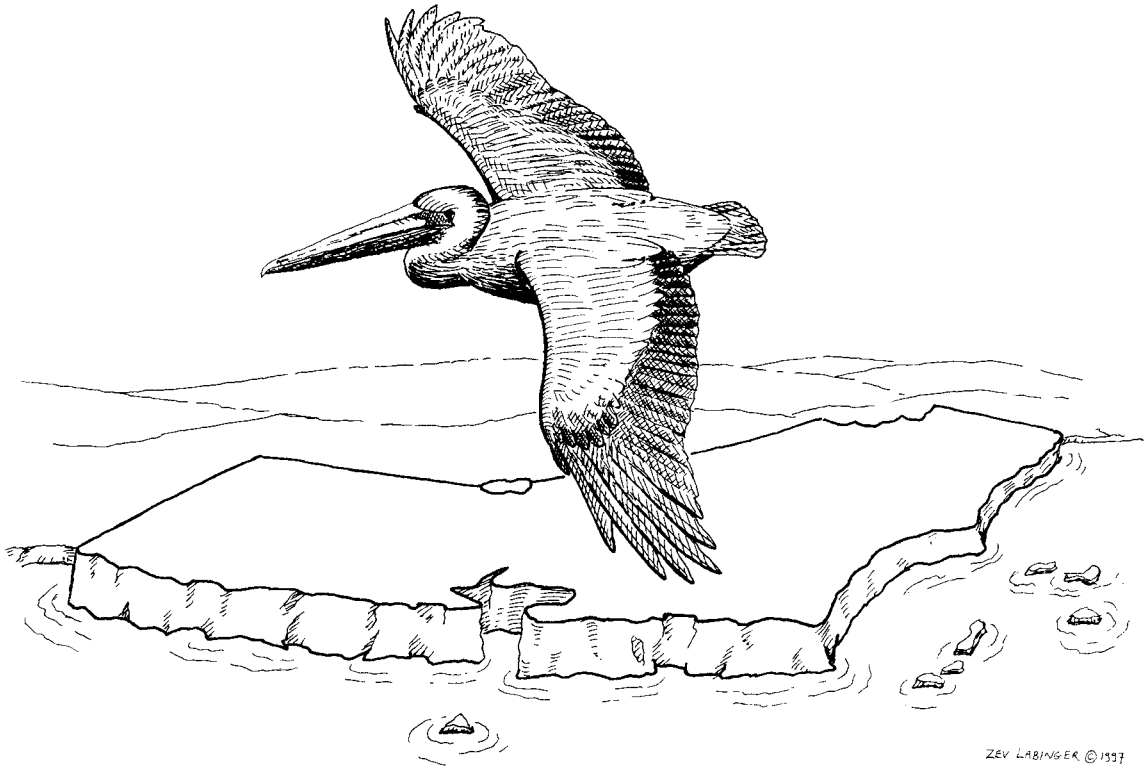
FINAL

FUNCTIONAL EQUIVALENT DOCUMENT

AMENDMENT OF
THE WATER QUALITY CONTROL PLAN
OCEAN WATERS OF CALIFORNIA

CALIFORNIA OCEAN PLAN



December 2004

STATE WATER RESOURCES CONTROL BOARD
CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

STATE WATER RESOURCES CONTROL BOARD
DIVISION OF WATER QUALITY

FINAL FUNCTIONAL EQUIVALENT DOCUMENT

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

CALIFORNIA OCEAN PLAN

DECEMBER 2004

State Water Resources Control Board

Division of Water Quality

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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: froddy@waterboards.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.waterboards.ca.gov/plnspols/oplans/.

John for Stan Martinson, Chief
Division of Water Quality

12/21/07
Date

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LIST OF ABBREVIATIONS

AB	Assembly Bill
ASBS	Areas of Special Biological Significance
BMP	best management practices
Cal/EPA	California Environmental Protection Agency
CCCW	California Coalition for Clean Water
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CSO	Combined Sewer Overflows
CWA	Clean Water Act
CWC	California Water Code
DFED	Draft Functional Equivalent Document
DHS	Department of Health Services
EIR	Environmental Impact Report
FED	Functional Equivalent Document
FFED	Final Functional Equivalent Document
GM	Geometric Mean
MAC	Microbiological Advisory Committee
Mgd	Million Gallons per Day
ml	milliliter
MPN	most probable number
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
NTAC	National Technical Advisory Committee of the Department of the Interior
POTW	publicly-owned treatment works
RWQCB	Regional Water Quality Control Board
SAIC	Science Applications International Corporation
SCCWRP	Southern California Coastal Water Research Project
SSM	single sample maximum
SSO	Sanitary Sewer Overflows
SWQPAs	State Water Quality Protection Areas
SWRCB	State Water Resources Control Board
TMDL	Total Maximum Daily Load
UC	University of California
USEPA	United States Environmental Protection Agency
WDR	Waste Discharge Requirements
WWTP	Waste Water Treatment Plant

SUMMARY

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

Choice of Indicator Organisms for Water-Contact Bacterial Standards

Add an enterococcus geometric mean and single sample maximum (SSM) water-contact standard. If a single sample exceeds any of the SSM standards, repeat sampling at that location will be conducted within 24 hours of receiving analytical results and continued until the sample result is less than the SSM standard, or until a sanitary survey is conducted to determine the source. Require monitoring for total coliform at offshore stations. Add a statement that it is state policy that the geometric mean is strongly preferred for use in water body assessment decisions. The use of only the SSM value is generally inappropriate, except under appropriate circumstances.

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.

On August 6, 2004, the SWRCB circulated a DFED which included recommendations 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.

Written comments on the DFED were received from 13 organizations. On October 6, 2004, the SWRCB held a hearing to receive testimony on the DFED and the proposed amendments. Three people provided oral testimony. At the hearing, staff informed the Board members that the reasonable potential issue needs to undergo external scientific review. Therefore, this Final FED (FFED) only addresses the water-contact bacterial indicator issue and its corresponding comments. The reasonable potential issue and comments received on it will be addressed in a subsequent FFED.

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.

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 recommended amendment, there will be no significant adverse environmental impacts from the proposed California Ocean Plan amendment. 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 amendment does 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 source dischargers are regulated by the State under the Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program (SWRCB 2004a) adopted by the SWRCB on May 20, 2004. The policy clarifies that all nonpoint source discharges must be regulated through waste discharge requirements (WDRs), waivers, or prohibitions.

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 amendment is proposed for adoption:

Choice of Indicator Organisms for Water-Contact Bacterial Standards

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 WDRs.

Proposed Project

The proposed project is the SWRCB adoption of the proposed amendment 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.

Comments Received: Comments received on the DFED are identified in this FFED by issue. When multiple comments were received addressing the same concern, SWRCB staff prepared a "combined comment" that paraphrases the individual comments. Commenters are identified by number at the end of the comment. Responses prepared by SWRCB staff are presented following each comment.

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.

Commenters and Affiliations

Individuals or organizations who submitted written comments on the DFED or who gave testimony at the October 2004 public hearing are listed below. Each of the commenters is referred to by number when referenced in the issue. When an agency or individual submitted written comments, staff has relied on that source to characterize these comments. All comments presented at the hearing pertaining to proposed amendments have been addressed.

Written Comments

No. 1
San Diego Regional Water Quality Control Board. 9174 Sky Park Court, Suite 100, San Diego, CA 92123
John H. Robertus
Los Angeles Regional Water Quality Control Board. 320 West 4th Street, Suite 200, Los Angeles, CA 90013
Jonathan Bishop

No. 2
Los Angeles Department of Water and Power. 111 North Hope Street, Los Angeles, CA 90012
Susan M. Damron

No. 3
AES Southland L.L.C. Steven.Maghy@AES.com
Steve Maghy

No. 4
Tri-TAC, California Association of Sanitation Agencies (CASA), and Southern California Alliance of Publicly Owned Treatment Works (SCAP). 1955 Workman Mill Road, Whittier, CA 90601
Roberta L. Larson and Sharon N. Green

No. 5
California Department of Transportation. P.O. Box 942874, Sacramento, CA 94274
Michael Flake

No. 6
Central Coast Regional Water Quality Control Board. 895 Aerovista Place, Suite 101, San Luis Obispo, CA 93401
Roger W. Briggs

No. 7
U.S. Environmental Protection Agency, Region IX. 75 Hawthorne Street, San Francisco, CA 94105
Douglas E. Eberhardt

No. 8
Nossaman, Guthner, Knox & Elliott, LLP. 18101 Von Karman Avenue, Irvine, CA 92612
Carollyn B. Lobell

No. 9
County Sanitation Districts of Los Angeles County. P.O. Box 4998, Whittier, CA 90607
James F. Stahl and Martha Rincon

No. 10
Western States Petroleum Association. 1415 L Street, Suite 600, Sacramento, CA 95814
Steven Arita

No. 11
San Francisco Public Utilities Commission. 1145 Market Street, Suite 401, San Francisco, CA 94103
Micahel P. Carlin

No. 12
Heal the Bay. 3220 Nebraska Avenue, Santa Monica, CA 90404
Mark Gold

No. 13
Santa Monica Baykeeper
Tracy Egoscue

Public Hearing Commenters and Affiliation

No. 4
Tri-TAC, California Association of Sanitation Agencies (CASA), and Southern California Alliance of Publicly Owned Treatment Works (SCAP). 1955 Workman Mill Road, Whittier, CA 90601
Sharon Green and Jim Colston

No. 10
Western States Petroleum Association. 1415 L Street, Suite 600, Sacramento, CA 95814
David Arrieta

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

I. Summary of Proposed California Ocean Plan Amendment

Add an enterococcus geometric mean and single sample maximum (SSM) water-contact standard. If a single sample exceeds any of the SSM standards, repeat sampling at that location will be conducted within 24 hours of receiving analytical results and continued until the sample result is less than the SSM standard, or until a sanitary survey is conducted to determine the source. Require monitoring for total coliform at offshore stations. Add a statement that it is State policy that the geometric mean is strongly preferred for use in water body assessment decisions. The use of only the SSM value is generally inappropriate, except under appropriate circumstances.

II. Present California Ocean Plan

Chapter II of the 2001 California Ocean Plan contains a total and fecal coliform water-contact standard and Chapter III 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 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).

The 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 2004a). A Final Rule was published in the Federal Register on November 16, 2004 (USEPA 2004b). 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 RWQCB, is included in the Final Rule. However, the USEPA is strongly urging the SWRCB to proceed with the SWRCB's adoption of water-contact bacterial standards. If adopted, California's marine waters will be removed from the Final Rule; only bays and estuaries will be included.

1. Indicator Organisms and the Development of Water Quality Criteria

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 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. Review of the USEPA Draft Guidance Documents

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. State Water Resources Control Board Activity

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 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. Review of Discharger Data

   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. Review of Recent Epidemiological Studies

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, is 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 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 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 statewide 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 Meeting.

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 (County) 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 the Porter-Cologne Water Quality Control Act 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. Public Comments and Board Staff Response

A. Comments on Single Sample Maximum (SSM) and Geometric Mean Standards

Comment 1: Protecting ocean water quality is important to our economy and way of life in Southern California. Because of the overwhelmingly high beach usage in Southern California, we should act in a conservative manner to protect our world-famous beaches. From a public health perspective, adopting conservative water quality standards is the responsible approach until there is definitive evidence that less conservative objectives will fully support beneficial uses. The two-tiered approach of SSM and geometric mean as part of water quality standards

should be retained in the Ocean Plan for total coliform. Additionally, a two-tiered approach for fecal coliform and enterococcus should be incorporated into the Ocean Plan. (1)

Response: California has the most comprehensive coastal water quality protection in the nation. Protection of water-contact recreation beneficial uses is under the jurisdiction of two agencies: the SWRCB and the DHS. Health and Safety Code Sections 100275, 115880, 116075, and 116080 authorize the DHS to adopt regulations pertaining to beach safety. The DHS regulations for public beaches and ocean water contact sports areas include those developed in response to requirements of Health and Safety Code Section 115880 (Assembly Bill 411, Statutes of 1997, Chapter 765). The DHS has delegated the authority to make beach posting and closure decisions to the local environmental health agencies. AB 411 required the DHS, in consultation with local health officers and the public, to establish minimum standards for the sanitation of public beaches. These regulations require: (1) testing of waters adjacent to all public beaches for total coliform, fecal coliform, and enterococci bacteria; (2) standards to be set for total coliform, fecal coliform, the ratio of total coliform to fecal coliform, and enterococci; (3) establishment of sampling protocols; (4) 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; (5) posting of beaches whenever that beach fails to meet bacteriological standards; and (6) establishment of a telephone hotline by the health officer to inform the public of all beaches currently closed, posted, or otherwise restricted. Decisions on beach postings and closures are based on violation of the bacterial standards contained in Title 17 of the CCR, Section 7958.

SWRCB staff have revised the proposed language to include SSM values as bacterial standards. The exceedance of a SSM standard will trigger the requirement for additional monitoring. Language has been included that states that it is the SWRCB policy that the geometric mean bacterial objectives are strongly preferred for use in water body assessment decisions and that the use of only SSM bacterial data is generally inappropriate except under special circumstances. Staff believe that the use of SSM standard exceedances to trigger additional monitoring is a proactive approach to protecting beneficial uses.

SWRCB staff agree that the interests of the people of our State are best served by limiting the possibility of illness due to water contact recreation. And the first line of response is the duty of the local health departments. Our role in limiting the possibility of illness due to water contact recreation is to identify and mitigate the source of the fecal contamination. And this role can be best performed by verifying that there is an actual problem, identifying the source(s) of fecal contamination, and eliminating or mitigating the sources.

Comment 2: Single sample maximum values are reasonable and accepted as part of water quality standards in federal law. (1)

Response: The comment quotes USEPA's Ambient Water Quality Criteria for Bacteria – 1986: " noncompliance is also signaled by an unacceptably high value for any single bacterial sample". That paragraph continues: "The maximum acceptable bacterial density for a single sample is set higher than that for the geometric mean, in order to avoid unnecessary beach closings based on single samples. In deciding whether a beach should be left open, it is the long-term geometric

mean bacterial density that is of interest. Because of day-to-day fluctuations around this mean, a decision based on a single sample (or even several samples) may be erroneous, *i.e*., the sample may exceed the recommended mean criteria even though the long-term geometric mean is protective, or may fall below the maximum even if this mean is in the nonprotective range" (USEPA 1986).

In its 2004 Proposed Rule, the USEPA states that its 1986 bacteria criteria document does not interpret the meaning of the term "single sample maximum." The USEPA offered three alternate options, one of which is similar to what staff proposes for the California Ocean Plan amendment. In its discussion of this option, the USEPA states that, in the original epidemiological studies that were used to determine bacterial criteria, the USEPA calculated the geometric mean of the summer bacterial density and correlated this with the summer average gastrointestinal illness rate. The USEPA then used this correlation as the basis of the geometric mean criterion. The USEPA concludes, "Thus, the geometric mean has the most direct relationship to the illness rate" (USEPA 2004a). In the Final Rule, the USEPA notes that SSM discussion in the 1986 bacteria criteria document refers only to beach monitoring and does not discuss how or whether the SSM should be implemented for other CWA applications such as establishing Total Maximum Daily Loads (TMDLs) or NPDES permit limitations. The USEPA states that SSM values are best used for making beach notification and closure decisions. However, they may, but need not, play a role in implementing other CWA programs. The USEPA expects that states will determine how to use SSM values in the context of their programs implementing the CWA (USEPA 2004b). This Rule is effective December 16, 2004.

Comment 3: Epidemiological study in Santa Monica Bay showed a direct link between single sample maximum values and rates of illnesses. (1)

Response: SWRCB staff agrees that the SSM value for enterococcus showed a positive association with diarrhea with blood in the Santa Monica Bay epidemiological study. This is a primary reason that the SSM value for enterococcus was adopted in the AB 411 regulations. As stated in the response to comment #1, these are the regulations that the local environmental health agencies must use to make their beach posting and closure decisions. These decisions must be made immediately, in spite of the shortcomings of using data from a single sample. Bacterial standards in the California Ocean Plan are used to protect beneficial uses, including the protection of public health during water-contact recreation. And to determine if this beneficial use is protected, it is more appropriate to use the geometric mean. In fact, recent research supports moving away from the use of the single sample results, even for determining beach postings and closures. In a 2002 study of southern California beaches, Dr. Alexandria Boehm of Stanford University states "Decisions to post or close a beach should not be based on the concentration of indicator bacteria in a single grab sample" (*Boehm, et al. 2002*).
Dr. Stanley Grant and Dr. Joon Hakim of the University of California, Irvine, conducted an analysis of historical shoreline monitoring data from Huntington Beach. They determined that the use of the SSM values as a benchmark for determining beach closures is prone to error. In order to make more reliable decisions using SSM values, samples would have to be collected at least every 40 minutes. And even if posting decisions were revised every 10 minutes, as much as 30 percent of the signage would be in error (*Kim and Grant 2004*).

Comment 4: Consistency is needed between the California Ocean Plan and the California Code of Regulations (CCR). (1)

Response: When the CCR was amended to include the AB 411 regulations, the DHS and the SWRCB staff agreed that the California Ocean Plan and the CCR should include the same indicator organisms. And the proposed amendment accomplishes this. Further, it includes the same numeric values for all indicator organisms as are found in the CCR. The only difference is how the data are to be interpreted. Although both agencies have the goal of protecting the public health during water contact recreation, the long-term goals of the two agencies are different. The DHS must protect persons from immediate adverse health effects, while the SWRCB must work to reduce or eliminate pollution sources contributing to the problem.

Comment 5: Single sample maximum objectives are particularly appropriate for southern California's wet weather conditions. (1)

Response: The concern is that bacteria and other contaminants accumulate on land between storms, enhancing runoff quality concerns compared to temperate areas where rainfall is more frequent. Many constituents are present in runoff at higher concentrations after long periods without rainfall, reflecting the accumulation of materials on land between storms. However, based on SCCWRP evaluation of five years of Los Angeles county data, this was not the case for bacteria. The length of the preceding dry period had little effect on beach bacterial concentrations (*Ackerman and Weisberg 2003*). The most likely explanation is that bacteria are more labile than chemical constituents, with indicator organisms typically decaying within a few days.

The San Diego RWQCB submitted data supporting its use of the SSM for TMDLs developed for exceedances during rain events. SWRCB staff will review these data and talk further with staff from the RWQCB and SWRCB Basin Planning and TMDL staff.

Comment 6: Wet weather and first flush related exceedances and problems will be masked by eliminating SSM standards. This will be especially problematic in the Los Angeles area. (13)

Response: Many constituents are present in runoff at higher concentrations after long periods without rainfall, reflecting the accumulation of materials on land between storms. However, based on SCCWRP's evaluation of five years of Los Angeles county data, this was not the case for bacteria. The length of the preceding dry period had little effect on beach bacterial concentrations (*Ackerman and Weisberg 2003*). The most likely explanation is that bacteria are more labile than chemical constituents, with indicator organisms typically decaying within a few days.

SWRCB staff conducted a data review of 11 beaches in southern California over a three year period (2002 – 2004). The number of SSM exceedances was compared against the number of geometric mean (GM) exceedance for the three year period. This was done for both enterococcus and for fecal coliform data. The exceedances were used to determine if that beach would have been listed, using three different approaches. The first approach looked at the percentage of violations for each indicator at each beach over the three year period. If any

indicator was in exceedance 10 percent or more of the time, that beach was labeled as "listed." Beaches where indicators were in exceedance less than 10 percent of the time were labeled as "not listed." The second approach used Table 3.2 of the Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List, adopted September 2004 (SWRCB 2004b). The third approach looked at which data set (GM vs. SSM) resulted in the greatest percentage of exceedances.

For fecal coliform data: In all 11 cases the percent of SSM violations was greater than the percent GM violation. Using the fecal coliform 10 percent exceedance criteria for listing, there would be two more listings out of the 11 cases using the SSM values as opposed to using the GM values, an 18 percent increase. Applying the 303(d) listing policy criteria to the fecal coliform data would result in one additional listing out of the 11 cases, a 9 percent increase. For all three analytical approaches, using the SSM data would lead to more 303(d) listings.

For enterococcus: In seven of 11 cases, the percent of GM violations was greater than the percent SSM violation. Using the enterococcus 10 percent exceedance criteria for listing, there would be one more listing out of the 11 cases using the SSM values as opposed to using the GM values, a 9 percent increase. Applying the 303(d) listing policy criteria to the enterococcus data would result in one less listing out of the 11 cases using the SSM values as opposed to using the GM values, a 9 percent decrease. For two of the three analytical approaches, the GM data would lead to more 303(d) listings.

Based on these data, using geometric mean values may mask fecal coliform results, but this does not seem the case for enterococcus. As a follow-up, the San Diego RWQCB has submitted data supporting its use of the SSM for TMDLs developed for rain events. SWRCB staff will review these data and talk further with appropriate RWQCB staff and other interested parties.

Comment 7: The SWRCB should proceed with the original amendment which included SSM values as triggers for additional monitoring. (4, 5, 8, 9, 11)

Response: Comment noted.

Comment 8: The SWRCB should proceed with the original amendment which included SSM values as triggers for additional monitoring. However, the requirement for daily sampling until sample densities were below the SSM value would be an enormous staff, laboratory and cost burden. The amendment should be modified to allow for less than daily monitoring. (4)

Response: SWRCB staff agree that daily monitoring would be a burden on dischargers in cases where they are not the source of bacterial contamination. Additional wording has been included in the revised amendment which required additional monitoring within 24 hours of receiving analytical results. This will in effect require monitoring every 48 hours.

Comment 9: The SWRCB should specify that data from shore and inshore stations collected within 48 hours of a major storm event (often defined as >0.1 inches of rainfall in a 24 hour period) be omitted from calculations of geometric means. This is consistent with existing permit language. (9)

Response: SWRCB staff would like to defer addressing this request until the proposed bacterial standards have been in place for a triennial review cycle.

Comment 10: SWRCB staff should clarify whether the exceedance of a SSM collected within 48 hours of a major storm event would trigger additional monitoring. Also, to clarify the intent of the SWRCB, the wording "at least weekly" should be deleted. (9)

Response: All sample results are to be used in calculation the GM, including those collected within 48 hours of a major storm event. The wording "at least weekly" has been deleted.

Comment 11: The SSM standard should not be eliminated, as the preponderance of epidemiological evidence supports the single sample standard for fecal bacteria. SWRCB needs to determine the frequency of days that single sample standards are exceeded for compliance assurance and for water quality assessment purposes. (12,13)

Response: The SWRCB has retained the SSM standard in the revised language. However, staff disagree that the SWRCB needs to determine the frequency of SSM exceedances for water quality assessment purposes and believe that it is inappropriate to rely on these individual measurements to make assessment decisions. As stated in the commenter's letter, findings by SCCWRP, UC Irvine, and the commenter's organization, as well as Stanford University, have found that there is high variability of fecal indicator bacteria. In fact, recent research supports moving away from the use of the single sample results, even for determining beach postings and closures. In a 2002 study of southern California beaches, Dr. Alexandria Boehm of Stanford University states "Decisions to post or close a beach should not be based on the concentration of indicator bacteria in a single grab sample" (*Boehm, et al. 2002*). Dr. Stanley Grant and Dr. Joon Hakim of UC Irvine conducted an analysis of historical shoreline monitoring data from Huntington Beach. They determined that the use of the SSM values as a benchmark for determining beach closures is prone to error. In order to make more reliable decisions using SSM values, samples would have to be collected at least every 40 minutes. And even if posting decisions were revised every 10 minutes, as much as 30 percent of the signage would be in error (*Kim and Grant 2004*).

Comment 12: The 1986 enterococcus criteria are comprised of both a geometric mean criterion and a single sample criterion, and is designed to avoid erroneous conclusion of noncompliance. Contrary to SWRCB staff beliefs, the 2002 EPA guidance document does not recommend using the geometric mean in lieu of the SSM criterion. (12)

Response: SWRCB staff agree that the 1986 bacteria criteria document identify both the SSM and the GM as part of the criteria. However, based on wording in the Final Rule, the USEPA acknowledges that the SSM discussion in the 1986 document refers only to beach monitoring and does not discuss whether the SSM should be implemented for other CWA applications. The USEPA agrees that the SSM values in the criteria are best used for making beach notification and closure decisions (USEPA 2004b). In its Proposed Rule, the USEPA states that, in the original epidemiological studies that were used to determine bacterial criteria, the USEPA calculated the GM of the summer bacterial density and correlated this with the summer average

gastrointestinal illness rate. The USEPA then used this correlation as the basis of the GM criterion. The USEPA concludes "Thus, the geometric mean has the most direct relationship to the illness rate" (USEPA 2004a). In the Final Rule, the USEPA states that it expects states to determine how to use the SSM criteria in the context of their broader programs implementing the CWA (USEPA 2004b). SWRCB staff has worked with the USEPA's technical and legal staffs to develop the revised wording of this amendment.

Comment 13: In order to meet the BEACH Act requirements, the California Ocean Plan should clarify whether the water-contact beneficial use is equivalent to REC-1. The amendment should include both a geometric mean and a SSM standard to provide consistency with the criteria in the USEPA's Proposed Rule. Also, the relationship between the California Ocean Plan provisions related to water-contact bacterial standards and provisions of the State Health Code regulations adopted pursuant to AB 411 should be clarified. (7)

Response: This comment letter was received on September 17, 2004. The USEPA issued its Final Rule on November 16, 2004. SWRCB staff has worked with USEPA technical staff to develop language which is acceptable to technical and legal staffs, as well as management of both the USEPA and the SWRCB. The revised amendment reflects this language.

B. Comments on Choice of Indicator Organisms

Comment 14: The SWRCB should modify the requirement to monitor for total coliform outside of water-contact recreation areas, as most Basin Plans do not contain the level of specificity to make this determination of boundaries of water-contact recreation areas. To rectify this problem, the SWRCB should require the RWQCBs to designate subcategories of use, or at least clarify designations to indicate where water-contact recreation does and does not apply. (4)

Response: SWRCB staff agree that this is a reasonable request. However, because of the effort that staff estimates it will take to complete this clarification, this will be addressed in a future amendment.

Comment 15: The SWRCB should not retain total and fecal coliform as bacterial standards. Multiple indicators make it hard to interpret data, and are of limited public health benefit. (8, 11)

Response: SWRCB staff has retained total and fecal coliform standards to be consistent with AB 411 regulation monitoring requirements. Public health agencies often use data collected by dischargers to make their decisions on beach postings. Therefore, for areas designated for water-contact recreation, staff believe that the California Ocean Plan should require monitoring for the same indicator organisms as are in AB 411 regulations.

Comment 16: The proposed enterococcus standards are based on old research. The USEPA's criteria fail to consider non-human sources of contamination which may be present in the watershed. DNA testing is now able to identify sources of contamination; this information was not available when the USEPA developed their criteria. For these reasons, newer methods need to be assessed. In addition, exceedances what may be caused by natural fauna should not be considered a violation of a discharge permit. There is poor correlation between indicators and

pathogens. Unknowns include human health impacts of bacteria from non-human sources, methods and techniques for differentiating between bacteria sources, and the magnitude of day-to-day (and even hour-to-hour) variations in bacteria densities. This scientific uncertainty highlights problems with the continued use of bacteria indicators to protect human health. (5, 8)

Response: SWRCB staff agree that the USEPA's criteria are based on studies conducted in the 1970s. Since then, a number of epidemiological studies have been conducted, including the Santa Monica Bay study. Some of these more recent studies support the use of enterococcus, others do not. The Santa Monica Bay study found that 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, is associated with increased risk of adverse health effects. Enterococcus was associated with increased risk of at least one health outcome (diarrhea with blood) independent of the total to fecal ratio (Haile, et al. 1996). Even though this is a rare adverse health effect, it is one of the more severe effects looked for in the study. AB 411 regulations, which local environmental health officers use to make beach posting decisions, were based on these data.

The USEPA admits that its criteria do not take into account non-human sources contributing to high indicator density. This is because feces from nonhuman sources do have the potential to cause disease, and technology is not readily available to differentiate sources of bacteria. In spite of all the advances made with source identification technology, there is still not a reliable method that can be used routinely for identifying all sources of fecal bacteria. In 1999, the SWRCB funded a fecal source identification study in Morro Bay, using DNA analysis of *E. coli* bacteria. Working with the Central Coast RWQCB, California Polytechnical State University, and Dr. Mansour Samadpour of the University of Washington, Seattle, a total of 1,659 *E. coli* strains were isolated. Of these, 1,235 were identified and 424 were classified as unknown, meaning there were no matches for these strains in the library used for comparisons. SWRCB obtained a 74 percent match rate, which is a high percentage for this type of work. The study was very expensive and very labor intensive, not something that can be done as part of a routine monitoring program.

SWRCB staff agree that there are problems associated with the continued use of bacterial indicators to protect human health. However, at this time there is no practical way to routinely monitor for pathogens. And because there is overlap in the sampling done by local environmental health agencies and regulated dischargers, SWRCB has agreed with the DHS to keep our monitoring requirements the same as those in AB 411 regulations.

C. Comments on Shortcomings of Proposal

Comment 17: Management actions are retrospective and can only be deployed after human exposure to the hazard. (5)

Response: SWRCB staff also agree with this point. The SWRCB recently funded a study to assist in the development of a rapid analytical method that will give results in under seven hours. Also, SWRCB staff has recently proposed that we begin testing predictive models currently being used in the Great Lakes regions. These models use historic data as well as physical

conditions of the water to predict indicator organism levels and have had up to an 85 percent success rate. But we must keep in mind that the main benefit of using a rapid analytical test or a predictive model will be for making beach posting decisions.

Comment 18: There is a lack of guidance for the 1986 criteria and USEPA-approved test methods for wastewater. Because of the ongoing research on runoff bacteria loading and experience in runoff sampling and analysis, we would like to discuss these issues with SWRCB staff. Additionally, page 6 of the draft FED states: "The proposed California Ocean Plan amendments do not alter the State's existing regulatory framework for controlling storm water and nonpoint sources of discharge". Further, numeric effluent limits are infeasible for storm water and that the dischargers must implement best management practices in lieu of numeric limits. This discussion does not consider that numeric limits may be imposed as part of the future requirements for controlling discharges to ASBS. (5)

Response: SWRCB staff will arrange a meeting with the commenter to discuss these concerns.

Comment 19: **A**lternative analysis of beneficial uses should be allowed, enabling the bacterial standards to be applied in a manner that reflects public health realities. Options could include, seasonal recreational use, exceptions for high flow, and wildlife impacted recreation. (8)

Response: SWRCB staff think that these are very good suggestions and will address the suggestions as a future amendment.

Comment 20: The sanitary survey requirement provision should not be deleted. The SWRCB should include definitive criteria for a sanitary survey, and has been making this suggestion for over a decade. A sanitary survey should be implemented when the geometric mean standards are exceeded more than 75% of the time in a 60 day period.

Response: The sanitary survey provision was put back into the proposed amendment prior to the October workshop and is still in the amended language. SWRCB staff also acknowledge the request for a sanitary survey criteria to be included in the California Ocean Plan and will consider this request in the next amendment.

D. Comments on Economic Analysis

Comment 21: The draft FED analysis is incomplete and inadequate in several areas. The analysis of economic impacts of the proposed bacterial standards is deficient. In addition, CWC section 13241 is deficient; section (c) was not discussed. Evaluation of Water Code section 13242 is completely absent. (4, 8)

Response: The economic impacts discussion has been amended and CWC sections 13241 and 13242 discussions have been completed in this FFED.

Comment 22: Retaining coliform indicators and adding enterococcus will make it even more difficult to measure the real health benefits of the indicator standards. Any predicted health benefit must be discounted fairly by the significant uncertainties that benefits will be realized

even if the indicator levels are achieved. The discounted benefits must be weighted against the costs to society of achieving and maintaining compliance with these standards. Those costs include the investment in control technologies and the potentially adverse environmental consequences of such control technologies. (8)

Response: The SWRCB is not required to conduct cost-benefit analyses when adopting water quality objectives. Rather, it is required to evaluate the cost of compliance with the proposed objectives. The USEPA has determined that most dischargers will be able to comply with the enterococcus standard without needing any controls beyond those used for fecal coliforms. Additional costs incurred by dischargers will be related to monitoring costs, which the USEPA estimates to be $2,600 per year more than for monitoring for fecal coliforms (SAIC 2004). Since dischargers in California are already required by the California Ocean Plan to monitor for enterococcus, as well as fecal and total coliforms, monitoring costs should not change from current conditions.

SWRCB staff does not anticipate the need for control technologies beyond those already in place. As such, there are no identified potentially adverse environmental consequences of such control technologies.

V. Summary of Changes Resulting from Comments

The following proposed changes have been made since the August 2004 draft FED:

1. The SSM values have been retained as standards instead of only triggers for additional
2. The required sampling interval after a SSM has been exceeded has been changed from daily to within 24 hours after receiving the last sample results.
3. The sampling requirement has been changed from "at least weekly" to "weekly."
4. The discussions on CWC sections 13241 and 13242 and economic considerations have been completed in the FFED.

VI. Alternatives for Board Actions and Staff Recommendations

Alternative 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 Personnel Years (over a three-year period).

Alternative 2. Baseline Effort

a. add an enterococcus GM and single sample water-contact standard to the California Ocean Plan;
b. if any SSM standard is exceeded, repeat sampling at that location will be conducted within 24 hours of receiving analytical results and continued until the sample result is less than the SSM standard, or until a sanitary survey is conducted to determine the source;
c. it is State policy that the GM are strongly preferred for use in water body assessment decisions. The use of only the SSM value is generally inappropriate except under appropriate circumstances;
d. require monitoring for total coliform at offshore stations;
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 it 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 propose 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).

In the Final Rule, the USEPA notes that SSM discussion in the 1986 bacteria criteria document refers only to beach monitoring and does not discuss how or whether the SSM should be implemented for other CWA applications such as establishing TMDLs or NPDES permit limitations. The USEPA states that SSM values are best used for making beach notification and closure decisions. However, they may, but need not, play a role in implementing other CWA programs. The USEPA expects that states will determine how to use SSM values in the context of their programs implementing the CWA (USEPA 2004b).

Staff realize that 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, 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. SWRCB staff is proposing that exceedances in SSM standards be used as to a trigger for additional monitoring. This would allow for a more complete data set to use in making decisions on water quality.

V. Environmental Impact Analyses

Based on the Environmental Checklist (Appendix A), SWRCB staff conclude 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 objective is 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 is required (SWRCB 2001). The California Ocean Plan further requires that if there is an exceedance of the coliform objectives or an exceedance of a GM 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. Generally, SWRCB does not expect that NPDES dischargers will need to modify their existing treatment technologies in order to comply. For potential cases of non-compliance, SWRCB believes that process optimization would be a reasonable means of compliance. These compliance measures are not expected to adversely impact the environment. 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 13241 of the California Water Code (CWC)

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, may 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. Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area.

Permitted discharges are a part of the overall control strategy for maintaining water quality in the coastal environment. Each NPDES permit granted by the RWQCBs will independently consider the multitude of factors that affect the water quality in the discharge area. For example, discharges are prohibited in Areas of Special Biological Significance. Ocean discharges having NPDES permits with effluent limits that are derived using California Ocean Plan objectives will help to maintain or improve existing water quality. Other programs and policies also reduce bacterial and pathogen loading including storm water, nonpoint source, combined sewer overflow control, sanitary sewer overflow control, and TMDLs.

D. 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 (CCR, Title 17, section 7958), which went into effect in 1999.

The USEPA had an economic analysis prepared for its promulgation of the *E. coli* and enterococcus criteria for coastal zones, where states have not set standards (SAIC 2004). USEPA estimated that total annual costs for all coastal facilities (those with NPDES permits) to be $15,000,000. These facilities are located in Alabama, Alaska, California, Delaware, Florida, Georgia, Hawaii, Louisiana, Maine, Maryland, Massachusetts, Mississippi, New Jersey, New York, North Carolina, Oregon, Rhode Island, South Carolina, Texas, and Washington. Of the 75 sample facilities used in USEPA's analysis, nine of them are within California (Table 3): two major facilities with flows >120 million gallons per day (mgd), six major facilities with flows <120 mgd, and one minor facility.

With the exception of the Southeast Waste Water Treatment Plant, San Francisco, all of the sample facilities were determined to be able to be in compliance with the new standards and the only additional annual costs would be $2,600 for monitoring. The USEPA estimated that the Southeast WWTP would need to optimize its chlorination process for potential permit limits based on the proposed enterococcus objectives. This could result in capital costs of $4,190,000 and operation and maintenance costs of $852,000 (at an annual cost of $1,248,000) (SAIC 2004). Overall, the majority of facilities will only have additional monitoring costs, which most dischargers are already incurring due to current regulations.

E. The Need for Developing Housing within the Region.

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.

F. The Need to Develop and Use Recycled Water.

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

VII. Compliance with Section 13242 of the CWC

Section 13242 of the CWC requires that the program for implementation for achieving water quality goals include: (a) a description of the nature of actions which are necessary to achieve the objectives, including recommendations for appropriate action by any entity, public or private; (b) a time schedule for the actions to be taken; and (c) a description of surveillance to be undertaken to determine compliance with objectives.

The SWRCB believes that for most POTWs and similar dischargers no new treatment measures will be required to meet the objectives. For a few dischargers, process optimization may be required. Storm water discharges from Municipal Separate Storm Sewer Systems (MS4s) are covered under the Phase I and Phase II storm water rules. The measures contained in the rules address pathogens (and other pollutants) contained in storm water discharged to coastal waters. Adding a standard for enterococcus would not affect the controls needed for MS4s since the measures are designed to reduce all pollutants found in storm water. Additional controls beyond those required by the current storm water rules are not indicated (SAIC 2004). The same is true for controls required for combined sewer overflows (CSOs) and controls anticipated by the USEPA for sanitary sewer overflows (SSOs) (SAIC 2004).

The USEPA determined that changing the bacterial indicator from fecal coliform to enterococcus would not result in any additional waters listed as impaired by pathogens or in additional controls on sources to coastal recreation waters already listed as impaired by pathogens (SAIC 2004). SWRCB staff reviewed monitoring data from 11 southern California beaches over a three year period (2002-2004) for enterococcus and fecal coliform. Applying the criteria from the SWRCB's Section 303(d) listing policy (SWRCB 2004b), it was determined that six beaches would meet the criteria for being listed using the GM for enterococcus; five beaches using the SSM for enterococcus; no beaches would meet the criteria for the GM of fecal coliform; and only one beach using SSM for fecal coliform. Therefore, SWRCB staff conclude that adding enterococcus as a bacterial indicator will most likely result in additional Section 303(d) listings. However, this action is subsequent to the USEPA's promulgation of its Final Rule which already requires the use of enterococcus as a bacterial indicator for coastal waters. The TMDL program addresses impaired water bodies and will be the appropriate process to achieve water quality goals for any new listings due to the addition of enterococcus as a bacterial indicator.

The TMDL process includes the development of time schedules for implementation of the measures developed for the TMDL. Compliance schedule provisions are also contained in RWQCB Water Quality Control Plans (Basin Plans) that can be used to establish time schedules for any dischargers found not to be in compliance with water quality objectives.

The proposed change in the implementation section of the California Ocean Plan identifies the monitoring requirements for determining whether bacterial objectives are being met.

VIII. Proposed Ocean Plan Amendment

Presented below are the proposed changes to the 2001 California Ocean Plan that will result if the changes proposed are adopted.

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

B. Bacterial Characteristics

1. Water-Contact Standards

Both the SWRCB and the California Department of Health Services (DHS) have established standards to protect water contact recreation in coastal waters from bacterial contamination. Subsection a of this section contains bacterial objectives adopted by the SWRCB for ocean waters used for water contact recreation. Subsection b describes the bacteriological standards adopted by DHS for coastal waters adjacent to public beaches and public water contact sports areas in ocean waters.

a. SWRCB Water-Contact Standards

(1) 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 (i.e., waters designated as REC-1), 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.~~

30-day Geometric Mean - The following standards are based on the geometric mean of the five most recent samples from each site:

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.

Single Sample Maximum:

i. Total coliform density shall not exceed 10,000 per 100 ml;
ii. Fecal coliform density shall not exceed 400 per 100 ml;
iii. Enterococcus density shall not exceed 104 per 100 ml; and
iv. Total coliform density shall not exceed 1,000 per 100 ml when the fecal coliform/total coliform ratio exceeds 0.1.

~~b.~~ (2) 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 kelp plants on waste discharge structures (e.g., outfall pipes and diffusers) do not constitute kelp* beds for purposes of bacterial standards.

b. DHS Standards

DHS has established minimum protective bacteriological standards for coastal waters adjacent to public beaches and for public water-contact sports areas in ocean waters. These standards are found in the California Code of Regulations, title 17, section 7958, and they are identical to the objectives contained in subsection a. above. When a public beach or public water-contact sports area fails to meet these standards, DHS or the local public health officer may post with warning signs or otherwise restrict use of the public beach or public water-contact sports area until the standards are met. The DHS regulations impose more frequent monitoring and more stringent posting and closure requirements on certain high-use public beaches that are located adjacent to a storm drain that flows in the summer.

For beaches not covered under AB 411 regulations, DHS imposes the same standards as contained in Title 17 and requires weekly sampling but allows the county health officer more discretion in making posting and closure decisions.

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. Weekly samples shall be collected from each site. The geometric mean shall be calculated using the five most recent sample results.

b. If a single sample exceeds any of the single sample maximum *(SSM)* standards, repeat sampling at that location shall be conducted to determine the extent and persistence of the exceedance. Repeat sampling shall be conducted within 24 hours of receiving analytical results and continued until the sample result is less than the SSM standard 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. It is state policy that the geometric mean bacterial objectives are strongly preferred for use in water body assessment decisions, for example, in developing the Clean Water Act section 303(d) list of impaired waters, because the geometric mean objectives are a more reliable measure of long-term water body conditions. In making assessment decisions on bacterial quality, single sample maximum data must be considered together with any available geometric mean data. The use of only single sample maximum bacterial data is generally inappropriate unless there is a limited data set, the water is subject to short-term spikes in bacterial concentrations, or other circumstances justify the use of only single sample maximum data.

d. For monitoring stations outside of the defined water-contact recreation zone (REC-1), samples will be analyzed for total coliform only.

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

Table 3: California point source dischargers used by USEPA for its economic analysis.

Facility	NPDES #	Major/minor	Type	Design flow	Average flow
Point Loam WWTP	CA0107409	Major	Municipal	240 mgd	190 mgd
Southeast WWTP, San Francisco	CA0037664	Major	Municipal	150 mgd	104 mgd
Benicia WWTP	CA0038091	Major	Municipal	3 mgd	3.4 mgd
Burlingame WWTP	CA0037788	Major	Municipal	6 mgd	5.3 mgd
Monterey Regional WWTP	CA0048551	Major	Municipal	30 mgd	14.8 mgd
Pismo Beach WWTP	CA0048151	Major	Municipal	2 mgd	1.1 mgd
San Mateo WWTP	CA0037541	Major	Municipal	14 mgd	13 mgd
University of California, San Diego	CA0107239	Minor	Other	1 mgd	Not Available

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))

Implementation of the proposed bacterial standard 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 amendment 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 amendment 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 A) 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
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
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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
1. 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	☐	☐	☐	☑
iv) result in substantial erosion or siltation on-or off-site?	☐	☐	☐	☑

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
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?	☐	☐	☐	☑
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?	☐	☐	☐	☑

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
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?	☐	☐	☐	☑
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)?	☐	☐	☐	☑

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
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?	☐	☐	☐	☑
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)	☐	☐	☐	☑

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
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:

_____

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 B
List of Preparers

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

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