Board including:
      (a) All Pollutant Minimization Program monitoring results for the previous year;
      (b) A list of potential sources of the reportable pollutant;
      (c) A summary of all action taken in accordance with the control strategy; and,
      (d) A description of actions to be taken in the following year.

~~9~~10. Toxicity Reduction Requirements

a. If a discharge consistently exceeds an effluent limitation based on a toxicity objective in Table B, a toxicity reduction evaluation (TRE) is required. The TRE shall include all reasonable steps to identify the source of toxicity. Once the source(s) of toxicity is identified, the discharger shall take all reasonable steps necessary to reduce toxicity to the required level.

* See Appendix I for definition of terms.

b. The following shall be incorporated into waste discharge requirements: (1) a requirement to conduct a TRE if the discharge consistently exceeds its toxicity effluent limitation, and (2) a provision requiring a discharger to take all reasonable steps to reduce toxicity once the source of toxicity is identified.

~~D. Implementation Provisions for Bacterial Assessment and Remedial Action Requirements~~

~~1. The requirements listed below shall be used to determine the occurrence and extent of any impairment of a beneficial use due to bacterial contamination, generate information which can be used in the development of an enterococcus standard, and provide the basis for remedial actions necessary to minimize or eliminate any impairment of a beneficial use.~~

~~a. Measurement of enterococcus density shall be conducted at all stations where measurement of total and fecal coliforms are required. In addition to the requirements of Chapter II.B.I, if a shore station consistently exceeds a coliform objective or exceeds a geometric mean enterococcus density of 24 organisms per 100 ml for a 30-day period or 12 organisms per 100 ml for a six-month period, the Regional Board shall require the appropriate agency to conduct a survey to determine if that agency's discharge is the source of the contamination. The geometric mean shall be a moving average based on no less than five samples per month, spaced evenly over the time interval. When a sanitary survey identifies a controllable source of indicator organisms associated with a discharge of sewage, the Regional Board shall take action to control the source.~~

b. ~~Waste discharge requirements shall require the discharger to conduct sanitary surveys when so directed by the Regional Board. Waste discharge requirements shall contain provisions requiring the discharger to control any controllable discharges identified in a sanitary survey.~~

D. Implementation Provisions for Bacterial Characteristics

1. Water-Contact Monitoring

a. Samples should be collected at least weekly from each site during each 30-day period, with sampling intervals evenly spaced. The geometric mean shall be calculated using the five most recent sample results.

b. If a single sample exceeds any of the following densities, repeat sampling at that location will be conducted daily to determine the extent and persistence of the exceedence. Repeat sampling will be conducted until the sample result is less than the following densities, or until a sanitary survey is conducted to determine the source of the high bacterial densities :

i) Total coliform density will not exceed 10,000 per 100 ml; or
ii) Fecal coliform density will not exceed 400 per 100 ml; or
iii) Total coliform density will not exceed 1,000 per 100 ml when the ratio of fecal/total coliform exceeds 0.1;
iv) enterococcus density will not exceed 104 per 100 ml.

* See Appendix I for definition of terms.

When repeat sampling is required because of an exceedance of any one single sample density, values from all samples collected during that 30-day period will be used to calculate the geometric mean.

c. For monitoring stations outside of the defined water-contact recreation zone but in areas determined by the Regional Board to be used for water-contact recreation, samples will be analyzed for total coliform only.

E. Implementation Provisions For Areas* of Special Biological Significance (ASBS)

1. Waste* shall not be discharged to areas designated as being of special biological significance. Discharges shall be located a sufficient distance from such designated areas to assure maintenance of natural water quality conditions in these areas.

2. Regional Boards may approve waste discharge requirements or recommend certification for limited-term (i.e. weeks or months) activities in ASBS*. Limited-term activities include, but are not limited to, activities such as maintenance/repair of existing boat facilities, restoration of sea walls, repair of existing storm water pipes, and replacement/repair of existing bridges. Limited-term activities may result in temporary and short-term changes in existing water quality. Water quality degradation shall be limited to the shortest possible time. The activities must not permanently degrade water quality or result in water quality lower than that necessary to protect existing uses, and all practical means of minimizing such degradation shall be implemented.

* See Appendix I for definition of terms.

F. <u>Revision of Waste* Discharge Requirements</u>

1. The Regional Board shall revise the waste* discharge requirements for existing* discharges as necessary to achieve compliance with this Plan and shall also establish a time schedule for such compliance.

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

3. Regional Boards may impose alternative less restrictive provisions than those contained within Table B of the Plan, provided an applicant can demonstrate that:

   a. Reasonable control technologies (including source control, material substitution, treatment and dispersion) will not provide for complete compliance; or

   b. Any less stringent provisions would encourage water* reclamation;

4. Provided further that:

   a. Any alternative water quality objectives shall be below the conservative estimate of chronic* toxicity, as given in Table D, and such alternative will provide for adequate protection of the marine environment;

   b. A receiving water quality toxicity objective of 1 TUc is not exceeded; and

   c. The State Board grants an exception (Chapter III. I.) to the Table B limits as established in the Regional Board findings and alternative limits.

TABLE D
CONSERVATIVE ESTIMATES OF CHRONIC TOXICITY

Constituent	**Estimate of Chronic Toxicity (ug/l)**
Arsenic	19.
Cadmium	8.
Hexavalent Chromium	18.
Copper	5.
Lead	22.
Mercury	0.4
Nickel	48.
Silver	3.
Zinc	51.
Cyanide	10.
Total Chlorine Residual	10.0
Ammonia	4000.0
Phenolic Compounds (non-chlorinated)	a) (see below)
Chlorinated Phenolics	a)
Chlorinated Pesticides and PCB's	b)

* See Appendix I for definition of terms.

Table D Notes:

a) There are insufficient data for phenolics to estimate chronic toxicity levels. Requests for modification of water quality objectives for these waste* constituents must be supported by chronic toxicity data for representative sensitive species. In such cases, applicants seeking modification of water quality objectives should consult the Regional Water Quality Control Board to determine the species and test conditions necessary to evaluate chronic effects.

b) Limitations on chlorinated pesticides and PCB's shall not be modified so that the total of these compounds is increased above the objectives in Table B.

G. Monitoring Program

1. The Regional Boards shall require dischargers to conduct self-monitoring programs and submit reports necessary to determine compliance with the waste* discharge requirements, and may require dischargers to contract with agencies or persons acceptable to the Regional Board to provide monitoring reports. Monitoring provisions contained in waste discharge requirements shall be in accordance with the Monitoring Procedures provided in Appendix III.

~~2. Where the Regional Board is satisfied that any substance(s) of Table B will not significantly occur in a discharger's effluent, the Regional Board may elect not to require monitoring for such substance(s), provided the discharger submits periodic certification that such substance(s) is not added to the waste* stream, and that no change has occurred in activities that could cause such substance(s) to be present in the waste* stream. Such election does not relieve the discharger from the requirement to meet the objectives of Table B.~~

~~3~~2. The Regional Board may require monitoring of bioaccumulation of toxicants in the discharge zone. Organisms and techniques for such monitoring shall be chosen by the Regional Board on the basis of demonstrated value in waste* discharge monitoring.

H. Discharge Prohibitions

1. Hazardous Substances

a. The discharge of any radiological, chemical, or biological warfare agent or high-level radioactive waste* into the ocean* is prohibited.

2. Areas Designated for Special Water Quality Protection

a. Waste* shall not be discharged to designated Areas* of Special Biological Significance except as provided in Chapter III E. Implementation Provisions For Areas of Special Biological Significance.

3. Sludge

a. Pipeline discharge of sludge to the ocean* is prohibited by federal law; the discharge of municipal and industrial waste* sludge directly to the ocean*, or into

* See Appendix I for definition of terms.

a waste* stream that discharges to the ocean*, is prohibited by this Plan. The discharge of sludge digester supernatant directly to the ocean*, or to a waste* stream that discharges to the ocean* without further treatment, is prohibited.

b. It is the policy of the SWRCB that the treatment, use and disposal of sewage sludge shall be carried out in the manner found to have the least adverse impact on the total natural and human environment. Therefore, if federal law is amended to permit such discharge, which could affect California waters, the SWRCB may consider requests for exceptions to this section under Chapter III, H. of this Plan, provided further that an Environmental Impact Report on the proposed project shows clearly that any available alternative disposal method will have a greater adverse environmental impact than the proposed project.

4. By-Passing

a. The by-passing of untreated wastes* containing concentrations of pollutants in excess of those of Table A or Table B to the ocean* is prohibited.

I. State Board Exceptions to Plan Requirements

1. The State Board may, in compliance with the California Environmental Quality Act, subsequent to a public hearing, and with the concurrence of the Environmental Protection Agency, grant exceptions where the Board determines:

a. The exception will not compromise protection of ocean* waters for beneficial uses, and,

b. The public interest will be served.

* See Appendix I for definition of terms.

APPENDIX I
DEFINITION OF TERMS

ACUTE TOXICITY

a. Acute Toxicity (TUa)

Expressed in Toxic Units Acute (TUa)

$$TUa = \frac{100}{\text{96-hr LC 50\%}}$$

b. Lethal Concentration 50% (LC 50)

LC 50 (percent waste giving 50% survival of test organisms) shall be determined by static or continuous flow bioassay techniques using standard marine test species as specified in Appendix III, Chapter II. If specific identifiable substances in wastewater can be demonstrated by the discharger as being rapidly rendered harmless upon discharge to the marine environment, but not as a result of dilution, the LC 50 may be determined after the test samples are adjusted to remove the influence of those substances.

When it is not possible to measure the 96-hour LC 50 due to greater than 50 percent survival of the test species in 100 percent waste, the toxicity concentration shall be calculated by the expression:

$$TUa = \frac{\log(100 - S)}{1.7}$$

where:

S = percentage survival in 100% waste. If $S > 99$, TUa shall be reported as zero.

AREAS OF SPECIAL BIOLOGICAL SIGNIFICANCE (ASBS) are those areas designated by the SWRCB as requiring protection of species or biological communities to the extent that alteration of natural water quality is undesirable.

CHLORDANE shall mean the sum of chlordane-alpha, chlordane-gamma, chlordene-alpha, chlordene-gamma, nonachlor-alpha, nonachlor-gamma, and oxychlordane.

CHRONIC TOXICITY: This parameter shall be used to measure the acceptability of waters for supporting a healthy marine biota until improved methods are developed to evaluate biological response.

a. Chronic Toxicity (TUc)

Expressed as Toxic Units Chronic (TUc)

$$TUc = \frac{100}{NOEL}$$

b. No Observed Effect Level (NOEL)

The NOEL 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 listed in Appendix II.

DDT shall mean the sum of 4,4'DDT, 2,4'DDT, 4,4'DDE, 2,4'DDE, 4,4'DDD, and 2,4'DDD.

DEGRADE: Degradation shall be determined by comparison of the waste field and reference site(s) for characteristic species diversity, population density, contamination, growth anomalies, debility, or supplanting of normal species by undesirable plant and animal species. Degradation occurs if there are significant differences in any of three major biotic groups, namely, demersal fish, benthic invertebrates, or attached algae. Other groups may be evaluated where benthic species are not affected, or are not the only ones affected.

DICHLOROBENZENES shall mean the sum of 1,2- and 1,3-dichlorobenzene.

DOWNSTREAM OCEAN WATERS shall mean waters downstream with respect to ocean currents.

DREDGED MATERIAL: Any material excavated or dredged from the navigable waters of the United States, including material otherwise referred to as "spoil".

ENCLOSED BAYS are indentations along the coast which enclose an area of oceanic water within distinct headlands or harbor works. Enclosed bays include all bays where the narrowest distance between headlands or outermost harbor works is less than 75 percent of the greatest dimension of the enclosed portion of the bay. This definition includes but is not limited to: Humboldt Bay, Bodega Harbor, Tomales Bay, Drakes Estero, San Francisco Bay, Morro Bay, Los Angeles Harbor, Upper and Lower Newport Bay, Mission Bay, and San Diego Bay.

ENDOSULFAN shall mean the sum of endosulfan-alpha and -beta and endosulfan sulfate.

ESTUARIES AND COASTAL LAGOONS are waters at the mouths of streams that serve as mixing zones for fresh and ocean waters during a major portion of the year. Mouths of streams that are temporarily separated from the ocean by sandbars shall be considered as estuaries. Estuarine waters will generally be considered to extend from a bay or the open ocean to the upstream limit of tidal action but may be considered to extend seaward if significant mixing of fresh and salt water occurs in the open coastal waters. The waters described by this definition include but are not limited to the Sacramento-San Joaquin Delta as defined by Section 12220 of the California Water Code, Suisun Bay, Carquinez Strait downstream to Carquinez Bridge, and appropriate areas of the Smith, Klamath, Mad, Eel, Noyo, and Russian Rivers.

HALOMETHANES shall mean the sum of bromoform, bromomethane (methyl bromide) and chloromethane (methyl chloride).

HCH shall mean the sum of the alpha, beta, gamma (lindane) and delta isomers of hexachlorocyclohexane.

INITIAL DILUTION is the process which results in the rapid and irreversible turbulent mixing of wastewater with ocean water around the point of discharge.

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

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

KELP BEDS, for purposes of the bacteriological standards of this plan, are significant aggregations of marine algae of the genera Macrocystis and Nereocystis. Kelp beds include the total foliage canopy of Macrocystis and Nereocystis plants throughout the water column.

MARICULTURE is the culture of plants and animals in marine waters independent of any pollution source.

MATERIAL: (a) In common usage: (1) the substance or substances of which a thing is made or composed (2) substantial; (b) For purposes of this Ocean Plan relating to waste disposal, dredging and the disposal of dredged material and fill, MATERIAL means matter of any kind or description which is subject to regulation as waste, or any material dredged from the navigable waters of the United States. See also, DREDGED MATERIAL.

MDL (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 PART 136 Appendix B.

MINIMUM LEVEL (ML) is the concentrations 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.

NATURAL LIGHT: Reduction of natural light may be determined by the Regional Board by measurement of light transmissivity or total irradiance, or both, according to the monitoring needs of the Regional Board.

OCEAN WATERS are the territorial marine waters of the State as defined by California law to the extent these waters are outside of enclosed bays, estuaries, and coastal lagoons. If a discharge outside the territorial waters of the State could affect the quality of the waters of the State, the discharge may be regulated to assure no violation of the Ocean Plan will occur in ocean waters.

PAHs (polynuclear aromatic hydrocarbons) shall mean the sum of acenaphthylene, anthracene, 1,2-benzanthracene, 3,4-benzofluoranthene, benzo[k]fluoranthene, 1,12-benzoperylene, benzo[a]pyrene, chrysene, dibenzo[ah]anthracene, fluorene, indeno[1,2,3-cd]pyrene, phenanthrene and pyrene.

PCBs (polychlorinated biphenyls) shall mean the sum of chlorinated biphenyls whose analytical characteristics resemble those of Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254 and Aroclor-1260.

SHELLFISH are organisms identified by the California Department of Health Services as shellfish for public health purposes (i.e., mussels, clams and oysters).

SIGNIFICANT difference is defined as a statistically significant difference in the means of two distributions of sampling results at the 95 percent confidence level.

TCDD EQUIVALENTS shall mean the sum of the concentrations of chlorinated dibenzodioxins (2,3,7,8-CDDs) and chlorinated dibenzofurans (2,3,7,8-CDFs) multiplied by their respective toxicity factors, as shown in the table below.

Isomer Group	Toxicity Equivalence Factor
2,3,7,8-tetra CDD	1.0
2,3,7,8-penta CDD	0.5
2,3,7,8-hexa CDDs	0.1
2,3,7,8-hepta CDD	0.01
octa CDD	0.001
2,3,7,8 tetra CDF	0.1
1,2,3,7,8 penta CDF	0.05
2,3,4,7,8 penta CDF	0.5
2,3,7,8 hexa CDFs	0.1
2,3,7,8 hepta CDFs	0.01
octa CDF	0.001

WASTE: As used in this Plan, waste includes a discharger's total discharge, of whatever origin, i.e., gross, not net, discharge.

WATER RECLAMATION: The treatment of wastewater to render it suitable for reuse, the transportation of treated wastewater to the place of use, and the actual use of treated wastewater for a direct beneficial use or controlled use that would not otherwise occur.

APPENDIX II
MINIMUM* LEVELS

The Minimum* Levels identified in this appendix 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. These Minimum* Levels were derived from data provided by state-certified analytical laboratories in 1997 and 1998 for pollutants regulated by the California Ocean Plan and shall be used until new values are adopted by the SWRCB. There are four major chemical groupings: volatile chemicals, semi-volatile chemicals, inorganics, pesticides & PCB's. "No Data" is indicated by "--".

TABLE II-1
MINIMUM* LEVELS – VOLATILE CHEMICALS

		Minimum* Level (ug/L)	
Volatile Chemicals	**CAS Number**	**GC Method [a]**	**GCMS Method [b]**
Acrolein	107028	2.	5
Acrylonitrile	107131	2.	2
Benzene	71432	0.5	2
Bromoform	75252	0.5	2
Carbon Tetrachloride	56235	0.5	2
Chlorobenzene	108907	0.5	2
Chlorodibromomethane	124481	0.5	2
Chloroform	67663	0.5	2
1,2-Dichlorobenzene (volatile)	95501	0.5	2
1,3-Dichlorobenzene (volatile)	541731	0.5	2
1,4-Dichlorobenzene (volatile)	106467	0.5	2
Dichlorobromomethane	75274	0.5	2
1,1-Dichloroethane	75343	0.5	1
1,2-Dichloroethane	107062	0.5	2
1,1-Dichloroethylene	75354	0.5	2
Dichloromethane	75092	0.5	2
1,3-Dichloropropene (volatile)	542756	0.5	2
Ethyl benzene	100414	0.5	2
Methyl Bromide	74839	1.	2
Methyl Chloride	74873	0.5	2
1,1,2,2-Tetrachloroethane	79345	0.5	2
Tetrachloroethylene	127184	0.5	2
Toluene	108883	0.5	2
1,1,1-Trichloroethane	71556	0.5	2
1,1,2-Trichloroethane	79005	0.5	2
Trichloroethylene	79016	0.5	2
Vinyl Chloride	75014	0.5	2

Table II-1 Notes

a) GC Method = Gas Chromatography
b) GCMS Method = Gas Chromatography / Mass Spectrometry
* To determine the lowest standard concentration in an instrument calibration curve for these techniques, use the given ML (see Chapter III, "Use of Minimum* Levels").

TABLE II-2
MINIMUM* LEVELS – SEMI VOLATILE CHEMICALS

Semi-Volatile Chemicals	CAS Number	GC Method [a, *]	GCMS Method [b, *]	HPLC Method [c,*]	COLOR Method [d]
		Minimum* Level (ug/L)			
Acenapthylene	208968	--	10	0.2	--
Anthracene	120127	--	10	2	--
Benzidine	92875	--	5	--	--
Benzo(a)anthracene	56553	--	10	2	--
Benzo(a)pyrene	50328	--	10	2	--
Benzo(b)fluoranthene	205992	--	10	10	--
Benzo(g,h,i)perylene	191242	--	5	0.1	--
Benzo(k)floranthene	207089	--	10	2	--
Bis 2-(1-Chloroethoxy) methane	111911	--	5	--	--
Bis(2-Chloroethyl)ether	111444	10	1	--	--
Bis(2-Chloroisopropyl)ether	39638329	10	2	--	--
Bis(2-Ethylhexyl) phthalate	117817	10	5	--	--
2-Chlorophenol	95578	2	5	--	--
Chrysene	218019	--	10	5	--
Di-n-butyl phthalate	84742	--	10	--	--
Dibenzo(a,h)anthracene	53703	--	10	0.1	--
1,2-Dichlorobenzene (semivolatile)	95504	2	2	--	--
1,3-Dichlorobenzene (semivolatile)	541731	2	1	--	--
1,4-Dichlorobenzene (semivolatile)	106467	2	1	--	--
3,3-Dichlorobenzidine	91941	--	5	--	--
2,4-Dichlorophenol	120832	1	5	--	--
1,3-Dichloropropene	542756	--	5	--	
Diethyl phthalate	84662	10	2	--	--
Dimethyl phthalate	131113	10	2	--	--
2,4-Dimethylphenol	105679	1	2	--	--
2,4-Dinitrophenol	51285	5	5	--	--
2,4-Dinitrotoluene	121142	10	5	--	--
1,2-Diphenylhydrazine	122667	--	1	--	--
Fluoranthene	206440	10	1	0.05	--
Fluorene	86737	--	10	0.1	--
Hexachlorobenzene	118741	5	1	--	--
Hexachlorobutadiene	87683	5	1	--	--
Hexachlorocyclopentadiene	77474	5	5	--	--

Table II-2 continued on next page…

Table II-2 (Continued)
Minimum* Levels – Semi Volatile Chemicals

Semi-Volatile Chemicals	CAS Number	Minimum* Level (ug/L) GC Method [a, *]	GCMS Method [b, *]	HPLC Method [c,*]	COLOR Method [d]
Hexachloroethane	67721	5	1	--	--
Indeno(1,2,3-cd)pyrene	193395	--	10	0.05	--
Isophorone	78591	10	1	--	--
2-methyl-4,6-dinitrophenol	534521	10	5	--	--
3-methyl-4-chlorophenol	59507	5	1	--	--
N-nitrosodi-n-propylamine	621647	10	5	--	--
N-nitrosodimethylamine	62759	10	5	--	--
N-nitrosodiphenylamine	86306	10	1	--	--
Nitrobenzene	98953	10	1	--	--
2-Nitrophenol	88755	--	10	--	--
4-Nitrophenol	100027	5	10	--	--
Pentachlorophenol	87865	1	5	--	--
Phenanthrene	85018	--	5	0.05	--
Phenol	108952	1	1	--	50
Pyrene	129000	--	10	0.05	--
2,4,6-Trichlorophenol	88062	10	10	--	--

Table II-2 Notes:

a) GC Method = Gas Chromatography
b) GCMS Method = Gas Chromatography / Mass Spectrometry
c) HPLC Method = High Pressure Liquid Chromatography
d) COLOR Method= Colorimetric

* To determine the lowest standard concentration in an instrument calibration curve for this technique, multiply the given ML by 1000 (see Chapter III, “Use of Minimum* Levels”).

TABLE II-3
MINIMUM* LEVELS - INORGANICS

Inorganic Substances	CAS Number	Minimum* Level (ug/L)								
		COLOR Method[a]	DCP Method[b]	FAA Method[c]	GFAA Method[d]	HYDRIDE Method[e]	ICP Method[f]	ICPMS Method[g]	SPGFAA Method[h]	CVAA Method[i]
Antimony	7440360	--	1000.	10.	5.	0.5	50.	0.5	5.	--
Arsenic	7440382	20.	1000.	--	2.	1.	10.	2.	2.	--
Beryllium	7440417	--	1000.	20.	0.5	--	2.	0.5	1.	--
Cadmium	7440439	--	1000.	10.	0.5	--	10.	0.2	0.5	--
Chromium (total)	--	--	1000.	50.	2.	--	10.	0.5	1.	--
Chromium (VI)	18540299	10.	--	5.	--	--	--	--	--	--
Copper	7440508	--	1000.	20.	5.	--	10.	0.5	2.	--
Cyanide	57125	5.	--	--	--	--	--	--	--	--
Lead	7439921	--	10000.	20.	5.	--	5.	0.5	2.	--
Mercury	7439976	--	--	--	--	--	--	0.5	--	0.2
Nickel	7440020	--	1000.	50.	5.	--	20.	1.	5.	--
Selenium	7782492	--	1000.	--	5.	1.	10.	2.	5.	--
Silver	7440224	--	1000.	10.	1.	--	10.	0.2	2.	--
Thallium	7440280	--	1000.	10.	2.	--	10.	1.	5.	--
Zinc	7440666	--	1000.	20.	--	--	20.	1.	10.	--

Table II-3 Notes

a) COLOR Method = Colorimetric
b) DCP Method = Direct Current Plasma
c) FAA Method = Flame Atomic Absorption
d) GFAA Method = Graphite Furnace Atomic Absorption
e) HYDRIDE Method = Gaseous Hydride Atomic Absorption
f) ICP Method = Inductively Coupled Plasma
g) ICPMS Method = Inductively Coupled Plasma / Mass Spectrometry
h) SPGFAA Method = Stabilized Platform Graphite Furnace Atomic Absorption (i.e., US EPA 200.9)
i) CVAA Method = Cold Vapor Atomic Absorption

* To determine the lowest standard concentration in an instrument calibration curve for these techniques, use the given ML (see Chapter III, "Use of Minimum* Levels").

TABLE II-4
MINIMUM* LEVELS – PESTICIDES AND PCBs

Pesticides – PCB's	CAS Number	Minimum* Level (ug/L) GC Method[a,*]
Aldrin	309002	0.005
Chlordane	57749	0.1
4,4'-DDD	72548	0.05
4,4'-DDE	72559	0.05
4,4'-DDT	50293	0.01
Dieldrin	60571	0.01
a-Endosulfan	959988	0.02
b-Endosulfan	33213659	0.01
Endosulfan Sulfate	1031078	0.05
Endrin	72208	0.01
Heptachlor	76448	0.01
Heptachlor Epoxide	1024573	0.01
a-Hexachlorocyclohexane	319846	0.01
b-Hexachlorocyclohexane	319857	0.005
d-Hexachlorocyclohexane	319868	0.005
g-Hexachlorocyclohexane (Lindane)	58899	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	8001352	0.5

Table II-4 Notes

a) GC Method = Gas Chromatography

* To determine the lowest standard concentration in an instrument calibration curve for this technique, multiply the given ML by 100 (see Chapter III, “Use of Minimum* Levels”).

APPENDIX III

STANDARD MONITORING PROCEDURES

The purpose of this appendix is to provide direction to the Regional Boards on the implementation of the California Ocean Plan and to ensure the reporting of useful information. It is not feasible to cover all circumstances and conditions that could be encountered by all dischargers. Therefore, this appendix should be considered as the basic component of any discharger monitoring program. Regional Boards can deviate from the procedures required in the appendix only with the approval of the State Water Resources Control Board unless the Ocean Plan allows for the selection of alternate protocols by the Regional Boards. If no direction is given in this appendix for a specific provision of the Ocean Plan, it is within the discretion of the Regional Board to establish the monitoring requirements for the provision.

The following text is referenced by applicable chapter in the Ocean Plan. All references to 40 CFR PART 136 are to the revised edition of May 14, 1999.

Ocean Plan Chapter II. B. <u>Bacterial Standards</u>:

For all bacterial analyses, sample dilutions should be performed so the range of values extends from 2 to 16,000. The detection methods used for each analysis shall be reported with the results of the analysis.

Detection methods used for coliforms (total and fecal) shall be those presented in Table 1A of 40 CFR PART 136, unless alternate methods have been approved in advance by US EPA pursuant to 40 CFR PART 136.

Detection methods used for enterococcus shall be those presented in EPA publication EPA 600/4-85/076, <u>Test Methods for *Escherichia coli* and Enterococci in Water By Membrane Filter Procedure</u> or any improved method determined by the Regional Board to be appropriate.

Ocean Plan Chapter II. H Table B. <u>Compliance with Table B Objectives</u>:

Procedures, calibration techniques, and instrument/reagent specifications used to determine compliance with Table B shall conform to the requirements of federal regulations (40 CFR PART 136). All methods shall be specified in the monitoring requirement section of waste discharge requirements.

Where methods are not available in 40 CFR PART 136, the Regional Boards shall specify suitable analytical methods in waste discharge requirements. Acceptance of data should be predicated on demonstrated laboratory performance.

Laboratories analyzing monitoring data shall be certified by the Department of Health Services, in accordance with the provisions of Section 13176 CWC, and must include quality assurance quality control data with their reports.

The State or Regional Board may, subject to EPA approval, specify test methods which are more sensitive than those specified in 40 CFR PART 136. Total chlorine residual is likely to be a method detection limit effluent limitation in many cases. The limit of detection of total chlorine residual in standard test methods is less than or equal to 20 ug/l.

Monitoring for the substances in Table B shall be required periodically. For discharges less than 1 MGD (million gallons per day), the monitoring of all the Table B parameters should consist of at least one complete scan of the Table B constituents one time in the life of the waste discharge requirements. For discharges between 1 and 10 MGD, the monitoring frequency shall be at least one complete scan of the Table B substances annually. Discharges greater than 10 MGD shall be required to monitor at least semiannually.

Compliance monitoring for the acute toxicity objective (TUa) in Table B shall be determined using an US EPA approved protocol as provided in 40 CFR PART 136. Acute toxicity monitoring requirements in permits prepared by the Regional Boards shall use marine test species instead of freshwater species when measuring compliance.

The Regional Board shall require the use of critical life stage toxicity tests specified in this Appendix to measure TUc. Other species or protocols will be added to the list after SWRCB review and approval. A minimum of three test species with approved test protocols shall be used to measure compliance with the toxicity objective. If possible, the test species shall include a fish, an invertebrate, and an aquatic plant. After a screening period, monitoring can be reduced to the most sensitive species. Dilution and control water should be obtained from an unaffected area of the receiving waters. The sensitivity of the test organisms to a reference toxicant shall be determined concurrently with each bioassay test and reported with the test results.

Use of critical life stage bioassay testing shall be included in waste discharge requirements as a monitoring requirement for all discharges greater than 100 MGD by January 1, 1991 at the latest. For other major dischargers, critical life stage bioassay testing shall be included as a monitoring requirement one year before the waste discharge requirement is scheduled for renewal.

The tests presented in Table III-1 shall be used to measure TUc. Other tests may be added to the list when approved by the State Board.

TABLE III-1
APPROVED TESTS – CHRONIC TOXICITY (TUc)

Species	Effect	Tier	Reference
giant kelp, *Macrocystis pyrifera*	percent germination; germ tube length	1	1,3
red abalone, *Haliotis rufescens*	Abnormal shell development	1	1,3
oyster, *Crassostrea gigas*; mussels, *Mytilus spp.*	Abnormal shell development; percent survival	1	1,3
urchin, *Strongylocentrotus purpuratus*; sand dollar, *Dendraster excentricus*	Percent normal development	1	1,3
urchin, *Strongylocentrotus purpuratus*; sand dollar, *Dendraster excentricus*	Percent fertilization	1	1,3
shrimp, *Holmesimysis costata*	Percent survival; growth	1	1,3
shrimp, *Mysidopsis bahia*	Percent survival; growth; fecundity	2	2,4
topsmelt, *Atherinops affinis*	Larval growth rate; percent survival	1	1,3
Silversides, *Menidia beryllina*	Larval growth rate; percent survival	2	2,4

Table III-1 Notes

The first tier test methods are the preferred toxicity tests for compliance monitoring. A Regional Board can approve the use of a second tier test method for waste discharges if first tier organisms are not available.

Protocol References

1. Chapman, G.A., D.L. Denton, and J.M. Lazorchak. 1995. Short-term methods for estimating the chronic toxicity of effluents and receiving waters to west coast marine and estuarine organisms. U.S. EPA Report No. EPA/600/R-95/136.

2. Klemm, D.J., G.E. Morrison, T.J. Norberg-King, W.J. Peltier, and M.A. Heber. 1994. Short-term methods for estimating the chronic toxicity of effluents and receiving water to marine and estuarine organisms. U.S. EPA Report No. EPA-600-4-91-003.

3. SWRCB 1996. Procedures Manual for Conducting Toxicity Tests Developed by the Marine Bioassay Project. 96-1WQ.

4. Weber, C.I., W.B. Horning, I.I., D.J. Klemm, T.W. Nieheisel, P.A. Lewis, E.L. Robinson, J. Menkedick and F. Kessler (eds). 1988. Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms. EPA/600/4-87/028. National Information Service, Springfield, VA.

APPENDIX IV

PROCEDURES FOR THE NOMINATION AND DESIGNATION OF AREAS* OF SPECIAL BIOLOGICAL SIGNIFICANCE (ASBS).

1. Any person may nominate areas of ocean waters for designation as ASBS by the SWRCB. Nominations shall be made to the appropriate RWQCB and shall include:

   (a) Information such as maps, reports, data, statements, and photographs to show that:

      (1) Candidate areas are located in ocean waters as defined in the "Ocean Plan".

      (2) Candidate areas are intrinsically valuable or have recognized value to man for scientific study, commercial use, recreational use, or esthetic reasons.

      (3) Candidate areas need protection beyond that offered by waste discharge restrictions or other administrative and statutory mechanisms.

   (b) Data and information to indicate whether the proposed designation may have a significant effect on the environment.

      (1) If the data or information indicate that the proposed designation will have a significant effect on the environment, the nominee must submit sufficient information and data to identify feasible changes in the designation that will mitigate or avoid the significant environmental effects.

2. The SWRCB or a RWQCB may also nominate areas for designation as ASBS on their own motion.

3. A RWQCB may decide to (a) consider individual ASBS nominations upon receipt, (b) consider several nominations in a consolidated proceeding, or (c) consider nominations in the triennial review of its water quality control plan (basin plan). A nomination that meets the requirements of 1. above may be considered at any time but not later than the next scheduled triennial review of the appropriate basin plan or Ocean Plan.

4. After determining that a nomination meets the requirements of paragraph 1. above, the Executive Officer of the affected RWQCB shall prepare a Draft Nomination Report containing the following:

   (a) The area or areas nominated for designation as ASBS.

   (b) A description of each area including a map delineating the boundaries of each proposed area.

   (c) A recommendation for action on the nomination(s) and the rationale for the recommendation. If the Draft Nomination Report recommends approval of the proposed designation, the Draft Nomination Report shall comply with the CEQA documentation requirements for a water quality control plan amendment in Section 3777, Title 23, California Code of Regulations.

5. The Executive Officer shall, at a minimum, seek informal comment on the Draft Nomination Report from the SWRCB, Department of Fish and Game, other interested state and federal agencies, conservation groups, affected waste dischargers, and other interested parties. Upon incorporation of responses from the consulted agencies, the Draft Nomination Report shall become the Final Nomination Report.

6. (a) If the Final Nomination Report recommends approval of the proposed designation, the Executive Officer shall ensure that processing of the nomination complies with the CEQA consultation requirements in Section 3778, Title 23, California Code of Regulations and proceed to step 7 below.

   (b) If the Final Nomination Report recommends against approval of the proposed designation, the Executive Officer shall notify interested parties of the decision. No further action need be taken. The nominating party may seek reconsideration of the decision by the RWQCB itself.

7. The RWQCB shall conduct a public hearing to receive testimony on the proposed designation. Notice of the hearing shall be published three times in a newspaper of general circulation in the vicinity of the proposed area or areas and shall be distributed to all known interested parties 45 days in advance of the hearing. The notice shall describe the location, boundaries, and extent of the area or areas under consideration, as well as proposed restrictions on waste discharges within the area.

8. The RWQCB shall respond to comments as required in Section 3779, Title 23, California Code of Regulations, and 40 C.F.R. Part 25 (July 1, 1999).

9. The RWQCB shall consider the nomination after completing the required public review processes required by CEQA.

   (a) If the RWQCB supports the recommendation for designation, the board shall forward to the SWRCB its recommendation for approving designation of the proposed area or areas and the supporting rationale. The RWQCB submittal shall include a copy of the staff report, hearing transcript, comments, and responses to comments.

   (b) If the RWQCB does not support the recommendation for designation, the Executive Officer shall notify interested parties of the decision, and no further action need be taken.

10. After considering the RWQCB recommendation and hearing record, the SWRCB may approve or deny the recommendation, refer the matter to the RWQCB for appropriate action, or conduct further hearing itself. If the SWRCB acts to approve a recommended designation, the SWRCB shall amend Appendix V, Table V-1, of this Plan. The amendment will go into effect after approval by the Office of Administrative Law and US EPA. In addition, after the effective date of a designation, the affected RWQCB shall revise its water quality control plan in the next triennial review to include the designation.

11. The SWRCB Executive Director shall advise other agencies to whom the list of designated areas is to be provided that the basis for an ASBS designation is limited to protection of marine life from waste discharges.

APPENDIX V

AREAS* OF SPECIAL BIOLOGICAL SIGNIFICANCE

TABLE V-1
AREAS OF SPECIAL BIOLOGICAL SIGNIFICANCE
(DESIGNATED OR APPROVED BY THE STATE WATER RESOURCES CONTROL BOARD)

No.	ASBS Name	Date Designated	SWRCB Resolution No.	Region No.
1.	Pygmy Forest Ecological Staircase	March 21, 1974,	74-28	1
2.	Del Mar Landing Ecological Reserve	March 21, 1974,	74-28	1
3.	Gerstle Cove	March 21, 1974,	74-28	1
4.	Bodega Marine Life Refuge	March 21, 1974,	74-28	1
5.	Kelp Beds at Saunders Reef	March 21, 1974,	74-28	1
6.	Kelp Beds at Trinidad Head	March 21, 1974,	74-28	1
7.	Kings Range National Conservation Area	March 21, 1974,	74-28	1
8.	Redwoods National Park	March 21, 1974,	74-28	1
9.	James V. Fitzgerald Marine Reserve	March 21, 1974,	74-28	2
10.	Farallon Island	March 21, 1974,	74-28	2
11.	Duxbury Reef Reserve and Extension	March 21, 1974,	74-28	2
12.	Point Reyes Headland Reserve and Extension	March 21, 1974,	74-28	2
13.	Double Point	March 21, 1974,	74-28	2
14.	Bird Rock	March 21, 1974,	74-28	2
15.	Ano Nuevo Point and Island	March 21, 1974,	74-28	3
16.	Point Lobos Ecological Reserve	March 21, 1974,	74-28	3
17.	San Miguel, Santa Rosa, and Santa Cruz Islands	March 21, 1974,	74-28	4
18.	Julia Pfeiffer Burns Underwater Park	March 21, 1974,	74-28	3
19.	Pacific Grove Marine Gardens Fish Refuge and Hopkins Marine Life Refuge	March 21, 1974,	74-28	3
20.	Ocean Area Surrounding the Mouth of Salmon Creek	March 21, 1974,	74-28	3
21.	San Nicolas Island and Begg Rock	March 21, 1974,	74-28	4
22.	Santa Barbara Island, Santa Barbara County and Anacapa Island	March 21, 1974,	74-28	4
23.	San Clemente Island	March 21, 1974,	74-28	4

Table V-1 Continued on next page…

Table V-1 (Continued)

Areas of Special Biological Significance (Designated or Approved by the State Water Resources Control Board)

No.	ASBS Name	Date Designated	SWRCB Resolution No.	Region No.
24.	Mugu Lagoon to Latigo Point	March 21, 1974,	74-28	4
25.	Santa Catalina Island – Subarea One, Isthmus Cove to Catalina Head	March 21, 1974,	74-28	4
26.	Santa Catalina Island - Subarea Two, North End of Little Harbor to Ben Weston Point	March 21, 1974,	74-28	4
27.	Santa Catalina Island - Subarea Three, Farnsworth Bank Ecological Reserve	March 21, 1974,	74-28	4
28.	Santa Catalina Island - Subarea Four, Binnacle Rock to Jewfish Point	March 21, 1974,	74-28	4
29.	San Diego-La Jolla Ecological Reserve	March 21, 1974,	74-28	9
30.	Heisler Park Ecological Reserve	March 21, 1974,	74-28	9
31.	San Diego Marine Life Refuge	March 21, 1974,	74-28	9
32.	Newport Beach Marine Life Refuge	April 18, 1974	74-32	8
33.	Irvine Coast Marine Life Refuge	April 18, 1974	74-32	8
34.	Carmel Bay	June 19, 1975	75-61	3

APPENDIX VI
Reasonable Potential Analysis Procedure for determining which Table B Objectives require effluent limitations

An effluent discharge, after accounting for dilution and background seawater concentrations, has the reasonable potential to exceed a Table B water quality objective if the one-sided, upper 95% confidence bound on the 95th percentile of the pollutant discharge distribution, or the maximum observed pollutant concentration, is above the Table B water quality objective.

In determining the need for an effluent limitation, the RWQCB shall use all representative information to characterize the pollutant discharge using a scientifically defensible statistical method that accounts for and captures the long-term variability of the pollutant in the effluent, accounts for limitations associated with sparse data sets, accounts for uncertainty associated with censored data sets, and (unless otherwise shown by the effluent data set) assumes a lognormal distribution of the facility-specific effluent data.

If insufficient information precludes the use of a statistical method to characterize the pollutant discharge or if the pollutant data consist entirely of results below the MDL or ML (or a combination of both), then the RWQCB may require whole effluent chronic toxicity testing or additional pollutant-specific monitoring as a condition of the Waste Discharge Requirement.

If the following reasonable potential analysis (see also Figure VI-1) indicates that a limitation is required for a Table B substance, the RWQCB shall establish the limitation using Equation 1.

Step 1: Identify C_o, the applicable water quality objective from Table B for the pollutant.

Step 2: Does information about the receiving water body or the discharge support a reasonable potential assessment (RPA) without characterizing facility-specific effluent monitoring data? If yes, go to *Step 14* to conduct an RPA based on best professional judgement (BPJ). Otherwise, proceed to *Step 3*.

Step 3: Is facility-specific effluent monitoring data available? If yes, proceed to *Step 4.* Otherwise, go to *Step 14.*

Step 4: Adjust all effluent monitoring data C_e, including non-detected values, to the concentration C expected after complete mixing. For Table B pollutants use $C = (C_e + D_m C_s) / (D_m + 1)$; for acute toxicity use $C = C_e / (0.1 D_m + 1)$; where D_m is the minimum probable initial dilution expressed as parts seawater per part wastewater and C_s is the background seawater concentration from Table C. Go to *Step 5*.

Step 5. Find $X_{(n)}$, the maximum detected pollutant concentration. Is $X_{(n)}$ greater than C_o? If yes, an effluent limitation must be developed. Otherwise, proceed to *Step 6*.

Step 6: Does the effluent monitoring data contain two or more detected observations? If yes, proceed to *Step 7* to conduct a statistically-based RPA. Otherwise, go to *Step 9* to conduct a sparse data RPA.

Step 7: Conduct a Statistically-based RPA.

- Calculate lnSDev, the standard deviation of the natural logarithm transformed effluent data expected after complete mixing. If needed, use censored data analysis methods such as Helsel and Cohn (1988).
- Obtain the factor, f_n, from the table below based on n, the total number of samples including non-detected values.
- Calculate the UCB i.e., the one-sided, upper 95% confidence bound for the 95th percentile of the effluent distribution after mixing, UCB = $X_{(n)}$ exp(lnSDev f_n).
- Proceed to *Step 8*.

Step 8: Is UCB greater than C_o? If yes, an effluent limitation must be developed. Otherwise, an effluent limitation is not required.

Step 9: Conduct a Sparse data RPA. Assume effluent data are lognormally distributed with a CV = 0.6 and lnSDev = 0.5545. Proceed to *Step 10*.

Step 10: Is the data 100% censored by having all non-detects or DNQs or a combination of both? If yes, go to *Step 13*. Otherwise, go to *Step 11*.

Step 11: Adjust the sample size, n, to the total number of observations less than or equal to the single detected value. Let $X_{(n)}$ = the single detected observation. Obtain the reasonable potential multiplying factor k from the table below based on n. Calculate the UCB i.e., the one-sided, upper 95% confidence bound for the 95th percentile of the effluent distribution after mixing, UCB = $X_{(n)}$ k. Proceed to *Step 12*.

Step 12: Is the UCB greater than C_o? If yes, an effluent limitation must be developed. Otherwise, an effluent limitation is not required.

Step 13: Is the lowest non-detected value greater than C_o? If yes, go to *Step 15*. Otherwise, an effluent limitation is not required.

Step 14: Conduct an RPA based on BPJ. Review all available information to determine if a water quality-based effluent limitation is required, notwithstanding the above analysis in *Steps 1* through *13*, 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, the presence of endangered or threatened species or critical habitat, and other information.

Is data or other information unavailable or insufficient to determine if a water quality-based effluent limitation is required? If yes, proceed with *Step 15.* Otherwise, an effluent limitation must be developed.

Step 15: If data are unavailable or insufficient to conduct the above analysis for the pollutant, or if all reported after dilution detection limits of the pollutant in the effluent are greater than C_o, the RWQCB shall establish interim requirements that require additional monitoring for the pollutant in place of a water quality-based effluent limitation.

Appendix VI References:

Helsel D. R. and T. A. Cohn. 1988. Estimation of descriptive statistics for multiply censored water quality data. Water Resources Research, Vol 24(12);1977-2004.

Hahn J. H. and W. Q. Meeker. 1991. Statistical Intervals, A guide for practitioners. J. Wiley & Sons, NY.

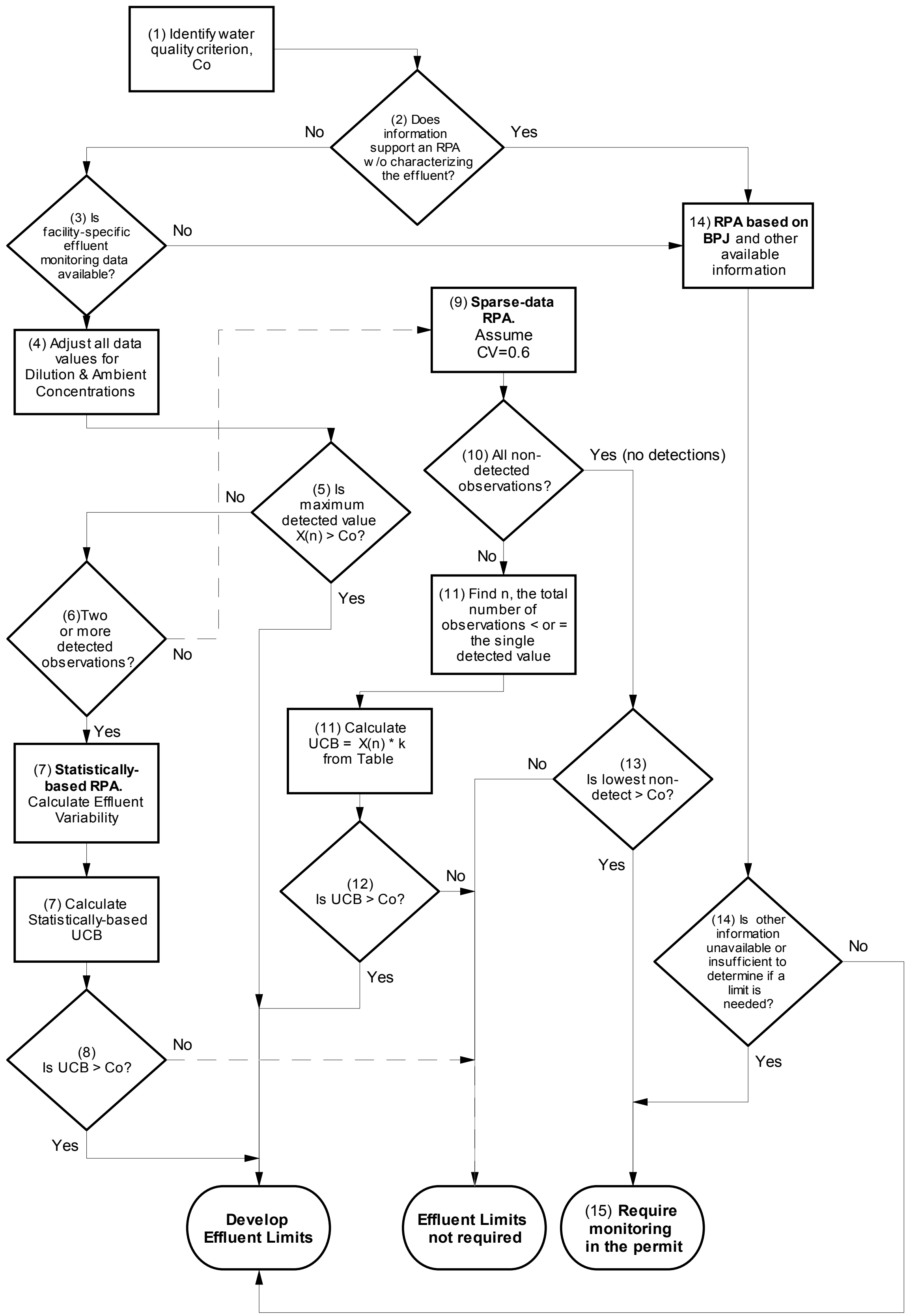
Harter, H. L. 1961. Expected values of normal order statistics. Biometrika 48:151-165.

Table VI-1. Factors used to calculate UCB, the upper 95% confidence bound for the 95th percentile of a lognormal distribution using the maximum detected observation $X_{(n)}$. g' are normal tolerance factors from Hahn & Meeker (1991) and $E[X_{(n)}]$ are expected values of the largest observation taken from a standard normal distribution from Harter (1961).

Number of Samples, n	For any CV $UCB_{(.95,\ .95,\ n,\ \sigma L)} = X_{(n)} \exp(\sigma_L f_n)$ where $f_n = (g'_{(.95,.95,n)} - E[X_{(n)}])$ f_n	For CV = 0.6 $UCB_{(.95,\ .95,\ n,\ 0.5545)} = X_{(n)}\ k$ *where* $k = \exp(0.5545\ f_n)$ k
1	25.696*	>1000000.000*
2	25.696	>1000000.000
3	6.810	43.644
4	4.115	9.792
5	3.040	5.396
6	2.441	3.871
7	2.047	3.111
8	1.763	2.659
9	1.546	2.357
10	1.372	2.140
11	1.229	1.976
12	1.107	1.847
13	1.003	1.744
14	0.911	1.657
15	0.830	1.585
16	0.758	1.522
17	0.692	1.468
18	0.633	1.420
19	0.579	1.378
20	0.528	1.341
21	0.479	1.304
22	0.434	1.272
23	0.392	1.243
24	0.354	1.217
25	0.319	1.194
26	0.286	1.172
27	0.256	1.153
28	0.228	1.135
29	0.201	1.118
30	0.177	1.103
31	0.151	1.087
32	0.127	1.073
33	0.102	1.058
34	0.080	1.045
35	0.057	1.032
36	0.038	1.021
37	0.018	1.010
38 or more	0.000	1.000

* Values shown are for n = 2

Figure VI-1: Reasonable potential analysis flow chart

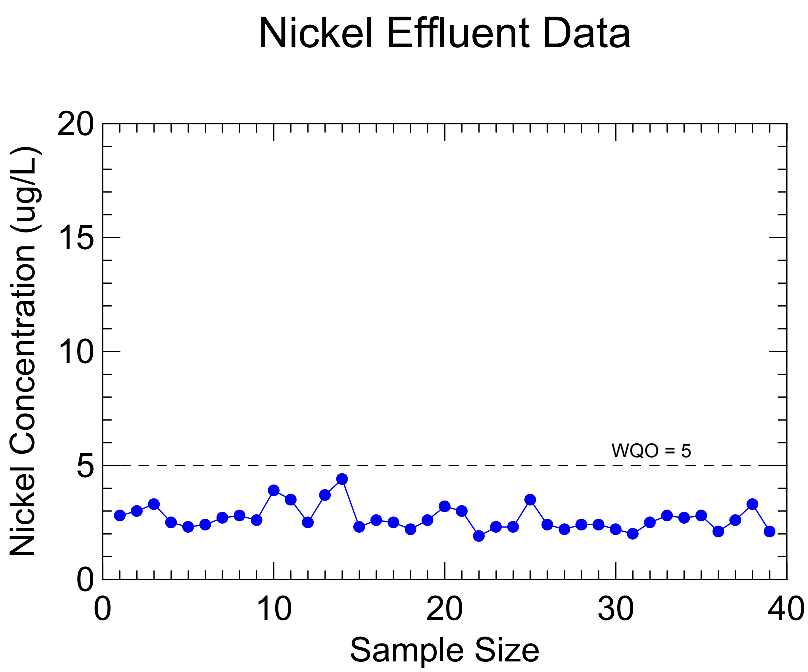


Appendix B
Comparison of TSD Procedure and the Lognormal Tolerance Bound Procedure

Appendix B. Comparison of the TSD procedure and the Lognormal Tolerance Bound procedure using nickel effluent data from an ocean discharger.

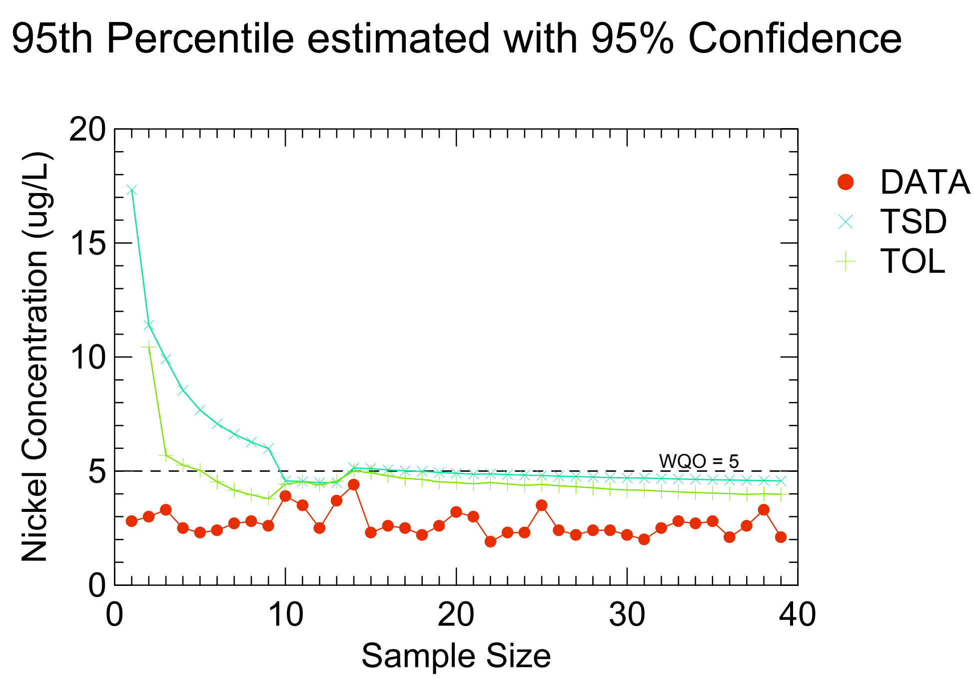
The California Ocean Plan water quality objective for nickel is 5 ug/L. Total nickel was measured each month in the effluent of a major California ocean discharger over a three year-period, from January 1999 to June 2002. The data set in ug/L in chronological order is {2.8, 3.0, 3.3, 2.5, 2.3, 2.4, 2.7, 2.8, 2.6, 3.9, 3.5, 2.5, 3.7, 4.4, 2.3, 2.6, 2.5, 2.2, 2.6, 3.2, 3.0, 1.9, 2.3, 2.3, 3.5, 2.4, 2.2, 2.4, 2.4, 2.2, 2.0, 2.5, 2.8, 2.7, 2.8, 2.1, 2.6, 3.3, 2.1}.

For this data, the mean nickel value was 2.7 ug/L, the median value was 2.6, and the sample CV was 0.2. All samples were above the detection limit and no single sample exceeded the water quality objective as illustrated below:


Nickel Effluent Data
Nickel Concentration (ug/L)
20
15
10
5
0
WQO = 5
0
10
20
30
40
Sample Size

Using all 39 available samples, we may estimate the one-sided, upper 95% confidence bound on the 95th percentile prior to dilution. The upper confidence bound using the TSD procedure is 4.6 ug/L, whereas using the Tolerance Bound procedure gives 4.0 ug/L. The upper bound of both procedures is less than the water quality objective; both procedures would conclude that an effluent limitation is not required based on 39 samples.

What if fewer samples were available? We can successively reduce the sample size by one observation, then recalculate the upper confidence bounds. The following figure illustrates the upper confidence bounds for the two procedures in relation to sample size:


95th Percentile estimated with 95% Confidence
Nickel Concentration (ug/L)
Sample Size
WQO = 5
DATA
TSD
TOL
0
5
10
15
20
0
10
20
30
40

Examination of the above figure reveals that the upper confidence bound increases using either procedure as the sample size decreases. This is due to the uncertainty associated with smaller sample sizes. The Tolerance Bound procedure would require an effluent limitation for 5 or less samples. The TSD procedure would require an effluent limitation for data sets of 9 or less samples and this conclusion would be based on a default CV of 0.6 rather than on the actual sample variability. The TSD procedure would also require an effluent limitation for sample sizes of 14, 15, 16 or 17. Note that in this example, upper confidence bounds calculated using tolerance intervals are always lower than bounds calculated with the TSD procedure.

Appendix C
Environmental Checklist

STATE WATER RESOURCES CONTROL BOARD
DIVISION OF WATER QUALITY
P.O. BOX 100
SACRAMENTO, CA 95812-0100

Environmental Checklist

I. Background

Project Title: Proposed Amendments for the California Ocean Plan

Contact Person: Frank Roddy, Telephone: (916) 341-5379
Email: roddf@dwq.swrcb.ca.gov

Project Description: The California Water Code (§13170.2) requires that the California Ocean Plan be reviewed at least every three years to guarantee that the current standards are adequate and are not allowing degradation to indigenous marine species or posing a threat to human health.

This project, if approved by the State Water Resources Control Board, will amend the 2001 California Ocean Plan. The following amendments are proposed for adoption:

Issue 1: Choice of Indicator Organisms for Water-Contact Bacterial Standards

Issue 2: Reasonable Potential: Determining When California Ocean Plan Water Quality-based Effluent Limitations are Required

II. Environmental Impacts

The environmental factors checked below could be potentially affected by this project. See the checklist on the following pages for more details.

☐	Land Use and Planning	☐	Transportation/Circulation	☐	Public Services
☐	Population and Housing	☐	Biological Resources	☐	Utilities and Service Systems
☐	Geological Problems /Soils	☐	Energy and Mineral Resources	☐	Aesthetics
☐	Hydrology/Water Quality	☐	Hazards	☐	Cultural Resources
☐	Air Quality	☐	Noise	☐	Recreation
☐	Agriculture Resources	☐	Mandatory Findings of Significance		

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
.. AESTHETICS. Would the project:				
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☑
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☑
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☐	☐	☑
d) Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?	☐	☐	☐	☑
2. AGRICULTURAL RESOURCES. In determining whether impacts to agricultural resources are significant environmental impacts, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping & Monitoring Program of the California Resources Agency, to non-agricultural uses?	☐	☐	☐	☑
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☑
c) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use?	☐	☐	☐	☑
3. AIR QUALITY. Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☐	☑
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☐	☐	☐	☑
c) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☐	☑
d) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors)?	☐	☐	☐	☑
e) Create objectionable odors affecting a substantial number of people?	☐	☐	☐	☑
4. BIOLOGICAL RESOURCES. Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or US Fish and Wildlife Service?	☐	☐	☐	☑

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Game or US Fish and Wildlife Service?	☐	☐	☐	☑
c) Have a substantial adverse effect on federally-protected wetlands as defined by Section 404 of the federal Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, *etc.*) through direct removal, filling, hydrological interruption or other means?	☐	☐	☐	☑
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory corridors, or impede the use of native wildlife nursery sites?	☐	☐	☐	☑
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☑
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☑
5. CULTURAL RESOURCES. Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	☐	☐	☐	☑
b) Cause a substantial adverse change in the significance of an archaeological resource as defined in §15064.5?	☐	☐	☐	☑
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☐	☑
d) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	☐	☑
6. GEOLOGY and SOILS. Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:	☐	☐	☐	☑
i) Rupture of a known earthquake fault, as delineated in the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines & Geology Special Publication 42.	☐	☐	☐	☑
ii) Strong seismic ground shaking?	☐	☐	☐	☑
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☐	☑
iv) Landslides?	☐	☐	☐	☑
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☐	☑
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	☐	☐	☐	☑
d) Be located on expansive soils, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☐	☐	☑

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
e) Have soils incapable of adequately supporting the use of septic tanks or alternate wastewater disposal systems where sewers are not available for the disposal of wastewater?	☐	☐	☐	☑

7. HAZARDS and HAZARDOUS MATERIALS. Would the project:

a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☐	☑
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☐	☑
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within ¼ mile of an existing or proposed school?	☐	☐	☐	☑
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code §65962.5 and, as a result, would it create a significant hazard to the public or to the environment?	☐	☐	☐	☑
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or a public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☑
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☑
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☑
h) Expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☐	☑

8. HYDROLOGY and WATER QUALITY. Would the project:

a) Violate any water quality standards or waste discharge requirements?	☐	☐	☐	☑
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (*e.g.*, the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☐	☑
c) Substantially alter the existing drainage pattern of the site, including through alteration of the course of a stream or river, or substantially increase the rate or volume of surface runoff in a manner that would:				
i) result in flooding on- or off-site	☐	☐	☐	☑
ii) create or contribute runoff water that would exceed the capacity of existing or planned stormwater discharge	☐	☐	☐	☑
iii) provide substantial additional sources of polluted runoff	☐	☐	☐	☑

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
iv) result in substantial erosion or siltation on-or off-site?	☐	☐	☐	☑
d) Otherwise substantially degrade water quality?	☐	☐	☐	☑
e) Place housing or other structures which would impede or re-direct flood flows within a 100-yr. flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	☑
f) Would the change in the water volume and/or the pattern of seasonal flows in the affected watercourse result in:				
i) a significant cumulative reduction in the water supply downstream of the diversion?	☐	☐	☐	☑
ii) a significant reduction in water supply, either on an annual or seasonal basis, to senior water right holders downstream of the diversion?	☐	☐	☐	☑
iii) a significant reduction in the available aquatic habitat or riparian habitat for native species of plants and animals?	☐	☐	☐	☑
iv) a significant change in seasonal water temperatures due to changes in the patterns of water flow in the stream?	☐	☐	☐	☑
v) a substantial increase or threat from invasive, non-native plants and wildlife	☐	☐	☐	☑
g) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	☐	☐	☐	☑
h) Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☐	☐	☑
i) Inundation by seiche, tsunami, or mudflow?	☐	☐	☐	☑
9. LAND USE AND PLANNING. Would the project:				
a) Physically divide an established community?	☐	☐	☐	☑
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to, the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☑
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☐	☐	☑
10. MINERAL RESOURCES. Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of future value to the region and the residents of the State?	☐	☐	☐	☑
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?	☐	☐	☐	☑

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
11. NOISE. Would the project result in:				
a) Exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☐	☑
b) Exposure of persons to, or generation of, excessive groundborne vibration or groundborne noise levels?	☐	☐	☐	☑
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☐	☑
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☐	☑
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing in or working in the project area to excessive noise levels?	☐	☐	☐	☑
f) For a project within the vicinity of a private airstrip, would the project expose people residing in or working in the project area to excessive noise levels?	☐	☐	☐	☑
12. POPULATION AND HOUSING. Would the project:				
a) Induce substantial population growth in an area either directly (*e.g.*, by proposing new homes and businesses) or indirectly (*e.g.*, through extension of roads or other infrastructure)?	☐	☐	☐	☑
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☑
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☑
13. PUBLIC SERVICES. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service rations, response times or other performance objectives for any of the public services:				
a) Fire protection?	☐	☐	☐	☑
b) Police protection?	☐	☐	☐	☑
c) Schools?	☐	☐	☐	☑
d) Parks?	☐	☐	☐	☑
e) Other public facilities?	☐	☐	☐	☑
14. RECREATION. Would the project:				
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☑
b) Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?	☐	☐	☐	☑

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
15. TRANSPORTATION / CIRCULATION. Would the project:				
a) Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (*i.e.*, result in a substantial increase in either the number of vehicle trips, the volume-to-capacity ratio on roads, or congestion at intersections)?	☐	☐	☐	☑
b) Exceed, either individually or cumulatively, a level-of-service standard established by the county congestion management agency for designated roads or highways?	☐	☐	☐	☑
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☐	☑
d) Substantially increase hazards due to a design feature (*e.g.*, sharp curves or dangerous intersections) or incompatible uses (*e.g.*, farm equipment)?	☐	☐	☐	☑
e) Result in inadequate emergency access?	☐	☐	☐	☑
f) Result in inadequate parking capacity?	☐	☐	☐	☑
g) Conflict with adopted policies supporting alternative transportation (*e.g.*, bus turnouts, bicycle racks)?	☐	☐	☐	☑
16. UTILITIES AND SERVICE SYSTEMS. Would the project:				
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☐	☑
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental impacts?	☐	☐	☐	☑
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental impacts?	☐	☐	☐	☑
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☐	☑
e) Result in a determination by the wastewater treatment provider that serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☑
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☐	☐	☑
g) Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	☐	☑
17. MANDATORY FINDINGS OF SIGNIFICANCE.				
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☐	☐	☑

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)	☐	☐	☐	☑
c) Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☐	☑

III. Determination

On the basis of this initial evaluation, I find that the proposed project COULD NOT have a significant effect on the environment.

Prepared By:

Francis J. Roddy PE 8/4/04

Frank Roddy Date

Staff Environmental Scientist

(Form updated 3/28/00)

Authority: Public Resources Code Sections 21083, 21084, 21084.1, and 21087.

Reference: Public Resources Code Sections 21080(c), 21080.1, 21080.3, 21082.1, 21083, 21083.1 through 21083.3, 21083.6 through 21083.9, 21084.1, 21093, 21094, 21151; *Sundstrom v. County of Mendocino*, 202 Cal. App. 3d 296 (1988); *Leonoff v. Monterey Board of Supervisors*, 222 Cal. App. 3d 1337 (1990).

Appendix D
List of Preparers

Appendix D List of Preparers

This draft Functional Equivalent Document was prepared by the following staff members at the State Water Resources Control Board:

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