Compilation of the
CALIFORNIA OCEAN PLAN
1972 – 2001

2001	Water Quality Control Plan, Ocean Waters of California, California Ocean Plan. Adopted November 16, 2000 but not yet approved by USEPA.
1997	Water Quality Control Plan, Ocean Waters of California, California Ocean Plan. July 23, 1997.
1990	Water Quality Control Plan, Ocean Waters of California, California Ocean Plan. October 18, 1990 (Corrected Copy for Table B Radioactivity).
1988	Water Quality Control Plan, Ocean Waters of California, California Ocean Plan. September 22, 1988.
1983	Water Quality Control Plan, Ocean Waters of California, California Ocean Plan. November 17, 1983.
1978	Water Quality Control Plan, Ocean Waters of California. January 19, 1978.
1978	Water Quality Control Plan, Table B Guidelines. January 19, 1978 (reprinted August 1980).
1972	Water Quality Control Plan, Ocean Waters of California, July 6, 1972.

This document compiled February 2001.

WATER QUALITY CONTROL PLAN
OCEAN WATERS OF CALIFORNIA

CALIFORNIA OCEAN PLAN

The 2001 Ocean Plan incorporates amendments approved by the SWRCB at the November 16, 2000 Board Meeting. However, the 2001 Ocean Plan will not become effective until approved by the USEPA. Until such approval occurs, the 1997 Ocean Plan remains in effect.

2001

STATE WATER RESOURCES CONTROL BOARD
CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

STATE OF CALIFORNIA
Gray Davis, Governor

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
Winston H. Hickox, Secretary

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1/01

State of California

STATE WATER RESOURCES CONTROL BOARD

2001

CALIFORNIA OCEAN PLAN

WATER QUALITY CONTROL PLAN

OCEAN WATERS OF CALIFORNIA

Approved ______________

Note: The 2001 Ocean Plan incorporates amendments approved by the SWRCB at the November 16, 2000 Board Meeting. However, the 2001 Ocean Plan will not become effective until approved by the USEPA. Until such approval occurs, the 1997 Ocean Plan remains in effect.

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Web-site at http://www.swrcb.ca.gov .

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STATE WATER RESOURCES CONTROL BOARD
RESOLUTION NO. 2000-108

ADOPTION OF THE PROPOSED AMENDMENTS TO THE CALIFORNIA OCEAN PLAN
(OCEAN PLAN)

WHEREAS:

1. The Ocean Plan was adopted by the State Water Resources Control Board (SWRCB) in 1972 and amended in 1978, 1983, 1988, 1990, and 1997.
2. The SWRCB is responsible for reviewing Ocean Plan water quality standards and for modifying and adopting standards in accordance with Section 303(c)(1) of the federal Clean Water Act and Section 13170.2 of the California Water Code (CWC).
3. The SWRCB initiated a public review of the Ocean Plan in 1991, including a public hearing, and adopted a workplan in 1992 for considering issues identified by the comments received.
4. The SWRCB reviewed these issues and amended the Ocean Plan in 1997.
5. The SWRCB staff reviewed the high priority issues remaining from the 1992 Workplan, selected five issues for further analyses, and based upon this analysis proposed five additional amendments to the Ocean Plan.
6. The SWRCB staff has also identified a sixth issue consisting of minor administrative changes to the Ocean Plan to update terminology and references.
7. The proposed amendments are the following:

   Issue 1: Replacement of the acute toxicity effluent limitation in Table "A" with an acute toxicity water quality objective.

   Issue 2: Revision of chemical water quality objectives for protection of human health.

   Issue 3: Addition of provisions for compliance determination for chemical water quality objectives.

   Issue 4: Revisions of the format and organization of the Ocean Plan.

Issue 5: Development of special protection for water quality and designated uses specifying procedures for nomination and designation of special category waters.

Issue 6: Administrative changes to the Ocean Plan that include:

a. Defining governmental agencies referenced in the Ocean Plan,
b. Defining dredged materials,
c. Describing the relationship of the Ocean Plan to other State plans and policies,
d. Updating the reference for the radioactivity water quality objective,
e. Changing the test method references for total and fecal bacteria and for acute toxicity,
f. Changing a subtitle in Appendix II, and
g. Changing the Ocean Plan's effective date.

8. The SWRCB prepared and circulated a draft Functional Equivalent Document (FED) in accordance with the provisions of the California Environmental Quality Act and Title 14, California Code of Regulations 15251(g).

9. The SWRCB held three public hearings in Sacramento, Irvine, and Monterey in November and December of 1998. The SWRCB has carefully considered all testimony and comments received on this matter and has determined that the adoption of the proposed Ocean Plan amendments will not have a significant adverse effect on the environment.

10. The SWRCB staff has prepared a draft Final FED, Attachment A to this resolution, which includes the specific proposed amendments to the Ocean Plan and responses to the comments received at the hearings.

11. The SWRCB has considered relevant management agency agreements in accordance with CWC Section 13179.1.

12. Amendments to the Ocean Plan do not become effective until approved by the Office of Administrative Law and the U.S. Environmental Protection Agency.

THEREFORE BE IT RESOLVED THAT:

The SWRCB:

1. Approves the draft Final FED identified as Attachment A to the resolution, as revised at the November 16, 2000 Board Meeting.

2. Approves the proposed amendments to the Ocean Plan, as revised at the November 16, 2000 Board Meeting.

3. Agrees to reassess and modify as appropriate the Minimum Level values in Appendix II of the Ocean Plan during the triennial reviews to consider and reflect the availability and use of more sensitive analytical methods. Prior to adoption of new Minimum Levels, the SWRCB will consider environmental and economic effects.

4. Authorizes the SWRCB Executive Director to sign the Certificate of Fee Exemption identified as Attachment B to the resolution.

5. Authorizes the SWRCB staff to submit the amended Ocean Plan to the Office of Administrative Law and the U.S. Environmental Protection Agency for final approval.

CERTIFICATION

The undersigned, Administrative Assistant to the Board, does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the State Water Resources Control Board held on November 16, 2000.

Maureen Marché

Maureen Marché
Administrative Assistant to the Board

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CALIFORNIA OCEAN PLAN

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CALIFORNIA OCEAN PLAN

WATER QUALITY CONTROL PLAN FOR OCEAN WATERS OF CALIFORNIA

INTRODUCTION

A. Purpose and Authority

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

B. Principles

1. Harmony Among Water Quality Control Plans and Policies.

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

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

C. Applicability

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

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

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

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

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* See Appendix I for definition of terms.

I. BENEFICIAL USES

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

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* See Appendix I for definition of terms.

II. WATER QUALITY OBJECTIVES

A. General Provisions

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

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

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

B. Bacterial Characteristics

1. Water-Contact Standards

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

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

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

    b. The "Initial* Dilution Zone" of wastewater outfalls shall be excluded from designation as "kelp* beds" for purposes of bacterial standards, and Regional Boards should recommend extension of such exclusion zone where warranted to the SWRCB (for consideration under Chapter III.H.). Adventitious assemblages of kelp plants on waste discharge structures (e.g., outfall pipes and diffusers) do not constitute kelp* beds for purposes of bacterial standards.

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* See Appendix I for definition of terms.

2. Shellfish* Harvesting Standards

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

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

C. Physical Characteristics

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

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

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

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

D. Chemical Characteristics

1. The dissolved oxygen concentration shall not at any time be depressed more than 10 percent from that which occurs naturally, as the result of the discharge of oxygen demanding waste* materials.
2. The pH shall not be changed at any time more than 0.2 units from that which occurs naturally.
3. The dissolved sulfide concentration of waters in and near sediments shall not be significantly* increased above that present under natural conditions.
4. The concentration of substances set forth in Chapter II, Table B, in marine sediments shall not be increased to levels which would degrade* indigenous biota.
5. The concentration of organic materials in marine sediments shall not be increased to levels that would degrade* marine life.
6. Nutrient materials shall not cause objectionable aquatic growths or degrade* indigenous biota.
7. Numerical Water Quality Objectives
   a. Table B water quality objectives apply to all discharges within the jurisdiction of this Plan.
   b. Table B Water Quality Objectives

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* See Appendix I for definition of terms.

TABLE B
WATER QUALITY OBJECTIVES

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

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* See Appendix I for definition of terms.

Table B Continued

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

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* See Appendix I for definition of terms.

Table B Continued

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

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* See Appendix I for definition of terms.

Table B Notes:

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

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

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

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

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

E. Biological Characteristics

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

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

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

F. Radioactivity

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

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* See Appendix I for definition of terms.

III. PROGRAM OF IMPLEMENTATION

A. General Provisions

1. Effective Date

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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* See Appendix I for definition of terms.

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

3. Areas of Special Biological Significance

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

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

B. <u>Table A Effluent Limitations</u>

TABLE A
EFFLUENT LIMITATIONS

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

Table A Notes:

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

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

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

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* See Appendix I for definition of terms.

2. Table A effluent limitations shall apply to a discharger's total effluent, of whatever origin (i.e., gross, not net, discharge), except where otherwise specified in this Plan.
3. The SWRCB is authorized to administer and enforce effluent limitations established pursuant to the Federal Clean Water Act. Effluent limitations established under Sections 301, 302, 306, 307, 316, 403, and 405 of the aforementioned Federal Act and administrative procedures pertaining thereto are included in this plan by reference. Compliance with Table A effluent limitations, or Environmental Protection Agency Effluent Limitations Guidelines for industrial discharges, based on Best Practicable Control Technology, shall be the minimum level of treatment acceptable under this plan, and shall define reasonable treatment and waste control technology.

C. Implementation Provisions for Table B

1. Effluent concentrations calculated from Table B water quality objectives shall apply to a discharger's total effluent, of whatever origin (i.e., gross, not net, discharge), except where otherwise specified in this Plan.
2. Effluent limitations shall be imposed in a manner prescribed by the SWRCB such that the concentrations set forth below as water quality objectives shall not be exceeded in the receiving water upon completion of initial* dilution, except that objectives indicated for radioactivity shall apply directly to the undiluted waste* effluent.
3. Calculation of Effluent Limitations
    a. Effluent limitations for water quality objectives listed in Table B, with the exception of acute* toxicity and radioactivity, shall be determined through the use of the following equation:

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

where:

Ce = the effluent concentration limit, ug/l

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

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

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

TABLE C
BACKGROUND SEAWATER CONCENTRATIONS (Cs)

Waste Constituent	Cs (ug/l)
Arsenic	3.
Copper	2.
Mercury	0.0005
Silver	0.16
Zinc	8.

For all other Table B parameters, Cs = 0.

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* See Appendix I for definition of terms.

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

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

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

where:

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

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

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

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

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

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

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

d. For the purpose of this Plan, minimum initial* dilution is the lowest average initial* dilution within any single month of the year. Dilution estimates shall be based on observed waste flow characteristics, observed receiving water density structure, and the assumption that no currents, of sufficient strength to influence the initial* dilution process, flow across the discharge structure.

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

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* See Appendix I for definition of terms.

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

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

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

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

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

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

where:

Ce = the effluent concentration limit, ug/l

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

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

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

4. Minimum* Levels

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

a. Selection of Minimum* Levels from Appendix II

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

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* See Appendix I for definition of terms.

b. Deviations from Minimum* Levels in Appendix II

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

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

5. Use of Minimum* Levels

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

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

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

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

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

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* See Appendix I for definition of terms.

6. Sample Reporting Protocols

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

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

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

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

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

7. Compliance Determination

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

   a. Compliance with Single-Constituent Effluent Limitations

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

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

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

   c. Multiple Sample Data Reduction

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

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* See Appendix I for definition of terms.

d. Powerplants and Heat Exchange Dischargers

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

8. Pollutant Minimization Program

a. Pollutant Minimization Program Goal

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

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

b. Determining the need for a Pollutant Minimization Program

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

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

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

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

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

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

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

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

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* See Appendix I for definition of terms.

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

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

d. Elements of a Pollutant Minimization Program

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

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

9. Toxicity Reduction Requirements

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

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* See Appendix I for definition of terms.

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

D. Implementation Provisions for Bacterial Assessment and Remedial Action Requirements

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

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

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

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

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

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

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* See Appendix I for definition of terms.

F. Revision of Waste* Discharge Requirements

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

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

3. Regional Boards may impose alternative less restrictive provisions than those contained within Table B of the Plan, provided an applicant can demonstrate that:
   - a. Reasonable control technologies (including source control, material substitution, treatment and dispersion) will not provide for complete compliance; or
   - b. Any less stringent provisions would encourage water* reclamation;

4. Provided further that:
   - a. Any alternative water quality objectives shall be below the conservative estimate of chronic* toxicity, as given in Table D, and such alternative will provide for adequate protection of the marine environment;
   - b. A receiving water quality toxicity objective of 1 TUc is not exceeded; and
   - c. The State Board grants an exception (Chapter III. I.) to the Table B limits as established in the Regional Board findings and alternative limits.

TABLE D
CONSERVATIVE ESTIMATES OF CHRONIC TOXICITY

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

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* See Appendix I for definition of terms.

Table D Notes:

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

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

G. Monitoring Program

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

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

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

H. Discharge Prohibitions

1. Hazardous Substances

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

2. Areas Designated for Special Water Quality Protection

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

3. Sludge

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

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* See Appendix I for definition of terms.

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

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

4. <u>By-Passing</u>

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

I. State Board Exceptions to Plan Requirements

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

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

   b. The public interest will be served.

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* See Appendix I for definition of terms.

APPENDIX I

DEFINITION OF TERMS

ACUTE TOXICITY

a. Acute Toxicity (TUa)

Expressed in Toxic Units Acute (TUa)

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

b. Lethal Concentration 50% (LC 50)

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

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

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

where:

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

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

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

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

a. Chronic Toxicity (TUc)

Expressed as Toxic Units Chronic (TUc)

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

b. No Observed Effect Level (NOEL)

The NOEL is expressed as the maximum percent effluent or receiving water that causes no observable effect on a test organism, as determined by the result of a critical life stage toxicity test listed in Appendix II.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

APPENDIX II

MINIMUM* LEVELS

The Minimum* Levels identified in this appendix represent the lowest concentration of a pollutant that can be quantitatively measured in a sample given the current state of performance in analytical chemistry methods in California. These Minimum* Levels were derived from data provided by state-certified analytical laboratories in 1997 and 1998 for pollutants regulated by the California Ocean Plan and shall be used until new values are adopted by the SWRCB. There are four major chemical groupings: volatile chemicals, semi-volatile chemicals, inorganics, pesticides & PCB's. "No Data" is indicated by "--".

TABLE II-1
MINIMUM* LEVELS – VOLATILE CHEMICALS

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

Table II-1 Notes

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

TABLE II-2
MINIMUM* LEVELS – SEMI VOLATILE CHEMICALS

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

Table II-2 continued on next page...

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

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

Table II-2 Notes:

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

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

TABLE II-3
MINIMUM* LEVELS - INORGANICS

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

Table II-3 Notes

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

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

TABLE II-4
MINIMUM* LEVELS – PESTICIDES AND PCBs

Pesticides – PCB's	CAS Number	Minimum* Level (ug/L) GC Method^{a,*}
Aldrin	309002	0.005
Chlordane	57749	0.1
4,4'-DDD	72548	0.05
4,4'-DDE	72559	0.05
4,4'-DDT	50293	0.01
Dieldrin	60571	0.01
a-Endosulfan	959988	0.02
b-Endosulfan	33213659	0.01
Endosulfan Sulfate	1031078	0.05
Endrin	72208	0.01
Heptachlor	76448	0.01
Heptachlor Epoxide	1024573	0.01
a-Hexachlorocyclohexane	319846	0.01
b-Hexachlorocyclohexane	319857	0.005
d-Hexachlorocyclohexane	319868	0.005
g-Hexachlorocyclohexane (Lindane)	58899	0.02
PCB 1016	--	0.5
PCB 1221	--	0.5
PCB 1232	--	0.5
PCB 1242	--	0.5
PCB 1248	--	0.5
PCB 1254	--	0.5
PCB 1260	--	0.5
Toxaphene	8001352	0.5

Table II-4 Notes

a) GC Method = Gas Chromatography

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

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APPENDIX III

STANDARD MONITORING PROCEDURES

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

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

Ocean Plan Chapter II. B. Bacterial Standards:

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

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

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

Ocean Plan Chapter II. H Table B. Compliance with Table B Objectives:

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

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

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

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

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

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

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

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

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

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

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

Table III-1 Notes

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

Protocol References

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

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

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

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

APPENDIX IV

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

APPENDIX V

AREAS* OF SPECIAL BIOLOGICAL SIGNIFICANCE

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

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

Table V-1 Continued on next page...

Table V-1 (Continued)

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

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

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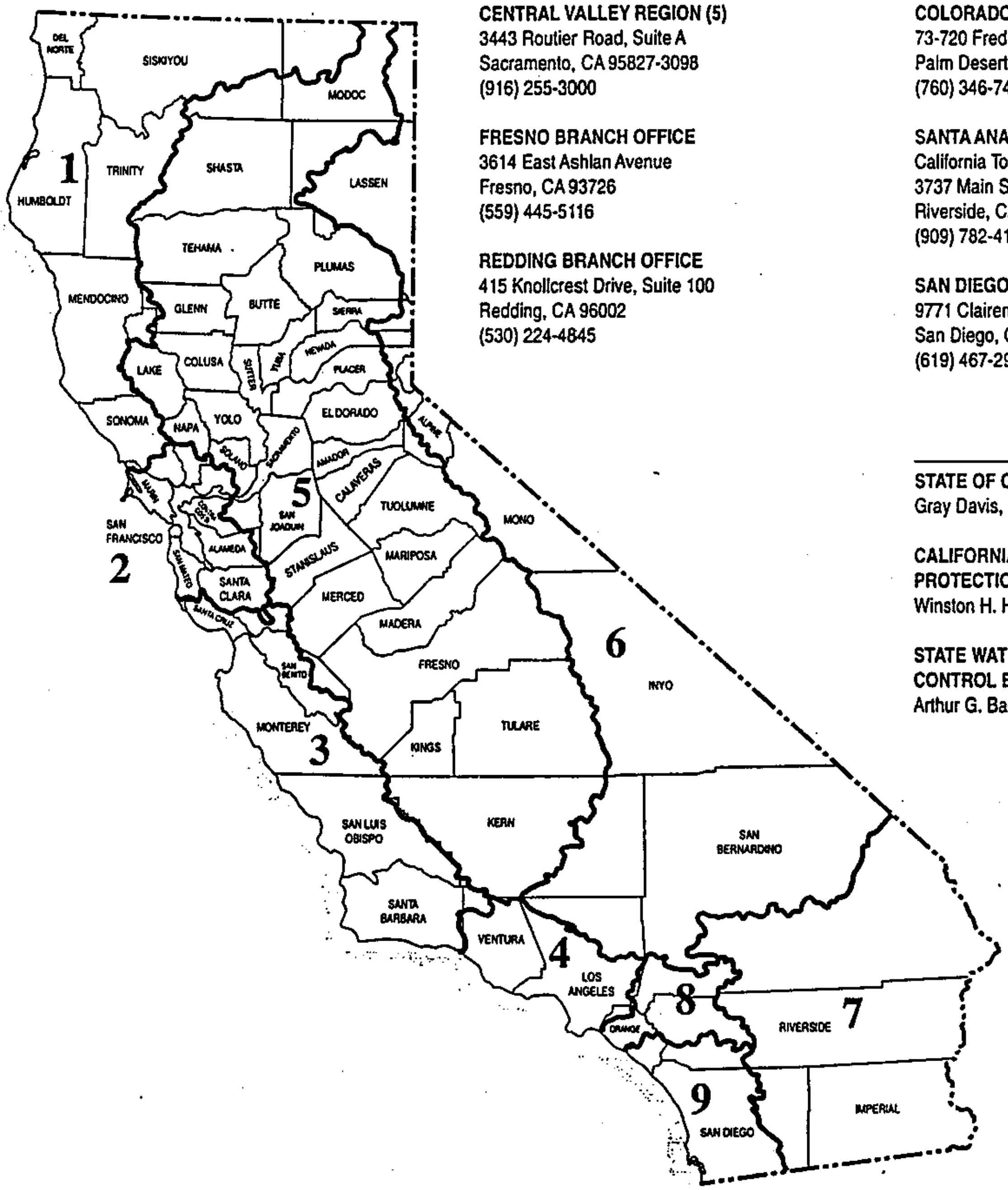


11/00

STATE OF CALIFORNIA
Gray Davis, Governor

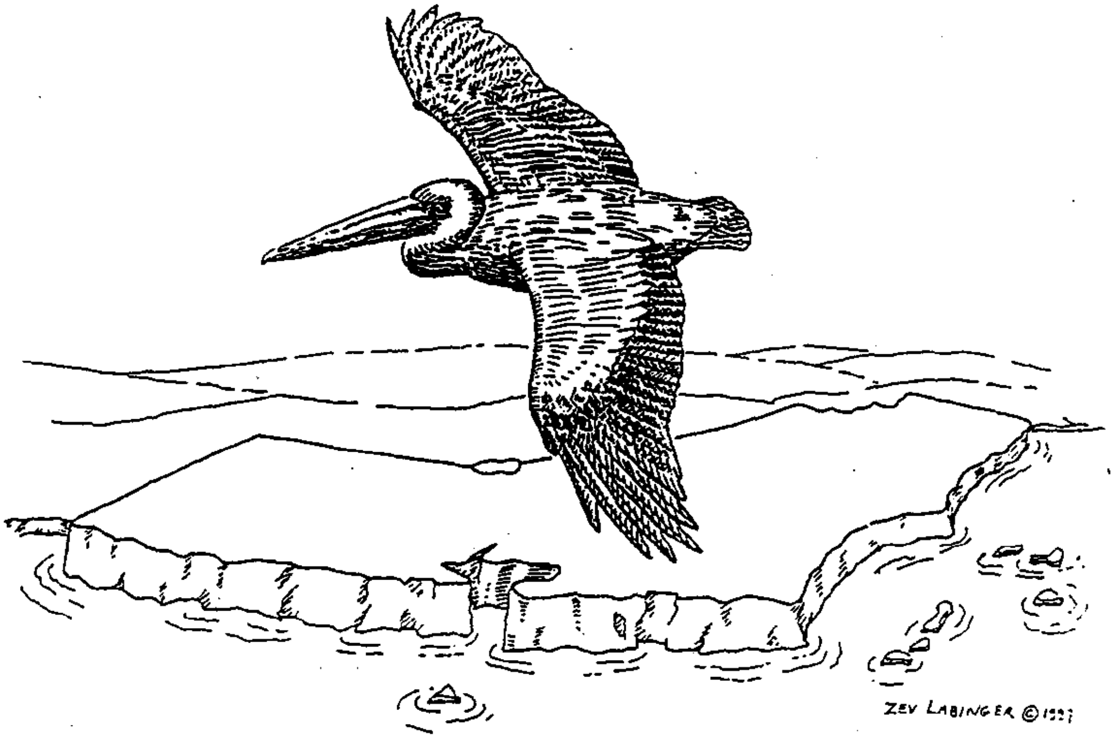
CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
Winston H. Hickox, Secretary

STATE WATER RESOURCES CONTROL BOARD
Arthur G. Baggett, Jr., Acting Chair

WATER QUALITY CONTROL PLAN

OCEAN WATERS OF CALIFORNIA

CALIFORNIA OCEAN PLAN



1997

STATE WATER RESOURCES CONTROL BOARD
CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

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California Environmental Protection Agency
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State of California

STATE WATER RESOURCES CONTROL BOARD

1997

CALIFORNIA OCEAN PLAN

WATER QUALITY CONTROL PLAN

OCEAN WATERS OF CALIFORNIA

Effective July 23, 1997

STATE WATER RESOURCES CONTROL BOARD
RESOLUTION NO. 97-026

ADOPTION OF AN AMENDMENT TO THE WATER QUALITY CONTROL PLAN FOR OCEAN WATERS OF CALIFORNIA

WHEREAS:

1. The Water Quality Control Plan for Ocean Waters of California (Ocean Plan) was adopted by the State Water Resources Control Board (SWRCB) in 1972 and amended in 1978, 1983, 1988 and 1990.

2. The SWRCB is responsible for reviewing Ocean Plan water quality standards and for modifying and adopting standards in accordance with Section 303(c)(1) of the Federal Clean Water Act and Section 13170.2 of the California Water Code (CWC).

3. The SWRCB initiated a public review of the Ocean Plan in 1991, including a public hearing, and adopted a workplan in 1992 for considering issues identified in the comments received.

4. The SWRCB staff reviewed the higher priority issues, selected several for analysis in accordance with the workplan, and is now proposing amendments to the Ocean Plan based on two of these selected issues.

5. The proposed amendments consist of:

   a. Revision of the current Ocean Plan list of critical life stage protocols used in testing the toxicity of waste discharges.

   b. Minor changes in terminology to make the Ocean Plan easier to understand and implement.

6. The SWRCB prepared and circulated a draft Functional Equivalent Document in accordance with provisions of the California Environmental Quality Act and Title 14, California Code of Regulations 15251(g).

7. The SWRCB held a public hearing in Sacramento, California on August 23, 1995 and has carefully considered all testimony and comments received on this matter and has determined that the adoption of the proposed Ocean Plan amendments will not have a significant adverse effect on the environment.

8. The SWRCB staff has prepared a final draft of the Functional Equivalent Document, Attachment "A" to this resolution, which includes the specific proposed amendments to the Ocean Plan, responses to the comments received, and a progress report on the other issues identified in the 1992 workplan.

9. The SWRCB has considered relevant management agency agreements in accordance with CWC Section 13170.1.

10. The SWRCB consulted with the Department of Fish and Game (DFG) on the potential impacts of the amendments on fish and wildlife resources, including threatened or endangered species. The DFG found that the proposed amendments will not jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of habitat essential to the continued existence of such species.

11. Amendments to SWRCB Water Quality Control Plans do not become effective until regulatory provisions are approved by the Office of Administrative Law (OAL).

THEREFORE BE IT RESOLVED THAT:
The SWRCB:

1. Approves the proposed amendments to the Ocean Plan, as described in Attachment "A", which will:

   a. Revise the current Ocean Plan list of critical life stage protocols used in testing the toxicity of waste discharges.

   b. Make minor changes in terminology to make the Ocean Plan easier to understand and implement.

2. Approves the draft final Functional Equivalent Document, identified as Attachment "A" to this resolution, which includes the responses to comments received and a progress report on other issues related to the Ocean Plan.

3. Agrees that within three years after DFG notifies the SWRCB that specific water bodies support threatened or endangered species and that scientific evidence indicates that certain existing water quality objectives for these water bodies do not adequately protect such species, the SWRCB shall determine whether these objectives are adequately protective. In cases where such existing objectives do not provide adequate protection for threatened and endangered species, the SWRCB shall develop and adopt adequately protective site-specific objectives for these constituents.

4. Authorizes the SWRCB Executive Director to sign the Certificate of Fee Exemption identified as Attachment "B" to this resolution.

5. Authorizes the SWRCB staff to submit the approved amended Ocean Plan to the U.S. Environmental Protection Agency and the OAL for their approval.

CERTIFICATION

The undersigned, Administrative Assistant to the Board, does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the State Water Resources Control Board held on March 20, 1997.

Maureen Marché

Maureen Marché
Administrative Assistant to the Board

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CALIFORNIA OCEAN PLAN

WATER QUALITY CONTROL PLAN FOR OCEAN WATERS OF CALIFORNIA

INTRODUCTION

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

This plan is applicable, in its entirety, to point source discharges to the ocean*. Nonpoint sources of waste* discharges to the ocean* are subject to Chapter I - Beneficial Uses, Chapter II - Water Quality Objectives, Chapter III -General Requirements, Chapter IV - Table B (wherein compliance with water quality objectives shall, in all cases, be determined by direct measurements in the receiving waters) and Chapter V - Discharge Prohibitions.

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

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

Chapter I

BENEFICIAL USES

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

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* See Appendix I for definition of terms.

Chapter II
WATER QUALITY OBJECTIVES

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

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

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

A. Bacterial Characteristics

1. Water-Contact Standards

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

a. 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).

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

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 VI.F.). 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.

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* See Appendix I for definition of terms.

2. Shellfish* Harvesting Standards

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

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

B. Bacterial Assessment and Remedial Action Requirements

The requirements listed below shall be used to 1) determine the occurrence and extent of any impairment of a beneficial use due to bacterial contamination; 2) generate information which can be used in the development of an enterococcus standard; and 3) provide the basis for remedial actions necessary to minimize or eliminate any impairment of a beneficial use.

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 Section II.A.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.

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.

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* See Appendix I for definition of terms

C. Physical Characteristics

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

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

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

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

D. Chemical Characteristics

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

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

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

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

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

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

E. Biological Characteristics

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

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

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

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* See Appendix I for definition of terms.

F. Radioactivity

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

Chapter III
GENERAL REQUIREMENTS FOR MANAGEMENT OF WASTE* DISCHARGE TO THE OCEAN*

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

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

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

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

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

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

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

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

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

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

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

3. Maximum protection is provided to the marine environment.

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

Chapter IV

QUALITY REQUIREMENTS FOR WASTE* DISCHARGES (EFFLUENT LIMITATIONS)

This chapter sets forth the quality requirements for waste* discharge to the ocean*.

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

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

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

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

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* See Appendix I for definition of terms.

TABLE A
EFFLUENT LIMITATIONS

	Unit of Measurement	Limiting Concentrations Monthly (30-day Average)	Weekly (7-day Average)	Maximum at any time
Grease and Oil	mg/l	25	40	75
Suspended Solids			see below+	
Settleable Solids	ml/l	1.0	1.5	3.0
Turbidity	NTU	75	100	225
pH	units		within limits of 6.0 to 9.0 at all times	
Acute* Toxicity	TUa	1.5	2.0	2.5

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

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

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

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* See Appendix I for definition of terms.

TABLE B
WATER QUALITY OBJECTIVES

	Units of Measurement	Limiting Concentrations 6-Month Median	Daily Maximum	Instantaneous Maximum
OBJECTIVES FOR PROTECTION OF MARINE AQUATIC LIFE				
Arsenic	µg/l	8	32	80
Cadmium	µg/l	1	4	10
Chromium (Hexavalent) (see below, a)	µg/l	2	8	20
Copper	µg/l	3	12	30
Lead	µg/l	2	8	20
Mercury	µg/l	0.04	0.16	0.4
Nickel	µg/l	5	20	50
Selenium	µg/l	15	60	150
Silver	µg/l	0.7	2.8	7
Zinc	µg/l	20	80	200
Cyanide (see below, b)	µg/l	1	4	10
Total Chlorine Residual (For intermittent chlorine sources, see below, c)	µg/l	2	8	60
Ammonia (expressed as nitrogen)	µg/l	600	2400	6000
Chronic* Toxicity	TUc		1	
Phenolic Compounds (non-chlorinated)	µg/l	30	120	300
Chlorinated Phenolics	µg/l	1	4	10
Endosulfan	µg/l	0.009	0.018	0.027
Endrin	µg/l	0.002	0.004	0.006
HCH*	µg/l	0.004	0.008	0.012
Radioactivity				

Not to exceed limits specified in Title 17, Division 1, Chapter 5, Subchapter 4, Group 3, Article 3, Section 30269 of the California Code of Regulations.

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* See Appendix I for definition of terms.

Table B Continued

	30-day Average (µg/l)	
Chemical	Decimal Notation	Scientific Notation
OBJECTIVES FOR PROTECTION OF HUMAN HEALTH -- NONCARCINOGENS		
acrolein	220	2.2 x 10^{2}
antimony	1,200	1.2 x 10^{3}
bis(2-chloroethoxy) methane	4.4	4.4 x 10^{0}
bis(2-chloroisopropyl) ether	1,200	1.2 x 10^{3}
chlorobenzene	570	5.7 x 10^{2}
chromium (III)	190,000	1.9 x 10^{5}
di-n-butyl phthalate	3,500	3.5 x 10^{3}
dichlorobenzenes*	5,100	5.1 x 10^{3}
1,1-dichloroethylene	7,100	7.1 x 10^{3}
diethyl phthalate	33,000	3.3 x 10^{4}
dimethyl phthalate	820,000	8.2 x 10^{5}
4,6-dinitro-2-methylphenol	220	2.2 x 10^{2}
2,4-dinitrophenol	4.0	4.0 x 10^{0}
ethylbenzene	4,100	4.1 x 10^{3}
fluoranthene	15	1.5 x 10^{1}
hexachlorocyclopentadiene	58	5.8 x 10^{1}
isophorone	150,000	1.5 x 10^{5}
nitrobenzene	4.9	4.9 x 10^{0}
thallium	14	1.4 x 10^{1}
toluene	85,000	8.5 x 10^{4}
1,1,2,2-tetrachloroethane	1,200	1.2 x 10^{3}
tributyltin	0.0014	1.4 x 10^{-3}
1,1,1-trichloroethane	540,000	5.4 x 10^{5}
1,1,2-trichloroethane	43,000	4.3 x 10^{4}
OBJECTIVES FOR PROTECTION OF HUMAN HEALTH -- CARCINOGENS		
acrylonitrile	0.10	1.0 x 10^{-1}
aldrin	0.000022	2.2 x 10^{-5}
benzene	5.9	5.9 x 10^{0}
benzidine	0.000069	6.9 x 10^{-5}
beryllium	0.033	3.3 x 10^{-2}
bis(2-chloroethyl) ether	0.045	4.5 x 10^{-2}
bis(2-ethylhexyl) phthalate	3.5	3.5 x 10^{0}
carbon tetrachloride	0.90	9.0 x 10^{-1}
chlordane*	0.000023	2.3 x 10^{-5}
chloroform	130	1.3 x 10^{2}
DDT*	0.00017	1.7 x 10^{-4}
1,4-dichlorobenzene	18	1.8 x 10^{1}
3,3'-dichlorobenzidine	0.0081	8.1 x 10^{-3}

Table B Continued

Chemical	30-day Average (μg/l) Decimal Notation	Scientific Notation
1,2-dichloroethane	130	1.3×10^2
dichloromethane	450	4.5×10^2
1,3-dichloropropene	8.9	8.9×10^0
dieldrin	0.00004	4.0×10^{-5}
2,4-dinitrotoluene	2.6	2.6×10^0
1,2-diphenylhydrazine	0.16	1.6×10^{-1}
halomethanes*	130	1.3×10^2
heptachlor*	0.00072	7.2×10^{-4}
hexachlorobenzene	0.00021	2.1×10^{-4}
hexachlorobutadiene	14	1.4×10^1
hexachloroethane	2.5	2.5×10^0
N-nitrosodimethylamine	7.3	7.3×10^0
N-nitrosodiphenylamine	2.5	2.5×10^0
PAHs*	0.0088	8.8×10^{-3}
PCBs*	0.000019	1.9×10^{-5}
TCDD equivalents*	0.0000000039	3.9×10^{-9}
tetrachloroethylene	99	9.9×10^1
toxaphene	0.00021	2.1×10^{-4}
trichloroethylene	27	2.7×10^1
2,4,6-trichlorophenol	0.29	2.9×10^{-1}
vinyl chloride	36	3.6×10^1

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

b) If a discharger can demonstrate to the satisfaction of the Regional Board (subject to EPA approval) that an analytical method is available to reliably distinguish between strongly and weakly complexed cyanide, effluent limitations for cyanide may be met by the combined measurement of free cyanide, simple alkali metal cyanides, and weakly complexed organometallic cyanide complexes. In order for the analytical method to be acceptable, the recovery of free cyanide from metal complexes must be comparable to that achieved by Standard Methods 412F, G, and H (Standard Methods for the Examination of Water and Wastewater. Joint Editorial Board, American Public Health Association, American Water Works Association, and Water Pollution Control Federation. Most recent edition.).

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

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

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

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* See Appendix I for definition of terms.

Implementation Provisions for Table B

A. Calculation of Effluent Limitations

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

$$Ce = Co + Dm (Co - Cs) \quad (1)$$

where:

Ce = the effluent concentration limit,
Co = the concentration (water quality objective) to be met at the completion of initial* dilution,
Cs = background seawater concentration (see Table C below),
Dm = minimum probable initial* dilution expressed as parts seawater per part wastewater.

For the purpose of this Plan, minimum initial dilution is the lowest average initial dilution within any single month of the year. Dilution estimates shall be based on observed waste flow characteristics, observed receiving water density structure, and the assumption that no currents, of sufficient strength to influence the initial dilution process, flow across the discharge structure.

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

TABLE C
BACKGROUND SEAWATER CONCENTRATIONS (Cs)

Waste Constituent	Cs (μg/l)
Arsenic	3
Copper	2
Mercury	0.0005
Silver	0.16
Zinc	8

For all other Table B parameters, Cs = 0.

The six-month median shall apply as a moving median of daily values for any 180 day period in which daily values represent flow weighted average concentrations within a

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* See Appendix I for definition of terms

24-hour period. For intermittent discharges, the daily value shall be considered to equal zero for days on which no discharge occurred.

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

The instantaneous maximum shall apply to grab sample determinations.

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

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

lbs/day = 8.34 x Ce x Q (2)

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

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

B. Compliance Determination

All analytical data shall be reported uncensored with detection limits and quantitation limits identified. For any effluent limitation, compliance shall be determined using appropriate statistical methods to evaluate multiple samples. Compliance based on a single sample analysis should be determined where appropriate as described below.

When a calculated effluent limitation is greater than or equal to the PQL*, compliance shall be determined based on the calculated effluent limitation and either single or multiple sample analyses.

When the calculated effluent limitation is below the PQL*, compliance determinations based on analysis of a single sample shall only be undertaken if the concentration of the constituent of concern in the sample is greater than or equal to the PQL*.

When the calculated effluent limitation is below the PQL*, and recurrent analytical responses between the PQL* and the calculated limit occur, compliance shall be determined by statistical analysis of multiple samples. Sufficient sampling and analysis shall be required to determine compliance.

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* See Appendix I for definition of terms.

Published values for MDL*s and PQL*s should be used except where revised MDL*s and PQL*s are available from recent laboratory performance evaluations, in which case the revised MDL*s and PQL*s should be used. Where published values are not available the Regional Boards should determine appropriate values based on available information.

If a discharger believes the sample matrix under consideration in the waste discharge requirements is sufficiently different from that used for an established MDL* value, the discharger may demonstrate to the satisfaction of the Regional Board what the appropriate MDL* should be for the discharger's matrix. In this case the PQL* shall be established at the limit of quantitation (equal to 10 standard deviations above the average measured blank used for development of the MDL* in the discharger's matrix).

When determining compliance based on a single sample, with a single effluent limitation which applies to a group of chemicals (e.g., PCBs) concentrations of individual members of the group may be considered to be zero if the analytical response for individual chemicals falls below the MDL* for that parameter.

Due to the large total volume of powerplant and other heat exchange discharges, special procedures must be applied for determining compliance with Table B objectives on a routine basis. Effluent concentration values (Ce) shall be determined through the use of equation 1 considering the minimal probable initial* dilution of the combined effluent (in-plant waste streams plus cooling water flow). These concentration values shall then be converted to mass emission limitations as indicated in equation 2. The mass emission limits will then serve as requirements applied to all inplant waste* streams taken together which discharge into the cooling water flow, except that limits for total chlorine residual, chronic* toxicity and instantaneous maximum concentrations in Table B shall apply to, and be measured in, the combined final effluent, as adjusted for dilution with ocean water. The Table B objective for radioactivity shall apply to the undiluted combined final effluent.

C. Toxicity Reduction Requirements

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

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

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Chapter V
DISCHARGE PROHIBITIONS

A. Hazardous Substances

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

B. Areas of Special Biological Significance

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

C. Sludge

Pipeline discharge of sludge to the ocean* is prohibited by federal law; the discharge of municipal and industrial waste* sludge directly to the ocean*, or into a waste* stream that discharges to the ocean*, is prohibited by this Plan. The discharge of sludge digester supernatant directly to the ocean*, or to a waste* stream that discharges to the ocean* without further treatment, is prohibited.

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

D. By-Passing

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

Chapter VI
GENERAL PROVISIONS

A. Effective Date

This Plan is in effect as of the date of approval by the Office of Administrative Law (OAL).

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* See Appendix I for definition of terms.

B. Waste Discharge Requirements

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

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

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

Any less stringent provisions would encourage water* reclamation;

Provided further that:

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

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

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

TABLE D
CONSERVATIVE ESTIMATES OF CHRONIC TOXICITY

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

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* See Appendix I for definition of terms.

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

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

C. Revision of Waste* Discharge Requirements

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

D. Monitoring Program

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

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

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

E. Areas of Special Biological Significance

Areas of special biological significance shall be designated by the SWRCB after a public hearing by the Regional Board and review of its recommendations.

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* See Appendix I for definition of terms.

F. State Board Exceptions to Plan Requirements

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

1. The exception will not compromise protection of ocean* waters for beneficial uses, and
2. The public interest will be served.

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* See Appendix I for definition of terms

APPENDIX I

DEFINITION OF TERMS

ACUTE TOXICITY

a. Acute Toxicity (TUa)

Expressed in Toxic Units Acute (TUa)

TUa = 100/96-hr LC 50%

b. Lethal Concentration 50% (LC 50)

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

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

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

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

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

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

a. Chronic Toxicity (TUc)

Expressed as Toxic Units Chronic (TUc)

TUc = 100/NOEL

b. No Observed Effect Level (NOEL)

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* See Appendix I for definition of terms.

The NOEL is expressed as the maximum percent effluent or receiving water that causes no observable effect on a test organism, as determined by the result of a critical life stage toxicity test listed in Appendix II.

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

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

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

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

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

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

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

HEPTACHLOR shall mean the sum of heptachlor and heptachlor epoxide.

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

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

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

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

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

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

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

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

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

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

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* See Appendix I for definition.of terms.

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

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

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

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

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

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

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

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

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* See Appendix I for definition of terms

APPENDIX II

STANDARD MONITORING PROCEDURES

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

The appendix is organized in the same manner as the Ocean Plan.

Chapter II. A. Bacterial Standards:

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

Detection methods used for coliforms (total and fecal) shall be those presented in the most recent edition of Standard Methods for the Examination of Water and Wastewater or any improved method determined by the Regional Board (and approved by EPA) to be appropriate.

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

Chapter IV. Table B. Compliance with Table B Objectives:

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

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

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* See Appendix I for definition of terms.

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

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

Chapter IV. Compliance with Toxicity Limitations and Objectives:

Compliance with the acute toxicity limitation (TUa) in Table A shall be determined using an established protocol, e.g., American Society for Testing Materials (ASTM), EPA, American Public Health Association, or State Board.

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

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

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* See Appendix I for definition of terms

The following tests shall be used to measure TUc. Other tests may be added to the list when approved by the State Board.

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

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

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* See Appendix I for definition of terms.

Protocol References

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

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

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

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

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* See Appendix I for definition of terms

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STATE OF CALIFORNIA
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CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
Peter M. Rooney, Secretary

STATE WATER RESOURCES CONTROL BOARD
John P. Caffrey, Chair

* Will change area code 6/13/98 to 323
** Will be moving around August 98

4'98

WATER QUALITY CONTROL PLAN

OCEAN WATERS OF CALIFORNIA

CALIFORNIA OCEAN PLAN

1990

STATE WATER RESOURCES CONTROL BOARD

STATE OF CALIFORNIA
Pete Wilson, Governor

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
James M. Strock, Secretary

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STATE WATER RESOURCES CONTROL BOARD

1990

CALIFORNIA OCEAN PLAN

WATER QUALITY CONTROL PLAN

OCEAN WATERS OF CALIFORNIA

CORRECTED COPY
(TABLE B, RADIOACTIVITY)
OCTOBER 18, 1990

STATE WATER RESOURCES CONTROL BOARD
RESOLUTION NO. 90-27

APPROVAL OF AMENDMENT TO THE WATER QUALITY CONTROL PLAN FOR OCEAN WATERS OF CALIFORNIA (CALIFORNIA OCEAN PLAN)

WHEREAS:

1. The State Water Resources Control (State Board) adopted the Ocean Plan on July 6, 1972 and revised the plan in 1978, 1983, and 1988.

2. The State Board may adopt water quality control plans for waters for which water quality standards are required by the Federal Clean Water Act in accordance with California Water Code Section 13170.

3. The State Board is responsible for reviewing Ocean Plan water quality standards and for modifying and adopting standards in accordance with Section 303(c)(1) of the Federal Clean Water Act and Section 13170.2(b) of the California Water Code.

4. The State Board has considered relevant management agency agreements in accordance with Section 13170.1 of the California Water Code.

5. Additional information pertinent to water quality objectives for dioxin and related compounds is being developed and reviewed by the scientific community.

6. The State Board prepared and circulated a draft Function Equivalent Document in accordance with the provisions of the California Environmental Quality Act and Title 14, California Code of Regulations 15251(g).

7. The State Board conducted a public hearing in Torrance on August 29, 1989 to solicit comments regarding the proposed amendments of the Ocean Plan and has reviewed and considered carefully all comments and testimony received. The State Board considered the information contained in the Functional Equivalent Document prior to approval of the California Ocean Plan.

8. The California Ocean Plan as approved will not have a significant adverse effect on the environment.

THEREFORE BE IT RESOLVED:

1. That the State Board approves the Functional Equivalent Document for the amendment of the Water Quality Control Plan for Ocean Waters of California.

2. That the State Board hereby adopts amendments to the California Ocean Plan (attached).

3. That the State Board authorizes the Executive Director, or his designee, to transmit the Plan to the U.S. Environmental Protection Agency, Region 9 in compliance with Section 303(c)(1) of the Clean Water Act.

4. That the State Board directs its staff to review the water quality objective for dioxin and related compounds as soon as possible within the next triennial review period.

5. That the State Board declares its intent to require continual monitoring of the marine environment to assure that the Plan reflects the latest available data and that the water quality objectives are adequate to fully protect indigenous marine species and to protect human health.

CERTIFICATION

The undersigned Administrative Assistant to the Board, does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the State Water Resources Control Board held on March 22, 1990.

Maureen Marché

Maureen Marche'
Administrative Assistant to the Board

Table of Contents

CALIFORNIA OCEAN PLAN

WATER QUALITY CONTROL PLAN FOR OCEAN WATERS OF CALIFORNIA

INTRODUCTION

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

This plan is applicable, it its entirety, to point source discharges to the ocean*. Nonpoint sources of waste* discharges to the ocean* are subject to Chapter I Beneficial Uses, Chapter II - Water Quality Objectives, Chapter III -General Requirements, Chapter IV - Table B (wherein compliance with water quality objectives shall, in all cases, be determined by direct measurements in the receiving waters) and Chapter V - Discharge Prohibitions.

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

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

Chapter I
BENEFICIAL USES

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

Chapter II
WATER QUALITY OBJECTIVES

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

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

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* See Appendix I for definition of terms.

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

A. Bacterial Characteristics

1. Water-Contact Standards

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

a. 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).

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

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 State Board (for consideration under Chapter VI.F.). 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.

2. Shellfish* Harvesting Standards

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

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

B. Bacterial Assessment and Remedial Action Requirements

The requirements listed below shall be used to 1) determine the occurrence and extent of any impairment of a beneficial use due to bacterial contamination; 2) generate information which can be used in the development of an enterococcus standard; and 3) provide the basis for remedial actions necessary to minimize or eliminate any impairment of a beneficial use.

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* See Appendix I for definition of terms.

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 Section II.A.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.

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.

C. Physical Characteristics

1. Floating particulates and grease and oil shall not be visible.
2. The discharge of waste* shall not cause aesthetically undesirable discoloration of the ocean* surface.
3. Natural* light shall not be significantly* reduced at any point outside the initial* dilution zone as the result of the discharge of waste*.
4. The rate of deposition of inert solids and the characteristics of inert solids in ocean* sediments shall not be changed such that benthic communities are degraded*.

D. Chemical Characteristics

1. The dissolved oxygen concentration shall not at any time be depressed more than 10 percent from that which occurs naturally, as the result of the discharge of oxygen demanding waste* materials.
2. The pH shall not be changed at any time more than 0.2 units from that which occurs naturally.
3. The dissolved sulfide concentration of waters in and near sediments shall not be significantly* increased above that present under natural conditions.
4. The concentration of substances set forth in Chapter IV, Table B, in marine sediments shall not be increased to levels which would degrade* indigenous biota.
5. The concentration of organic materials in marine sediments shall not be increased to levels which would degrade* marine life.
6. Nutrient materials shall not cause objectionable aquatic growths or degrade* indigenous biota.

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* See Appendix I for definition of terms.

E. Biological Characteristics

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

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

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

F. Radioactivity

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

Chapter III
GENERAL REQUIREMENTS FOR MANAGEMENT OF WASTE* DISCHARGE TO THE OCEAN*

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

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

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

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

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

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

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

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

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

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

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* See Appendix I for definition of terms.

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

3. Maximum protection is provided to the marine environment.

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

Chapter IV
QUALITY REQUIREMENTS FOR WASTE* DISCHARGES
(EFFLUENT QUALITY REQUIREMENTS)

This chapter sets forth the quality requirements for waste* discharge to the ocean*.

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

Table B limitations apply to all discharges within the jurisdiction of this plan.

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

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

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* See Appendix I for definition of terms.

TABLE A
MAJOR WASTEWATER CONSTITUENTS AND PROPERTIES

		Limiting Concentrations		
	Unit of measurement	Monthly (30 day Average)	Weekly (7 day Average)	Maximum at any time
Grease and Oil	mg/l	25	40	75
Suspended Solids			see below+	
Settleable Solids	ml/l	1.0	1.5	3.0
Turbidity	NTU	75	100	225
pH	units		within limits of 6.0 to 9.0 at all times	
Acute* Toxicity	TUa	1.5	2.0	2.5

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

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

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

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* See Appendix I for definition of terms.

TABLE B
TOXIC MATERIALS LIMITATIONS

	Units of Measurement	Limiting Concentrations 6-Month Median	Daily Maximum	Instantaneous Maximum
OBJECTIVES FOR PROTECTION OF MARINE AQUATIC LIFE				
Arsenic	ug/l	8	32	80
Cadmium	ug/l	1	4	10
Chromium (Hexavalent) (see below, a)	ug/l	2	8	20
Copper	ug/l	3	12	30
Lead	ug/l	2	8	20
Mercury	ug/l	0.04	0.16	0.4
Nickel	ug/l	5	20	50
Selenium	ug/l	15	60	150
Silver	ug/l	0.7	2.8	7
Zinc	ug/l	20	80	200
Cyanide (see below, b)	ug/l	1	4	10
Total Chlorine Residual (For intermittent chlorine sources, see below, c)	ug/l	2	8	60
Ammonia (expressed as nitrogen)	ug/l	600	2400	6000
Chronic* Toxicity	TUc		1	
Phenolic Compounds (non-chlorinated)	ug/l	30	120	300
Chlorinated Phenolics	ug/l	1	4	10
Endosulfan	ng/l	9	18	27
Endrin	ng/l	2	4	6
HCH*	ng/l	4	8	12
Radioactivity				

Not to exceed limits specified in Title 17, Division 1, Chapter 5, Subchapter 4, Group 3, Article 3, Section 30269 of the California Code of Regulations.

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* See Appendix I for definition of terms.

Table B Continued

Chemical	Units of Measurement	30-day Average
OBJECTIVES FOR PROTECTION OF HUMAN HEALTH -- NONCARCINOGENS		
acrolein	ug/l	220
antimony	mg/l	1.2
bis(2-chloroethoxy) methane	ug/l	4.4
bis(2-chloroisopropyl) ether	mg/l	1.2
chlorobenzene	ug/l	570
chromium (III)	mg/l	190
di-n-butyl phthalate	mg/l	3.5
dichlorobenzenes*	mg/l	5.1
1,1-dichloroethylene	mg/l	7.1
diethyl phthalate	mg/l	33
dimethyl phthalate	mg/l	820
4,6-dinitro-2-methylphenol	ug/l	220
2,4-dinitrophenol	ug/l	4.0
ethylbenzene	mg/l	4.1
fluoranthene	ug/l	15
hexachlorocyclopentadiene	ug/l	58
isophorone	mg/l	150
nitrobenzene	ug/l	4.9
thallium	ug/l	14
toluene	mg/l	85
1,1,2,2-tetrachloroethane	mg/l	1.2
tributyltin	ng/l	1.4
1,1,1-trichloroethane	mg/l	540
1,1,2-trichloroethane	mg/l	43
OBJECTIVES FOR PROTECTION OF HUMAN HEALTH -- CARCINOGENS		
acrylonitrile	ug/l	0.10
aldrin	ng/l	0.022
benzene	ug/l	5.9
benzidine	ng/l	0.069
beryllium	ng/l	33
bis(2-chloroethyl) ether	ug/l	0.045
bis(2-ethylhexyl) phthalate	ug/l	3.5
carbon tetrachloride	ug/l	0.90
chlordane*	ng/l	0.023
chloroform	mg/l	0.13
DDT*	ng/l	0.17
1,4-dichlorobenzene	ug/l	18
3,3'-dichlorobenzidine	ng/l	8.1

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* See Appendix I for definition of terms.

Table B Continued

Chemical	Units of Measurement	30-day Average
1,2-dichloroethane	mg/l	0.13
dichloromethane	mg/l	0.45
1,3-dichloropropene	ug/l	8.9
dieldrin	ng/l	0.040
2,4-dinitrotoluene	ug/l	2.6
1,2-diphenylhydrazine	ug/l	0.16
halomethanes*	mg/l	0.13
heptachlor*	ng/l	0.72
hexachlorobenzene	ng/l	0.21
hexachlorobutadiene	ug/l	14
hexachloroethane	ug/l	2.5
N-nitrosodimethylamine	ug/l	7.3
N-nitrosodiphenylamine	ug/l	2.5
PAHs*	ng/l	8.8
PCBs*	ng/l	0.019
TCDD equivalents*	pg/l	0.0039
tetrachloroethylene	ug/l	99
toxaphene	ng/l	0.21
trichloroethylene	ug/l	27
2,4,6-trichlorophenol	ug/l	0.29
vinyl chloride	ug/l	36

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

b) If a discharger can demonstrate to the satisfaction of the Regional Board (subject to EPA approval) that an analytical method is available to reliably distinguish between strongly and weakly complexed cyanide, effluent limitations for cyanide may be met by the combined measurement of free cyanide, simple alkali metal cyanides, and weakly complexed organometallic cyanide complexes. In order for the analytical method to be acceptable, the recovery of free cyanide from metal complexes must be comparable to that achieved by Standard Methods 412F, G, and H (Standard Methods for the Examination of Water and Wastewater. Joint Editorial Board, American Public Health Association, American Water Works Association, and Water Pollution Control Federation. Most recent edition.).

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

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

where: y = the water quality objective (in ug/l) to apply when chlorine is being discharged;

x = the duration of uninterrupted chlorine discharge in minutes.

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* See Appendix I for definition of terms.

Implementation Provisions for Table B

A. Calculation of Effluent Limitations

Effluent limitations for parameters identified in Table B with the exception of Radioactivity, shall be determined through the use of the following equation:

$$Ce = Co + Dm\ (Co - Cs) \quad (1)$$

where:

Ce = the effluent concentration limit,
Co = the concentration to be met at the completion of initial* dilution,
Cs = background seawater concentration (see Table C below),
Dm = minimum probable initial* dilution expressed as parts seawater per part wastewater.

For the purpose of this Plan, minimum initial dilution is the lowest average initial dilution within any single month of the year. Dilution estimates shall be based on observed waste flow characteristics, observed receiving water density structure, and the assumption that no currents, of sufficient strength to influence the initial dilution process, flow across the discharge structure.

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

TABLE C
BACKGROUND SEAWATER CONCENTRATIONS (Cs)

Waste Constituent	Cs (ug/l)
Arsenic	3
Copper	2
Mercury	0.0005
Silver	0.16
Zinc	8

For all other Table B parameters, Cs = 0.

The six-month median effluent concentration limit shall apply as a moving median of daily values for any 180 day period in which daily values represent flow weighted

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* See Appendix I for definition of terms.

average concentrations within a 24-hour period. For intermittent discharges, the daily value shall be considered to equal zero for days on which no discharge occurred.

The daily maximum effluent concentration limit shall apply to flow weighted 24 hour composite samples.

The instantaneous maximum shall apply to grab sample determinations.

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

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

lbs/day = 8.34 x Ce x Q (2)

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

Any significant change in waste* flow shall be cause for reevaluating effluent quality requirements.

B. Compliance Determination

All analytical data shall be reported uncensored with detection limits and quantitation limits identified. For any effluent limitation, compliance shall be determined using appropriate statistical methods to evaluate multiple samples. Compliance based on a single sample analysis should be determined where appropriate as described below.

When a calculated effluent limitation is greater than or equal to the PQL*, compliance shall be determined based on the calculated effluent limitation and either single or multiple sample analyses.

When the calculated effluent limitation is below the PQL*, compliance determinations based on analysis of a single sample shall only be undertaken if the concentration of the constituent of concern in the sample is greater than or equal to the PQL*.

When the calculated effluent limitation is below the PQL* and recurrent analytical responses between the PQL* and the calculated limit occur, compliance shall be determined by statistical analysis of multiple samples. Sufficient sampling and analysis shall be required to determine compliance.

Published values for MDL*s and PQL*s should be used except where revised MDL*s and PQL*s are available from recent laboratory performance evaluations, in which case the

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* See Appendix I for definition of terms.

revised MDL*s and PQL*s should be used. Where published values are not available the Regional Boards should determine appropriate values based on available information.

If a discharger believes the sample matrix under consideration in the waste discharge requirements is sufficiently different from that used for an established MDL* value, the discharger may demonstrate to the satisfaction of the Regional Board what the appropriate MDL* should be for the discharger's matrix. In this case the PQL* shall be established at the limit of quantitation (equal to 10 standard deviations above the average measured blank used for development of the MDL* in the discharger's matrix).

When determining compliance based on a single sample, with a single effluent limitation which applies to a group of chemicals (e.g., PCBs) concentrations of individual members of the group may be considered to be zero if the analytical response for individual chemicals falls below the MDL* for that parameter.

Due to the large total volume of powerplant and other heat exchange discharges, special procedures must be applied for determining compliance with Table B limitations on a routine basis. Effluent concentration values (Ce) shall be determined through the use of equation 1 considering the minimal probable initial* dilution of the combined effluent (in-plant waste streams plus cooling water flow). These concentration values shall then be converted to mass emission limitations as indicated in equation 2. The mass emission limits will then serve as requirements applied to all inplant waste* streams taken together which discharge into the cooling water flow, except that limitations on total chlorine residual, chronic* toxicity and instantaneous maximum limitations on Table B toxic materials shall apply to, and be measured in, the combined final effluent, as adjusted for dilution with ocean water. The Table B limitation on radioactivity shall apply to the undiluted combined final effluent.

C. Toxicity Reduction Requirements

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

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

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* See Appendix I for definition of terms.

Chapter V
DISCHARGE PROHIBITIONS

A. Hazardous Substances

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

B. Areas of Special Biological Significance

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

C. Sludge

Pipeline discharge of sludge to the ocean* is prohibited by federal law; the discharge of municipal and industrial waste* sludge directly to the ocean*, or into a waste* stream that discharges to the ocean*, is prohibited by this Plan. The discharge of sludge digester supernatant directly to the ocean*, or to a waste* stream that discharges to the ocean* without further treatment, is prohibited.

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

D. By-Passing

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

Chapter VI
GENERAL PROVISIONS

A. Effective Date

This Plan is in effect as of the date of adoption by the State Water Resources Control Board.

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* See Appendix I for definition of terms.

B. Waste Discharge Requirements

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

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

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

Any less stringent provisions would encourage water* reclamation;

Provided further that:

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

b) A receiving water toxicity* objective of 1 TUc is not exceeded; and

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

TABLE D
CONSERVATIVE ESTIMATES OF CHRONIC TOXICITY

Constituent	Estimate of Chronic Toxicity (ug/l)
Arsenic	19
Cadmium	8
Hexavalent Chromium	18
Copper	5
Lead	22
Mercury	0.4
Nickel	48
Silver	3
Zinc	51
Cyanide	10
Total Chlorine Residual	10.0
Ammonia	4,000.0
Phenolic Compounds (non-chlorinated)	a)(see below)
Chlorinated Phenolics	a)
Chlorinated Pesticides and PCB's	b)

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* See Appendix I for definition of terms.

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

b. Limitations on chlorinated pesticides and PCB's shall not be modified so that the total of these compounds is increased above the limitations in Table B (6-Month Median = 31 ng/l, Daily Maximum = 62 ng/l, and Instantaneous Maximum = 93 ng/l).

C. Revision of Waste* Discharge Requirements

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

D. Monitoring Program

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

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

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

E. Areas of Special Biological Significance

Areas of special biological significance shall be designated by the State Board after a public hearing by the Regional Board and review of its recommendations.

F. State Board Exceptions to Plan Requirements

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

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* See Appendix I for definition of terms.

1. The exception will not compromise protection of ocean* waters for beneficial uses, and
2. The public interest will be served.

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* See Appendix I for definition of terms.

APPENDIX I

DEFINITION OF TERMS

ACUTE TOXICITY

a. Acute Toxicity (TUa)

Expressed in Toxic Units Acute (TUa)

TUa = 100/96-hr LC 50%

b. Lethal Concentration 50% (LC 50)

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

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

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

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

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

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

a. Chronic Toxicity (TUc)

Expressed as Toxic Units Chronic (TUc)

TUc = 100/NOEL

b. No Observed Effect Level (NOEL)

The NOEL is expressed as the maximum percent effluent or receiving water that causes no observable effect on a test organism, as determined by the result of a critical life stage toxicity test listed in Appendix II.

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* See Appendix I for definition of terms.

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

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

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

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

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

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

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

HEPTACHLOR shall mean the sum of heptachlor and heptachlor epoxide.

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

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

For a submerged buoyant discharge, characteristic of most municipal and industrial wastes that are released from the submarine outfalls, the momentum of the discharge and its initial buoyancy act together to produce turbulent mixing. Initial

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* See Appendix I for definition of terms.

dilution in this case is completed when the diluting wastewater ceases to rise in the water column and first begins to spread horizontally.

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

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

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

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

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

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

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

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

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

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

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* See Appendix I for definition of terms.

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

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

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

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

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

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* See Appendix I for definition of terms.

APPENDIX II

STANDARD MONITORING PROCEDURES

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

The appendix is organized in the same manner as the Ocean Plan.

Chapter II. A. Bacterial Standards:

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

Detection methods used for coliforms (total and fecal) shall be those presented in the most recent edition of Standard Methods for the Examination of Water and Wastewater or any improved method determined by the Regional Board (and approved by EPA) to be appropriate.

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

Chapter IV. Table B. Compliance with Table B objectives:

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

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

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

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* See Appendix I for definition of terms.

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

Chapter IV. Compliance with Toxicity Objectives:

Compliance with the acute toxicity objective (TUa) in Table A shall be determined using an established protocol, e.g., American Society for Testing Materials (ASTM), EPA, American Public Health Association, or State Board.

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

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

The following tests shall be used to measure TUc. Other tests may be added to the list when approved by the State Board.

Species	Effect	Test Duration	Reference
red alga, Champia parvula	number of cystocarps	7-9 days	1
giant kelp, Macrocystis pyrifera	percent germination; germ tube length	48 hours	2
abalone, Haliotis rufescens	abnormal shell development	48 hours	2

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* See Appendix I for definition of terms.

oyster, *Crassostrea gigas*; mussel, *Mytilus edulis*	abnormal shell development; percent survival	48 hours	3
urchins, *Strongylocentrotus purpuratus*, *S. franciscanus*; sand dollar, *Dendraster excentricus*	percent fertilization	1 hour	4
shrimp, *Mysidopsis bahia*	percent survival; growth; fecundity	7 days	1
silversides, *Menidia beryllina*	larval growth rate; percent survival	7 days	1

Bioassay References

1. Weber, C.I., W.B. Horning, II, D.J. Klemm, T.W. Neiheisel, P.A. Lewis, E.L. Robinson, J. Menkedick, and F. Kessler (eds.). 1988. Short-term methods for estimating the chronic toxicity of effluents and receiving waters to marine and estuarine organisms. EPA-600/4-87/028. National Technical Information Service, Springfield, VA.

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* See Appendix I for definition of terms.

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WATER QUALITY CONTROL PLAN

OCEAN WATERS OF CALIFORNIA

CALIFORNIA OCEAN PLAN

1988
STATE WATER RESOURCES CONTROL BOARD

STATE OF CALIFORNIA

George Deukmejian, Governor

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State of California

STATE WATER RESOURCES CONTROL BOARD

1988

CALIFORNIA OCEAN PLAN

WATER QUALITY CONTROL PLAN

OCEAN WATERS OF CALIFORNIA

Adopted and Effective

September 22, 1988

STATE WATER RESOURCES CONTROL BOARD
RESOLUTION NO. 88-111

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

WHEREAS:

1. The State Board adopted the Ocean Plan on July 6, 1972 and revised the plan in 1978 and 1983.

2. The State Board is responsible for reviewing Ocean Plan water quality standards and for modifying and adopting standards in accordance with Section 303(c)(1) of the Federal Clean Water Act and Section 13170.2(b) of the California Water Code.

3. The State Board prepared and circulated a draft Functional Equivalent Document in accordance with the provisions of the California Environmental Quality Act, California Administrative Code 15251(g).

4. The State Board conducted a public hearing in Sacramento on June 20, 1988 to solicit comments regarding the proposed amendments of the Ocean Plan, has reviewed and considered carefully all comments and testimony received and considered the information contained in the Document prior to approval of the California Ocean Plan.

5. The California Ocean Plan as approved will not have a significant adverse effect on the environment.

THEREFORE BE IT RESOLVED:

1. That the State Board approves the Functional Equivalent Document for the amendment of the Water Quality Control Plan for Ocean Waters of California.

2. That the State Board hereby adopts the California Ocean Plan as amended (attached).

3. That the State Board authorizes the Executive Director, or his designee, to transmit the Plan to the Environmental Protection Agency, Region 9 in compliance with Section 303(c)(1) of the Clean Water Act.

4. That the State Board declares its intent to require continual monitoring of the marine environment to assure that the Plan reflects the latest available data and that the water quality objectives are adequate to fully protect indigenous marine species and to protect human health.

CERTIFICATION

The undersigned, Administrative Assistant to the Board, does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the State Water Resources Control Board held on September 22, 1988.

Maureen Marche

Table of Contents

CALIFORNIA OCEAN PLAN

WATER QUALITY CONTROL PLAN FOR OCEAN WATERS OF CALIFORNIA

INTRODUCTION

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

This plan is applicable, it its entirety, to point source discharges to the ocean*. Nonpoint sources of waste* discharges to the ocean* are subject to Chapter I - Beneficial Uses, Chapter II - Water Quality Objectives, Chapter III -General Requirements, Chapter IV - Table B (wherein compliance with water quality objectives shall, in all cases, be determined by direct measurements in the receiving waters) and Chapter V - Discharge Prohibitions.

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

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

Chapter I

BENEFICIAL USES

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

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* [illegible]

Chapter II
WATER QUALITY OBJECTIVES

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

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

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

A. Bacteriological Characteristics

1. Body-Contact Standards

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 body contact sports, as determined by the Regional Board, but including all kelp* beds, the following bacteriological objectives shall be maintained throughout the water column:

a. Samples of water from each sampling station shall have a concentration 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).

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

The "Initial* Dilution Zone" of wastewater outfalls shall be excluded from designation as "kelp* beds" for purposes of bacteriological standards, and Regional Boards should recommend extension of such exclusion zone where warranted to the State Board (for consideration under Chapter VI.F.). Adventitious assemblages of kelp plants on waste discharge structures (e.g., outfall pipes and diffusers) do not constitute kelp* beds for purposes of bacteriological standards.

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* See Appendix for definition of terms.

2. <u>Shellfish* Harvesting Standards</u>

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

   > The median total coliform concentration shall not exceed 70 per 100 ml, and not more than 10 percent of the samples shall exceed 230 per 100 ml.

B. <u>Physical Characteristics</u>

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

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

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

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

C. <u>Chemical Characteristics</u>

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

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

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

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

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

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

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* See Appendix for definition of

D. Biological Characteristics

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

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

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

E. Radioactivity

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

Chapter III
GENERAL REQUIREMENTS FOR MANAGEMENT OF WASTE* DISCHARGE TO THE OCEAN*

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

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

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

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

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

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

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

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

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

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* See Appendix for definition of terms.

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

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

3. Maximum protection is provided to the marine environment.

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

Chapter IV

QUALITY REQUIREMENTS FOR WASTE* DISCHARGES

(EFFLUENT QUALITY REQUIREMENTS)

This chapter sets forth the quality requirements for waste* discharge to the ocean*.

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

Table B limitations apply to all discharges within the jurisdiction of this plan.

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

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

Effluent Limits

TABLE A
MAJOR WASTEWATER CONSTITUENTS AND PROPERTIES

		Limiting Concentrations		
	Unit of measurement	Monthly (30 day Average)	Weekly (7 day Average)	Maximum at any time
Grease and Oil	mg/l	25	40	75
Suspended Solids			see below+	
Settleable Solids	ml/l	1.0	1.5	3.0
Turbidity	NTU	75	100	225
pH	units		within limits of 6.0 to 9.0 at all times	
Toxicity* Concentration	tu	1.5	2.0	2.5

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

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

one of init. dilution

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

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* See Appendix for definition of terms.

Receiving Water Limits

TABLE B
TOXIC MATERIALS LIMITATIONS

		Limiting Concentrations		
	Unit of Measurement	6-Month Median	Daily Maximum	Instantaneous Maximum
Arsenic	ug/l	8	32	80
Cadmium	ug/l	1	4	10
Chromium (Hexavalent) (see below, a)	ug/l	2	8	20
Copper	ug/l	3	12	30
Lead	ug/l	2	8	20
Mercury	ug/l	0.04	0.16	0.4
Nickel	ug/l	5	20	50
Silver	ug/l	0.7	2.8	7
Zinc	ug/l	20	80	200
Cyanide	ug/l	5	20	50
Total Chlorine Residual (For intermittent chlorine sources, see below b)	ug/l	2	11	126
Ammonia (expressed as nitrogen)	ug/l	600	2400	6000
Toxicity* Concentration	tu	0.05	-	-
Phenolic Compounds (non-chlorinated)	ug/l	30	120	300
Chlorinated Phenolics	ug/l	1	4	10
Aldrin and Dieldrin	ug/l	0.002	0.004	0.006
Chlordane* and Related Compounds	ug/l	0.003	0.006	0.009
DDT* and Derivatives	ug/l	0.001	0.002	0.003
Endrin	ug/l	0.002	0.004	0.006
HCH*	ug/l	0.004	0.008	0.012
PCBs	ug/l	0.003	0.006	0.009
Toxaphene	ug/l	0.007	0.014	0.021
Radioactivity	Not to exceed limits specified in Title 17, Chapter 5, Subchapter 4, Group 3, Article 3, Section 30269 of the California Administrative Code.			

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

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

$$\log y = -0.33 (\log x) + 2.1$$

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

Effluent limitations for substances identified in Table B with the exception of Radioactivity, shall be determined through the use of the following equation:

$$Ce = Co + Dm (Co - Cs) \qquad (1)$$

where:

Ce = the effluent concentration limit,
Co = the concentration to be met at the completion of initial* dilution,
Cs = background seawater concentration (see Table C below),
Dm = minimum probable initial* dilution expressed as parts seawater per part wastewater.

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

TABLE C
BACKGROUND SEAWATER CONCENTRATIONS (Cs)

Waste Constituent	Cs (ug/l)
Arsenic	3
Cadmium	0
Chromium (Hexavalent)	0
Copper	2
Lead	0
Mercury	0.0005
Nickel	0
Silver	0.16
Zinc	8
Cyanide	0
Phenolic Compounds	0
Total Chlorine Residual	0
Ammonia (Expressed as nitrogen)	0
Toxicity* Concentration (in toxicity units)	0
Chlorinated Pesticides and PCB's	0

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* See Appendix for definition of terms.

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

The daily maximum effluent concentration limit shall apply to flow weighted 24 hour composite samples.

The instantaneous maximum shall apply to grab sample determinations.

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

$$\text{lbs/day} = 8.34 \times Ce \times Q \qquad (2)$$

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

Any significant change in waste* flow shall be cause for reevaluating effluent quality requirements.

If a calculated Ce value falls below the limit of detection of the test method specified in the Code of Federal Regulations, 40 CFR 136, the limit of detection shall serve as the limiting effluent concentration.

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

Due to the large total volume of powerplant and other heat exchange discharges, special procedures must be applied for determining compliance with Table B limitations on a routine basis. Effluent concentration values (Ce) shall be determined through the use of equation 1 considering the minimal probable initial* dilution of the combined effluent (in-plant waste streams plus cooling water flow). These concentration values shall then be converted to mass emission limitations as indicated in equation 2. The mass emission limits will then serve as requirements applied to all inplant waste* streams taken together which discharge into the cooling water flow, except that limitations on total chlorine residual, toxicity* concentration and instantaneous maximum limitations on Table B toxic materials shall apply to, and be measured in, the combined final effluent, as adjusted for dilution with ocean water. The Table B limitation on radioactivity shall apply to the undiluted combined final effluent.

Chapter V
DISCHARGE PROHIBITIONS

A. Hazardous Substances

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

B. Areas of Special Biological Significance

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

C. Sludge

Pipeline discharge of sludge to the ocean* is prohibited by federal law; the discharge of municipal and industrial waste* sludge directly to the ocean*, or into a waste* stream that discharges to the ocean*, is prohibited by this Plan. The discharge of sludge digester supernatant directly to the ocean*, or to a waste* stream that discharges to the ocean* without further treatment, is prohibited.

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

D. By-Passing

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

Chapter VI
GENERAL PROVISIONS

A. Effective Date

This Plan is in effect as of the date of adoption by the State Water Resources Control Board.

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* See Appendix for definition of terms.

B. Waste Discharge Requirements

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

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

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

Any less stringent provisions would encourage water* reclamation;

Provided further that:

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

b) A receiving water toxicity* objective of 0.05 tu is not exceeded; and

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

TABLE D
CONSERVATIVE ESTIMATES OF CHRONIC TOXICITY

Constituent	Estimate of Chronic Toxicity (ug/l)
Arsenic	19
Cadmium	8
Hexavalent Chromium	18
Copper	5
Lead	22
Mercury	0.4
Nickel	48
Silver	3
Zinc	51
Cyanide	a)(see below)
Total Chlorine Residual	10.0
Ammonia	4,000.0
Phenolic Compounds (non-chlorinated)	a)
Chlorinated Phenolics	a)
Chlorinated Pesticides and PCB's	b)

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

b. Limitations on chlorinated pesticides and PCB's shall not be modified so that the total of these compounds is increased above the limitations in Table B (6-Month Median = 0.022 ug/l, Daily Maximum = 0.044 ug/l, and Instantaneous Maximum = 0.066 ug/l).

C. Revision of Waste* Discharge Requirements

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

D. Monitoring Program

The Regional Board shall require dischargers to conduct self-monitoring programs and submit reports necessary to determine compliance with the waste* discharge requirements, and may require dischargers to contract with agencies or persons acceptable to the Regional Board to provide monitoring reports.

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

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

E. Areas of Special Biological Significance

Areas of special biological significance shall be designated by the State Board after a public hearing by the Regional Board and review of its recommendations.

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* See Appendix for definition of terms.

F. State Board Exceptions to Plan Requirements

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

1. The exception will not compromise protection of ocean* waters for beneficial uses, and
2. The public interest will be served.

APPENDIX

DEFINITION OF TERMS

CHLORDANE AND RELATED COMPOUNDS shall mean the sum of chlordane (cis + trans), trans-nonachlor, oxychlordane, heptachlor and heptachlor epoxide.

DDT AND DERIVATIVES shall mean the sum of the p,p' and o,p' isomers of DDT, DDD (TDE) and DDE.

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

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

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

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

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

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

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* See Appendix for definition of terms.

wastewater ceases to rise in the water column and first begins to spread horizontally.

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

For the purpose of this Plan, minimum initial dilution is the lowest average initial dilution within any single month of the year. Dilution estimates shall be based on observed waste flow characteristics, observed receiving water density structure, and the assumption that no currents, of sufficient strength to influence the initial dilution process, flow across the discharge structure.

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

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

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

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

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

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

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

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a. Toxicity Concentration (Tc)

Expressed in Toxicity Units (tu)

$$Tc\ (tu) = \frac{100}{96\text{-hr. TLm\%}}$$

b. Median Tolerance Limit (TLm%)

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

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

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

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

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

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

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* See Appendix for definition of terms.

STATE WATER RESOURCES CONTROL BOARD
P.O. Box 100, Sacramento, CA 95801

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARDS

ORTH COAST REGION (1)
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Santa Rosa, CA 95401
(707) 576-2220

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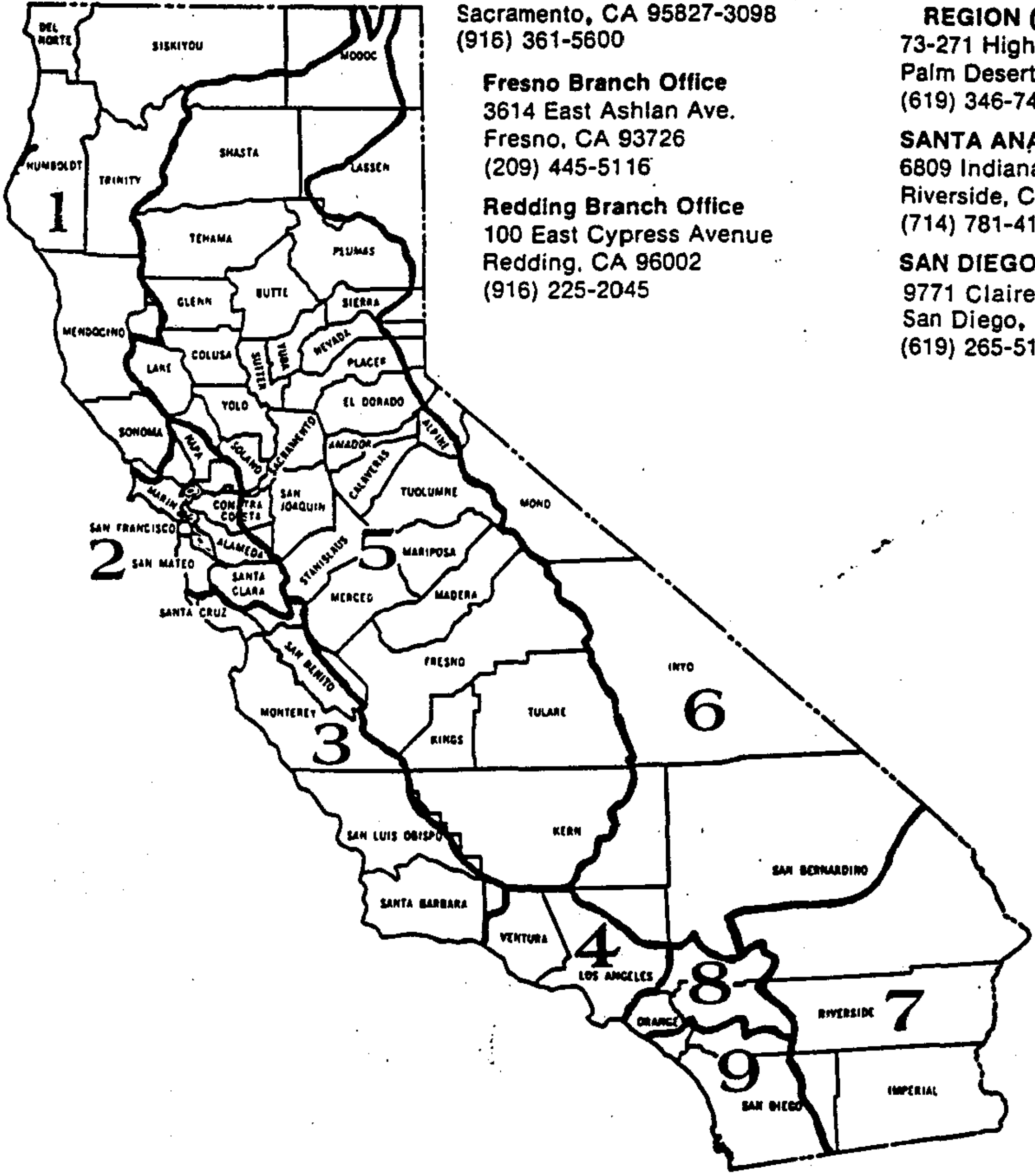

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25287

WATER QUALITY CONTROL PLAN

OCEAN WATERS
OF CALIFORNIA

1983

State Water Resources Control Board

25288

State of California

STATE WATER RESOURCES CONTROL BOARD

1983

WATER QUALITY CONTROL PLAN

OCEAN WATERS OF CALIFORNIA

Adopted and Effective

November 17, 1983

STATE WATER RESOURCES CONTROL BOARD
RESOLUTION NO. 83-87

WATER QUALITY CONTROL PLAN FOR OCEAN WATERS OF CALIFORNIA

WHEREAS:

1. The Board adopted the "Water Quality Control Plan for Ocean Waters of California" on July 6, 1972, and revised the plan in 1978.

2. In the period since the 1978 revision, the Board has received additional information regarding ocean water quality and wastewater management needs.

3. The Board conducted an extensive review of the 1978 Plan and new information available since the adoption of the 1978 Plan, prepared a draft set of amendments, prepared and circulated a draft Environmental Impact Report (EIR) in accordance with the provisions of the California Environmental Quality Act (CEQA), and on April 21, 1983, held a public hearing to consider comments regarding the draft amendments.

4. The EIR for the "Water Quality Control Plan for Ocean Waters of California" has been completed in compliance with CEQA and the State Guidelines for implementation of CEQA, and the State Board has reviewed and considered the information contained in the EIR prior to approval of the "Water Quality Control Plan for Ocean Waters of California 1983".

5. The Water Quality Control Plan as approved will not have a significant effect on the environment.

THEREFORE BE IT RESOLVED:

1. That the EIR forthe "Water Quality Control Plan for Ocean Waters of California 1983" is approved.

2. The State Board adopts the "Water Quality Control Plan for Ocean Waters of California 1983".

3. The State Board hereby declares its intent to determine from time to time the need for revising the Plan to assure that it reflects current knowledge of water quality objectives necessary to protect beneficial uses of ocean waters and that it is based on latest technological improvements.

4. The State Board hereby declares its intent to require continual monitoring of the marine environment to assure that the Plan reflects the latest available data and that the water quality objectives fully protect the marine environment.

CERTIFICATION

The undersigned, Executive Director of the State Water Resources Control Board, does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the State Water Resources Control Board held on November 17, 1983.

M A Campos
Michael A. Campos
Executive Director

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Resolution NO. 83-87

25295

WATER QUALITY CONTROL PLAN FOR OCEAN WATERS OF CALIFORNIA

INTRODUCTION

In furtherance of legislative policy set forth in Section 13000 of Division 7 of the California Water Code (Stats. 1969, Chap. 482) pursuant to the authority contained in Section 13170 (Stats. 1971, Chap. 1288) the State Water Resources Control Board hereby finds and declares that protection of the quality of the ocean* waters for use and enjoyment by the people of the State requires control of the discharge of waste* to ocean* waters in accordance with the provisions contained herein.

This plan is applicable, it its entirety, to point source discharges to the ocean*. Nonpoint sources of waste* discharges to the ocean* are subject to Chapter I - Beneficial Uses, Chapter II - Water Quality Objectives, Chapter III - General Requirements, Chapter IV - Table B (wherein compliance with water quality objectives shall, in all cases, be determined by direct measurements in the receiving waters), and Chapter V - Discharge Prohibitions.

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

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

Chapter I
BENEFICIAL USES

The beneficial uses of the ocean* waters of the State that shall be protected include industrial water supply, recreation, esthetic enjoyment, navigation, and preservation and enhancement of fish, wildlife, and other marine resources or preserves.

Chapter II
WATER QUALITY OBJECTIVES

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

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

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

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* See Appendix for definition of terms

A. Bacteriological Characteristics

1. Body-Contact Standards

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 body-contact sports, as determined by the Regional Board, but including all kelp* beds, the following bacteriological objectives shall be maintained throughout the water column:

a. Samples of water from each sampling station shall have a concentration 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).

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

The "Initial* Dilution Zone" of wastewater outfalls shall be excluded from designation as "kelp* beds" for purposes of bacteriological standards, and Regional Boards should extend the area of such exclusion zone where warranted. Adventitious assemblages of kelp plants on waste discharge structures (e.g. outfall pipes and diffusers) do not constitute kelp* beds for purposes of bacteriological standards.

2. Shellfish* Harvesting Standards

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

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

B. Physical Characteristics

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

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

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

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* See Appendix for definition of terms

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

C. Chemical Characteristics

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

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

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

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

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

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

D. Biological Characteristics

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

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

E. Radioactivity

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

Chapter III
GENERAL REQUIREMENTS FOR MANAGEMENT OF WASTE* DISCHARGE TO THE OCEAN*

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

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

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

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* See Appendix for definition of terms

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

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

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

5. Materials that result in esthetically undesirable discoloration of the ocean* surface.

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

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

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

2. Natural water quality conditions are not altered in areas designated as being of special biological significance.

3. Maximum protection is provided to the marine environment.

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

Chapter IV
QUALITY REQUIREMENTS FOR WASTE* DISCHARGES
(EFFLUENT QUALITY REQUIREMENTS)

This chapter sents forth the quality requirements for waste* discharge to the ocean*.

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

Table B limitations apply to all discharges within the jurisdiction of this plan.

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

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

TABLE A
MAJOR WASTEWATER CONSTITUENTS AND PROPERTIES

	Unit of measurement	Limiting Concentrations		Maximum at any time
		Monthly (30 day Average)	Weekly (7 day Average)	
Grease and Oil	mg/l	25	40	75
Suspended Solids		see below+		
Settleable Solids	mg/l	1.0	1.5	3.0
Turbidity	JTU	75	100	225
pH	units	within limits of 6.0 to 9.0 at all times		
Toxicity* Concentration	tu	1.5	2.0	2.5

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

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

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* See Appendix for definition of terms

TABLE B
TOXIC MATERIALS LIMITATIONS

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

		Limiting Concentrations		
	Unit of Measurement	6-Month Median	Daily Maximum	Instantaneous Maximum
Arsenic	ug/l	8	32	80
Cadmium	ug/l	3	12	30
Chromium (Hexavalent) see below, a)	ug/l	2	8	20
Copper	ug/l	5	20	50
Lead	ug/l	8	32	80
Mercury	ug/l	0.14	0.56	1.4
Nickel	ug/l	20	80	200
Silver	ug/l	0.45	1.8	4.5
Zinc	ug/l	20	80	200
Cyanide	ug/l	5	20	50
Total Chlorine Residual	ug/l	2	11	126
(For intermittent chlorine sources, see below, b)				
Ammonia (expressed as nitrogen)	ug/l	600	2400	6000
Toxicity* Concentration	tu	0.05	-	-
Phenolic Compounds (non-chlorinated)	ug/l	30	120	300
Chlorinated Phenolics	ug/l	1	4	10
Aldrin and Dieldrin	ug/l	0.002	0.004	0.006
Chlordane* and Related Compounds	ug/l	0.003	0.006	0.009
DDT* and Derivatives	ug/l	0.001	0.002	0.003
Endrin	ug/l	0.002	0.004	0.006
HCH*	ug/l	0.004	0.008	0.012
PCBs	ug/l	0.003	0.006	0.009
Toxaphene	ug/l	0.007	0.014	0.021
Radioactivity	Not to exceed limits specified in Title 17, Chapter 5, Subchapter 4, Group 3, Article 3, Section 30269 of the California Administrative Code.			

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

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

$$\log y = -0.33 (\log x) + 2.1$$

where: y = the water quality objective (in ug/l) to apply when chlorine is being discharged;

x = the duration of uninterrupted chlorine discharge in minutes.

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* See Appendix for definition of terms

Effluent limitations for substances identified in Table B with the exception of Radioactivity, shall be determined through the use of the following equation:

$$Ce = Co + Dm\ (Co - Cs) \qquad (1)$$

where:

Ce = the effluent concentration limit,
Co = the concentration to be met at the completion of initial* dilution,
Cs = background seawater concentration (see Table C below),
Dm = minimum probable initial* dilution expressed as parts seawater per part wastewater.

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

TABLE C
BACKGROUND SEAWATER CONCENTRATIONS (Cs)

Waste Constituent	Cs (ug/l)
Arsenic	3
Cadmium	0
Chromium (Hexavalent)	0
Copper	2
Lead	0
Mercury	0.06
Nickel	0
Silver	0.16
Zinc	8
Cyanide	0
Phenolic Compounds	0
Total Chlorine Residual	0
Ammonia (Expressed as nitrogen)	0
Toxicity* Concentration (in toxicity units)	0
Chlorinated Pesticides and PCB's	0

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

The daily maximum effluent concentration limit shall apply to flow weighted 24-hour composite samples.

The instantaneous maximum shall apply to grab sample determinations.

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* See Appendix for definition of terms

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

$$\text{lbs/day} = 8.34 \times Ce \times Q \qquad (2)$$

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

Any significant change in waste* flow shall be cause for reevaluating effluent quality requirements.

If a calculated Ce value falls below the limit of detection of the test method specified in the Code of Federal Regulations, 40 CFR 136, the limit of detection shall serve as the limiting effluent concentration.

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

Due to the large total volume of powerplant and other heat exchange discharges, special procedures must be applied for determining compliance with Table B limitations on a routine basis. Effluent concentration values (Ce) shall be determined through the use of equation 1 considering the minimal probable initial* dilution of the combined effluent (in-plant waste streams plus cooling water flow). These concentration values shall then be converted to mass emission limitations as indicated in equation 2. The mass emission limits will then serve as requirements applied to all inplant waste* streams taken together which discharge into the cooling water flow, except that limitations on total chlorine residual, toxicity* concentration and instantaneous maximum limitations on Table B toxic materials shall apply to, and be measured in, the combined final effluent, as adjusted for dilution with ocean water. The Table B limitation on radioactivity shall apply to the undiluted combined final effluent.

Chapter V
DISCHARGE PROHIBITIONS

A. Hazardous Substances

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

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* See Appendix for definition of terms

B. Areas of Special Biological Significance

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

C. Sludge

Pipeline discharge of sludge to the ocean* is prohibited by federal law; the discharge of municipal and industrial waste* sludge directly to the ocean*, or into a waste* stream that discharges to the ocean*, is prohibited by this Plan. The discharge of sludge digester supernatant directly to the ocean*, or to a waste* stream that discharges to the ocean* without further treatment, is prohibited.

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

D. By-Passing

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

Chapter VI
GENERAL PROVISIONS

A. Effective Date

This Plan is in effect as of the date of adoption by the State Water Resources Control Board.

B. Waste Discharge Requirements

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

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

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* See Appendix for definition of terms

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

Any less stringent provisions would encourage water* reclamation;

Provided further that:

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

b) A receiving water toxicity* objective of 0.05 tu is not exceeded; and

c) The State Board and the Environmental Protection Agency concur in the Regional Board findings and alternative limits.

TABLE D
CONSERVATIVE ESTIMATES OF CHRONIC TOXICITY

Constituent	Estimate of Chronic Toxicity (ug/l)
Arsenic	a) (see below)
Cadmium	7.6
Hexavalent chromium	14.6
Copper	6.4
Lead	26.0
Mercury	1.6
Nickel	146.0
Silver	a)
Zinc	56.0
Cyanide	a)
Total Chlorine Residual	10.0
Ammonia	4,000.0
Phenolic Compounds (non-chlorinated)	a)
Chlorinated Phenolics	a)
Chlorinated Pesticides and PCB's	b)

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

b. Limitations on chlorinated pesticides and PCB's shall not be modified so that the total of these compounds is increased above the limitations in Table B (6-Month Median = 0.022 ug/l, Daily Maximum = 0.044 ug/l, and Instantaneous Maximum = 0.066 ug/l).

C. Revision of Waste* Discharge Requirements

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

D. Monitoring Program

The Regional Board shall require dischargers to conduct self-monitoring programs and submit reports necessary to determine compliance with the waste* discharge requirements, and may require dischargers to contract with agencies or persons acceptable to the Regional Board to provide monitoring reports.

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

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

E. Areas of Special Biological Significance

Areas of special biological significance shall be designated by the State Board after a public hearing by the Regional Board and review of its recommendations.

F. State Board Exceptions to Plan Requirements

The State Board may, subsequent to a public hearing, and with the concurrence of the Environmental Protection Agency, grant exceptions to any provision of this Plan where the Board determines:

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

2. The public interest will be served.

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* See Appendix for definition of terms

APPENDIX

DEFINITION OF TERMS

CHLORDANE AND RELATED COMPOUNDS shall mean the sum of chlordane (cis + trans), trans-nonachlor, oxychlordane, heptachlor and heptachlor epoxide.

DDT AND DERIVATIVES shall mean the sum of the p,p' and o,p' isomers of DDT, DDD (TDE) and DDE.

DEGRADE: Degradation shall be determined by analysis of the effects of waste discharge on species diversity, population density, contamination, growth anomalies, debility, or supplanting of normal species by undesirable plant and animal species.

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

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

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

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

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

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

For the purpose of this Plan, minimum initial dilution is the lowest average initial dilution within any single month of the year. Dilution estimates shall be based on observed waste flow characteristics, observed receiving water density structure, and the assumption that no currents, of sufficient strength to influence the initial dilution process, flow across the discharge structure.

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

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

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

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

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

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

a. Toxicity Concentration (Tc)

Expressed in Toxicity Units (tu)

$$Tc\ (tu) = \frac{100}{96\text{-hr. TLm\%}}$$

b. Median Tolerance Limit (TLm%)

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

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

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

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

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

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

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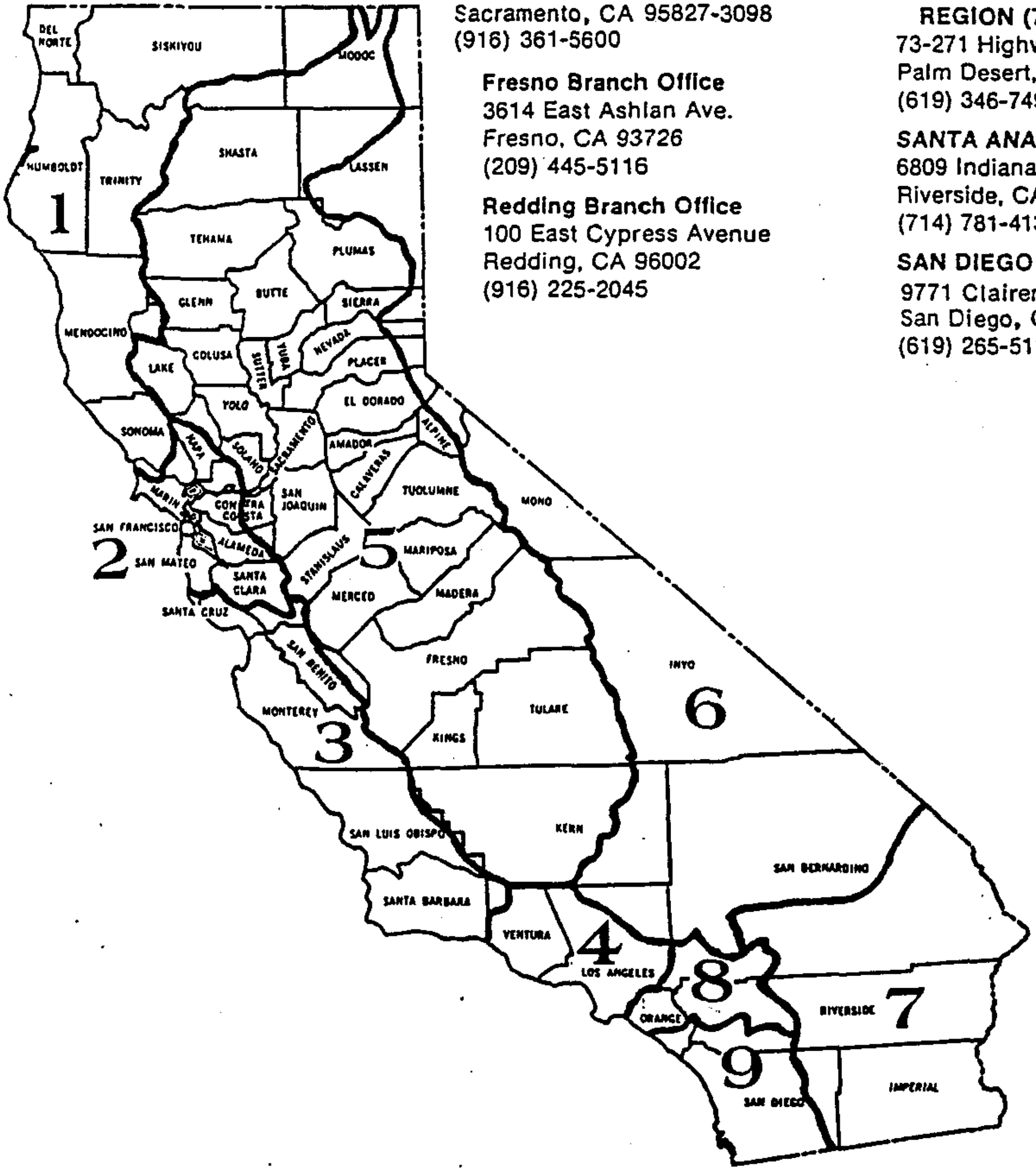

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WATER QUALITY CONTROL PLAN

OCEAN WATERS

OF CALIFORNIA

1978

State Water Resources Control Board

STATE OF CALIFORNIA
Edmund G. Brown Jr., Governor

STATE WATER RESOURCES
CONTROL BOARD
John E. Bryson, Chairman
W. Don Maughan, Vice Chairman
W. W. Adams, Member
Larry Walker, Executive Director
Water Quality

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State of California
The Resources Agency

STATE WATER RESOURCES CONTROL BOARD

1978

WATER QUALITY CONTROL PLAN

FOR

OCEAN WATERS OF CALIFORNIA

Adopted and Effective
1978

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RESOLUTION NO. ~~72-45~~

RESOLUTION NO. 78-2

WATER QUALITY CONTROL PLAN
FOR
OCEAN WATERS OF CALIFORNIA

WHEREAS:

1. The Board adopted the "Water Quality Control Plan for Ocean Waters of California" on July 6, 1972;

2. In the period between July 1972 and December 1977, the Board has received additional information regarding ocean water quality and wastewater management needs.

3. The Board conducted an extensive review of the 1972 Plan, prepared a draft set of amendments, prepared and circulated a draft initial study and negative declaration in accordance with the provisions of the California Environmental Quality Act, and on October 19, 1977, held a public hearing regarding the draft amendments.

THEREFORE BE IT RESOLVED THAT:

1. The Board adopts the "Water Quality Control Plan for Ocean Waters of California 1978" and the Negative Declaration and Initial Study pertaining thereto.

2. The Board hereby declares its intent to determine from time to time the need for revising the Plan to assure that it reflects current knowledge of water quality objectives necessary to protect beneficial uses of ocean waters and that it is based on latest technological improvements.

3. The Board hereby declares its intent to require continual monitoring of the marine environment to assure that the Plan reflects the latest available data and that the water quality objectives fully protect the marine environment.

CERTIFICATION

The undersigned, Executive Director of the State Water Resources Control Board, does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the State Water Resources Control Board held on January 19, 1978.

Larry F. Walker

Larry F. Walker
Executive Director
Water Quality

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

WATER QUALITY CONTROL PLAN FOR
OCEAN WATERS OF CALIFORNIA
(As amended, 1978)

INTRODUCTION

In furtherance of legislative policy set forth in Section 13000 of Division 7 of the California Water Code (Stats. 1969, Chap. 482) and pursuant to the authority contained in Section 13170 (Stats. 1971, Chap. 1288) the State Water Resources Control Board hereby finds and declares that protection of the quality of the ocean waters for use and enjoyment by the people of the State requires control of the discharge of waste[1] to ocean water[2] in accordance with the provisions contained herein.

CHAPTER I.
BENEFICIAL USES

The beneficial uses of the ocean waters of the State that shall be protected include industrial water supply, recreation, esthetic enjoyment, navigation, and preservation and enhancement of fish, wildlife, and other marine resources or preserves.

CHAPTER II.
WATER QUALITY OBJECTIVES

This chapter sets forth limits or levels of water quality characteristics for ocean waters to ensure the reasonable protection of beneficial uses and the prevention of nuisance. The discharge of waste shall not cause violation of these objectives.[3]

A. Bacteriological Characteristics

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[4] outside this zone used for body-contact sports, the following bacteriological objectives shall be maintained throughout the water column:

    (a.) Samples of water from each sampling station shall have a concentration of 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

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Originally adopted by the State Water Resources Control Board by Resolution No. 72-45 on July 6, 1972, and amended in 1973 and 1978.

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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).

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

2. At all areas[4] where shellfish may be harvested for human consumption, the following bacteriological objectives shall be maintained throughout the water column:

> The median total coliform concentration shall not exceed 70 per 100 ml, and not more than 10 percent of the samples shall exceed 230 per 100 ml.

B. Physical Characteristics

1. Floating particulates and grease and oil shall not be visible.
2. The discharge of waste shall not cause esthetically undesirable discoloration of the ocean surface.
3. The transmittance of natural light shall not be significantly[5] reduced at any point outside the initial dilution zone.[6]
4. The rate of deposition of inert solids and the characteristics of inert solids in ocean sediments shall not be changed such that benthic communities are degraded.[7]

C. Chemical Characteristics

1. The dissolved oxygen concentration[8] shall not at any time be depressed more than 10 percent from that which occurs naturally, as the result of the discharge of oxygen demanding waste materials.
2. The pH[8] shall not be changed at any time more than 0.2 units from that which occurs naturally.

3. The dissolved sulfide concentration of waters in and near sediments shall not be significantly[5] increased above that present under natural conditions.

4. The concentration of substances set forth in Chapter IV, Table B, in marine sediments shall not be increased to levels which would degrade[7] indigenous biota.

5. The concentration of organic materials in marine sediments shall not be increased above that which would degrade[7] marine life.

6. Nutrient materials shall not cause objectionable aquatic growths or degrade[7] indigenous biota.

D. Biological Characteristics

1. Marine communities, including vertebrate, invertebrate, and plant species, shall not be degraded.[7]

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

E. Radioactivity

1. Radioactivity shall not exceed the limits specified in Title 17, Chapter 5, Subchapter 4, Group 3, Article 3, Section 30269 of the California Administrative Code.

CHAPTER III.
GENERAL REQUIREMENTS FOR MANAGEMENT OF WASTE DISCHARGE TO THE OCEAN

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

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

   1. material that is floatable or will become floatable upon discharge,

   2. settleable material or substances that form sediments which degrade[7] benthic communities or other aquatic life,

3. substances toxic to marine life due to increases in concentrations in marine waters or sediments,

4. substances that significantly decrease the natural light to benthic communities and other marine life, and

5. materials that result in esthetically undesirable discoloration of the ocean surface.

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

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

1. pathogenic organisms and viruses are not present in areas where shellfish are harvested for human consumption or in areas used for swimming or other body-contact sports.9/

2. natural water quality conditions are not altered in areas designated as being of special biological significance, and

3. maximum protection is provided to the marine environment.

CHAPTER IV.
QUALITY REQUIREMENTS FOR WASTE DISCHARGES
(EFFLUENT QUALITY REQUIREMENTS)

This chapter sets forth the quality requirements for waste discharge to the ocean.3/

Table A limitations apply only to publicly owned treatment works and industrial discharges for which Effluent Guideline Limitations have not been established pursuant to Sections 301, 302, 304, or 306 of the Federal Water Pollution Control Act of 1972.

Table B limitations apply to all discharges within the jurisdiction of this Plan.

The State Board is authorized to administer and enforce effluent requirements established pursuant to the Federal Water Pollution Control Act of 1972. Effluent limitations established

under Sections 301, 302, 306, 307, 316, 403, and 405 of the aforementioned Federal Act and administrative procedures pertaining thereto, are included in this Plan by reference.

Compliance with Table A limitations, or Environmental Protection Agency Effluent Guideline Limitations for industrial discharges, shall be the minimum level of treatment acceptable under this Plan, and define reasonable treatment and waste control technology.

TABLE A

MAJOR WASTEWATER CONSTITUENTS AND PROPERTIES

		Limiting Concentrations		
	Unit of measurement	Monthly (30 day Average)	Weekly (7 day Average)	Maximum at any time
Grease and Oil	mg/l	25	40	75
Suspended Solids	mg/l	75 Percent Removal		
Settleable Solids	ml/l	1.0	1.5	3.0
Turbidity	JTU	75	100	225
pH	units	within limits of 6.0 to 9.0 at all times		
Toxicity Concentration[12]	tu	1.5	2.0	2.5

TABLE B

TOXIC MATERIALS LIMITATIONS

Effluent limitations shall be imposed in a manner prescribed by the State Board[10] such that the concentrations set forth below as water quality objectives, shall not be exceeded in the receiving water upon the completion of initial dilution, except that limitations indicated for total chlorinated pesticides and PCB's and Radioactivity shall apply directly to the undiluted waste effluent.

Chapter IV.
Table B (continued)

		Limiting Concentrations		
	Unit of Measurement	6-Month Median	Daily Maximum	Instantaneous Maximum
Arsenic	mg/l	0.008	0.032	0.08
Cadmium	mg/l	0.003	0.012	0.03
Total Chromium	mg/l	0.002	0.008	0.02
Copper	mg/l	0.005	0.020	0.05
Lead	mg/l	0.008	0.032	0.08
Mercury	mg/l	0.00014	0.00056	0.0014
Nickel	mg/l	0.02	0.08	0.2
Silver	mg/l	0.00045	0.0018	0.0045
Zinc	mg/l	0.020	0.08	0.2
Cyanide	mg/l	0.005	0.02	0.05
Phenolic Compounds	mg/l	0.03	0.12	0.3
Total Chlorine Residual	mg/l	0.002	(See Footnote 11/)	
Ammonia (expressed as nitrogen)	mg/l	0.6	2.4	6.0
Toxicity Concentration 12/	tu	0.05	-	-
Total Chlorinated Pesticides and PCB's 13/	mg/l	0.002	0.004	0.006
Radioactivity	Not to exceed limits specified in Section 30269 of the California Administrative Code.			

CHAPTER V.
DISCHARGE PROHIBITIONS

A. Hazardous Substances

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

B. Areas of Special Biological Significance

Waste shall be discharged a sufficient distance from areas designated as being of special biological significance to assure maintenance of natural water quality conditions in these areas.

C. Sludge

The discharge of municipal and industrial waste sludge directly to the ocean, or into a waste stream that discharges to the ocean, shall be prohibited. The discharge of sludge digester supernatant directly to the ocean, or into a waste stream that discharges to the ocean without further treatment shall be prohibited.

D. By-Passing

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

CHAPTER VI.
GENERAL PROVISIONS

A. Effective Date

This Plan is in effect as of the date of adoption by the State Water Resources Control Board.

B. Waste Discharge Requirements

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

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

> Reasonable control technologies (including source control, material substitution, treatment and dispersion) will not provide for complete compliance or;
>
> *Any less stringent provisions* would encourage water reclamation;

Provided further than;

a) Any alternative water quality objectives shall be below the conservative estimate of chronic toxicity, upon which this Plan is based, and such alternative will provide for adequate protection of the marine environment;

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b) A receiving water toxicity objective of 0.05 tu is not exceeded; and

c) The State Board and the Environmental Protection Agency concur in the Regional Board findings and alternative limits.

C. Revision of Waste Discharge Requirements

The Regional Board shall revise the waste discharge requirements for existing discharges as necessary to achieve compliance with this Plan and shall also establish a time schedule for compliance in accordance with State Board Resolution 74-5.

D. State Board Review of Time Schedules

The State Board shall review proposed time schedules for all municipal discharges throughout the State and shall recommend to the Regional Boards specific schedules to assure the maximum benefit from, and equitable distribution of, available state and federal grant funds.

E. Monitoring Program

The Regional Board shall require dischargers to conduct self-monitoring programs and submit reports necessary to determine compliance with the waste discharge requirements, and may require dischargers to contract with agencies or persons acceptable to the Regional Board to provide monitoring reports. Such monitoring programs shall comply with Guidelines for Monitoring the Effects of Waste Discharges on the Ocean which shall be issued by the Executive Director of the State Board.

F. Areas of Special Biological Significance

Areas of special biological significance shall be designated by the State Board after a public hearing by the Regional Board and review of its recommendations.

G. State Board Exceptions to Plan Requirements

The State Board may, subsequent to a public hearing, and with the concurrence of the Environmental Protection Agency, grant exceptions to any provision of this Plan where the Board determines:

1) The existence of unusual circumstances not anticipated at the time of the Plan's adoption;

2) The exception will not compromise protection of ocean waters for beneficial uses, and

3) The public interest will be served.

FOOTNOTES

1/ This Plan is applicable, in its entirety, to point source discharges to the ocean. Nonpoint sources of waste discharges to the ocean are subject to Chapter I - Beneficial Uses, Chapter II - Water Quality Objectives, Chapter III - General Requirements, Chapter IV - Table B (wherein compliance with water quality objectives shall, in all cases, be determined by direct measurements in the receiving waters), and Chapter V-Discharge Prohibitions.

This Plan is not applicable to discharges to enclosed bays and estuaries or inland waters nor is it applicable to vessel wastes, and the control of dredging spoil.

Provisions regulating the thermal aspects of waste discharged to the ocean are set forth in the Water Quality Control Plan for the Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California dated May 18, 1972.

2/ Ocean waters are waters of the Pacific Ocean adjacent to the California coast outside of enclosed bays, estuaries, and coastal lagoons.

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

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

Footnotes (continued)

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

4/ Body-contact sports areas outside the shoreline zone set forth in Chapter II.A.1. and all shellfishing areas shall be determined by the Regional Board on an individual basis.

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

6/ Initial dilution is the process which results in the rapid and irreversible turbulent mixing of wastewater with ocean water around the point of discharge.

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

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

For the purpose of this Plan, minimum initial dilution is the lowest average initial dilution within any single month of the year. Dilution estimates shall be based on observed waste flow characteristics, observed receiving water density structure, and the assumption that no currents, of sufficient strength to influence the initial dilution process, flow across the discharge structure.

The Executive Director shall issue guidelines to be used by the State and Regional Boards for determining the initial dilution achieved by each ocean discharge.

Footnotes (continued)

7/ Degradation shall be determined by analysis of the effects of waste discharge on species diversity, population density, contamination, growth anomalies, debility, or supplanting of normal species by undersirable plant and animal species.

8/ Compliance with the water quality objectives of Chapter II shall be determined from samples collected at stations representative of the area within the waste field where initial dilution is completed.

9/ Waste that contains pathogenic organisms or viruses should be discharged a sufficient distance from shellfishing and body-contact sports areas to maintain applicable bacteriological standards without disinfection. Where conditions are such that an adequate distance cannot be attained, reliable disinfection in conjunction with a reasonable separation of the discharge point from the area of use must be provided. Consideration should be given to disinfection procedures that do not increase effluent toxicity and that constitute the least environmental and human hazard in their production, transport, and utilization.

10/ Effluent limitations for substances identified in Chapter IV, Table B, with the exceptions of Radioactivity and Total Identifiable Chlorinated Hydrocarbons, shall be determined through the use of the following equation:

$$Ce = Co + Dm\ (Co - Cs) \qquad (1)$$

where:

Ce = the effluent concentration limit,
Co = the concentration to be met at the completion of initial dilution,
Cs = background seawater concentration, and
Dm = minimum probable initial dilution expressed as parts seawater per part wastewater.

The State Board shall assist the Regional Boards in the evaluation of Dm, the minimum initial dilution for a specific waste discharge. Discharging agencies will be informed of the basis for the determination of minimum initial dilution.

Footnotes (continued)

Waste Constituent	Cs mg/l
Arsenic	0.003
Cadmium	0.000
Total Chromium	0.000
Copper	0.002
Lead	0.000
Mercury	0.00006
Nickel	0.00
Silver	0.00016
Zinc	0.008
Cyanide	0.000
Phenolic Compounds	0.0
Total Chlorine Residual	0.000
Ammonia (expressed as nitrogen)	0.0
Toxicity Concentration (in toxic units)	0.00

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

The daily maximum effluent concentration limit shall apply to flow weighted concentrations within 24 hours.

The instantaneous maximum shall apply to grab sample determinations.

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

$$\text{lbs/day} = 8.34 \times Ce \times Q \qquad (2)$$

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

Any significant change in waste flow shall be cause for reevaluating effluent quality requirements.

If a calculated Ce value falls below the limit of detection of the test method specified in the Code of the Federal Register, 40 CFR 136, the limit of detection shall serve as

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Footnotes (continued)

the limiting effluent concentration. The State or Regional Board may, at their discretion, specify test methods which are more sensitive than those specified in 40 CFR 136. Total chlorine residual is likely to be a "limit of detection" effluent requirement in many cases. The limit of detection of total chlorine residual in standard test methods is less than, or equal to, 0.02 mg/l.

Due to the large total volume of powerplant and other heat exchange discharges, special procedures must be applied for determining compliance with Table B limitations on a routine basis. Effluent concentration values (Ce) shall be determined through the use of Equation 1 considering the minimal probable initial dilution of the combined effluent (in-plant waste streams plus cooling water flow). These concentration values shall then be converted to mass emission limitations as indicated in Equation 2. The mass emission limits will then serve as requirements applied to all in-plant waste streams taken together which discharge into the cooling water flow. The procedure described above shall apply to all Table B materials except limitations on total chlorine residual and radioactivity which shall apply to, and be measured in, the combined final effluent.

11/ Water quality objectives for total chlorine residual applying to intermittent discharges not exceeding two hours, and 24 hours and instantaneous (1 minute) maximum objectives applying to continuous sources, shall be determined through the use of the following equation:

$$\log y = -0.328 \log x - 0.905$$

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

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

a. Toxicity Concentration (Tc)

Expressed in Toxicity Units (tu)

$$\text{Tc (tu)} = \frac{100}{\text{96-hr. TLm\%}}$$

Footnotes (continued)

b. Median Tolerance Limit (TLm%)

The TLm shall be determined by static or continuous flow bioassay techniques using standard test species. If specific identifiable substances in wastewater can be demonstrated by the discharger as being rapidly rendered harmless upon discharge to the marine environment, the TLm may be determined after the test samples are adjusted to remove the influence of those substances.

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

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

S = percentage survival in 100% waste.

13/ Total chlorinated pesticides and PCB's shall be measured by summing the individual concentrations of DDT, DDD, DDE, aldrin, BHC, chlordane, endrin, heptachlor, lindane, dieldrin, and polychlorinated biphenyls.

The Executive Director shall undertake a preliminary investigation into the presence and hazards posed by the other halogenated hydrocarbons which may be present in wastewater discharges. Such review shall lead to a recommendation regarding the necessity for regulation, gathering of necessary data, or other appropriate actions which should be taken by the State Board.

As part of the preliminary investigation, the Executive Director may impose additional monitoring requirements on discharging agencies to assess the occurrence of halogenated hydrocarbons other than those specifically mentioned in this Plan.

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WATER QUALITY CONTROL PLAN

TABLE B GUIDELINES

OCEAN WATERS OF CALIFORNIA

REPRINTED AUGUST 1980

1978

State Water Resources Control Board

25352

STATE OF CALIFORNIA
Edmund G. Brown Jr., Governor

STATE WATER RESOURCES
CONTROL BOARD

Carla M. Bard, Chairwoman
William J. Miller, Vice Chairman
L. L. Mitchell, Member
Jill B. Dunlap, Member
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◆

Clinton L. Whitney, Executive Director

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WATER QUALITY CONTROL PLAN

TABLE B GUIDELINES

OCEAN WATERS OF CALIFORNIA

1978

STATE OF CALIFORNIA
STATE WATER RESOURCES CONTROL BOARD
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EDMUND G. BROWN JR., *Governor*

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These guidelines have been developed by the staff of the State Water Resources Control Board to assist in implementing the Water Quality Control Plan - Ocean Waters of California (Ocean Plan) adopted by the Board on January 19, 1978. The Environmental Protection Agency cooperated in this development as a result of their approval of the Ocean Plan as a state water quality standard in accordance with the provisions of the Federal Clean Water Act.

The guidelines are intended to amplify the Ocean Plan and provide direction for its application to the most common situations which will be encountered. As additional experience is gained in applying the Ocean Plan,or unusual, but not unique, situations are encountered, these guidelines can be expanded.

Larry F. Walker

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Executive Director,
Water Quality

SECTION I

INTRODUCTION

On January 19, 1978, the State Water Resources Control Board amended the 1972 Water Quality Control Plan-Ocean Waters of California. The revised Plan created a different system for developing effluent quality requirements and made additional changes to the system which had been employed during the preceding six years for the regulation of waste discharges occurring to the waters of the Pacific Ocean. This document is intended to provide a series of guidelines to assist the Regional Water Quality Control Boards in utilizing the 1978 Plan as a regulatory tool. In addition, the guidelines will assist the dischargers and other interested persons in fully understanding how this Plan will be applied in specific situations.

As the Boards obtain experience in dealing with a wide variety of situations, some revisions of these guidelines may be required. It is intended that the guidelines contained herein be continuously refined to reflect new information as it becomes available.

These guidelines are not meant to completely replace those described in "Guidelines for Technical Reports and Monitoring Programs issued October 6, 1972. They alter only the approaches to setting Table B effluent limitations, monitoring for Table B pollutants in receiving waters, modifying limitations based on Table B, statistical interpretation of monitoring data, and calculating minimum initial dilution.

SECTION II

ESTIMATES OF INITIAL DILUTION

The 1978 Plan contains an extensive set of numerical water quality objectives which must be translated into effluent limitations. This translation is to occur utilizing the following equation:

$$Ce = Co + Dm\ (Co-Cs)$$

Where: Ce = Effluent concentration limit

Co = Water quality objective

Cs = Background seawater concentration

Dm = Mimimum initial dilution

Values of Co are contained in Table B, Chapter IV of the Plan. Appropriate values of Cs are found in Footnote 10, Page 13 of the Plan.

The minimum initial dilution (Dm) is defined in the Plan as a process which results in the rapid and irreversible turbulent mixing of wastewater with ocean water around the point of discharge. It was intended by the Board, as evidenced in the record before the Board and the environmental documents associated with the Plan, that the estimate of initial dilution should be a conservative estimate.

In attempting to judge the initial dilution obtained for dischargers to ocean waters there are two cases which represent the vast majority of situations. The first is a discharge through a submerged outfall of a fluid of lighter density than the receiving medium. This is perhaps the most studied case and is representative of the most commonly found municipal and industrial discharges. The second case is that resulting from a surface discharge where the density difference between the two fluids is primarily related to a thermal gradient. This latter case is often found in discharges from powerplants. Guidelines for handling these two cases follow. Judgments of initial dilution for discharge types other than these two standard cases must be based on other techniques approved by the Board on a case by case basis.

Most ocean dischargers will submit basic information relative to their facility to the appropriate Regional Board on Form 1 (Attachment J). For any case involving powerplant discharges to the ocean, data submitted should also include specific operations information including planned noncooling water waste flow amount and frequency if intermittent, cooling water flow variations under normal full capacity operation and expected pollutant load in the undiluted noncooling water waste stream in addition to the physical parameters to be given on Form 1. Regional Boards will set effluent limitations based on the information received, the initial dilution calculated, and the requirements set forth in the Plan.

The following guidelines represent conservative estimates in keeping with the Board's overall intent in adopting the Plan. However, it is recognized that hydrodynamic modeling of discharges is a rapidly advancing technology and it is possible that superior techniques may become available for making estimates of minimum initial dilution. New techniques will be accepted for use by the State Board. However, any alternative estimates must be universally applicable to a general physical case, proven to represent a conservative estimate or critical case situation, and also the results should be verified.

To simplify and standardize the calculation and use of initial dilution values certain standard conditions will be recognized. The ocean level at which depth and flow parameters are determined should be mean sea level. Outlet parameters should be measured where the pipe, channel, or other outlet structure ceases and the ocean begins. The daily rate of flow should be averaged within each calendar month to obtain the average daily flow for that month. This would only include data from days of operation at full capacity and would exclude days of zero flow. For submerged discharge the monthly flow is programmed into the "plume" model in conjunction with the most severe stratification profile in the receiving water. Generally, for either surface or submerged discharge the minimum initial dilution can be expected to occur in the warmest months except for areas which are influenced by large freshwater discharges to coastal waters during the winter months. The lowest initial dilution resulting from this process will be considered the minimum initial dilution and will be used to determine D_m.

A. Submerged Discharges

The case of the submerged buoyant discharge is the most typical situation encountered. For such discharges the momentum of the discharge and its initial buoyance act together to produce turbulent mixing. Initial dilution is completed when the diluting plume ceases to rise in the water column and begins to spread horizontally.

A rather simple model describing this process is the U. S. Environmental Protection Agency's "Plume"[1/] program. "Plume" is designed to determine the geometric and dynamic behavior of a buoyant round plume issuing from a port in stagnant, density stratified surroundings. The port may be oriented at any angle from 0° (horizontal) to 90° (vertical). The governing differental equations are based upon similarity principles. Computed results include coordinates for plume centerline, centerline dilution as a function of position, and maximum height of rise if the receiving water is stratified. Dilution due to multiple port discharge can be calculated but plume interaction is not considered. Analysis of shallow (depth less than seven outlet diameters) vertical and near vertical outlets should be discussed (see Part C, Page 15) on a case-by-case basis with the staffs of the Regional Board and the State Board.

The "Plume" model is conservative in that it does not account for any increased rate of dilution associated with ambient currents in the region of the discharge. For convenience, the initial dilutions calculated using the plume program represent the plume

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[1/] "Users Guide and Documentation for Outfall Plume Model", D. J. Baumgartner, D. S. Trent, and R. V. Byram. Working Paper No. 80, EPA, Pacific Northwest Laboratory, May 1971. Available by writing National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22151.

centerline dilution at a given depth. For purposes of demonstrating impact upon water quality objectives, the development of effluent limits for inclusion in waste discharge requirements, and for field monitoring, the appropriate value to use is the average cross sectional plume dilution. This represents the minimun dilution for a plume subjected to no cross current. The cross sectional dilution is 1.77 times the centerline dilution. Hence, Dm equals 1.77 $(D_{cl}-1)$ where D_{cl} is the centerline dilution obtained through the "Plume" program.[2/]

The "Plume Model" uses a relatively simple set of input conditions. The Regional Boards should obtain the input data by requiring the discharger to complete Form 1. The Regional Boards should transmit a completed Form 1 to the Legal Division, State Water Resources Control Board. The Legal Division will check the input data and prepare the data for computer entry. The Division will request a computer run and supply the Regional Board with a copy of the run and "Plume" program estimates for both minimum initial dilution and centerline dilution. The minimum initial dilution should be utilized by the Regional Boards in the development of effluent limitations.

[2/] The plume program calculates the ratio of entrained seawater plus effluent volume to the effluent volume alone. To determine the initial dilution as defined in the Ocean Plan, subtract one (for the effluent) from the value calculated by the plume program.

In the event that someone wishes to utilize another technique for prediction of Dm, they must submit a request to the State Board outlining the proposed technique in detail, demonstrate its general applicability, and verification results. Any results obtained by such a technique shall be compared to estimates obtained utilizing the "plume" model and the benefits derived from utilization of the technique shall be clearly documented. The Executive Director of the State Board will determine if the technique is acceptable and can be used to make the necessary estimates.

B. Surface Discharge

The initial dilution of a surface discharge differs from that of a submerged discharge. The extent of surface jet initial mixing is determined primarily by the nature of its initial discharge flow, its submergence, velocity, dimensions, and temperature rise above ambient. Mixing due to buoyancy is not a major factor. Initial dilution is completed not when the diluting plume ceases to rise but when turbulent entrainment due to momentum ceases. This point occurs at the end of a region of stability in which the centerline velocity drops sharply, the jet depth decreases, the lateral spread increases, and temperature and dilution remain relatively constant. (See Figure 1, Page 10.) The model from which the computation method is derived[3/]

[3/] "A Users Manual For Three-Dimensional Heated Surface Discharge Computations" by Keith D. Stolzenbach, E. Eric Adams, and Donald R. F. Harleman; Report No. 156; September 1972; Massachusetts Institute of Technology, Department of Civil Engineering. Contact Gary Risch, Data Management, 21st and T, Sacramento, phone number (916) 322-3759 for computer program and manual.

can be used to estimate the dilution at the end of this stable region given the discharge flow, its initial temperature, depth, and velocity. It is assumed that the receiving body of water is of large extent vertically and horizontally and the bottom of the receiving water does not interfere with the vertical development of the surface jet. A nonuniform cross current, V, may be present in the receiving water but for use with the Ocean Plan the most conservative estimate of initial dilution occurs when the cross current is zero (V = 0).

The authors[3/] of the model have taken a nondeterminant theory and with several judicious assumptions developed a method of calculation based on four dimensionless parameters only two of which are required for computation of minimum initial dilution:

(A) $IF_o = \frac{U_o}{(\beta g \ \Delta T_o \ h_o)^{1/2}}$ = Initial densimetric Frouds number 4/

(B) $A = h_o/b_o$ = Discharge channel aspect ratio

The two other parameters (related to surface heat loss and cross flow velocity) are considered to be zero for Ocean Plan dilution calculations. For quick calculation of minimum initial dilution (stable zone conditions) the following equation can be used:

(C) $$D_m = 1.4 \ [(IF_o)^2 \ (A)^{1/2} + 1]^{1/2} - 1$$

Where $D_m = \frac{\text{Seawater Flow Entrained}}{\text{Initial Wastewater Flow}}$

4/ Note that $\beta \Delta T_o = \frac{(P_a - P_o)}{P_a}$ where "P_a" and "P_o" are the densities of the receiving water and the discharge water, respectively.

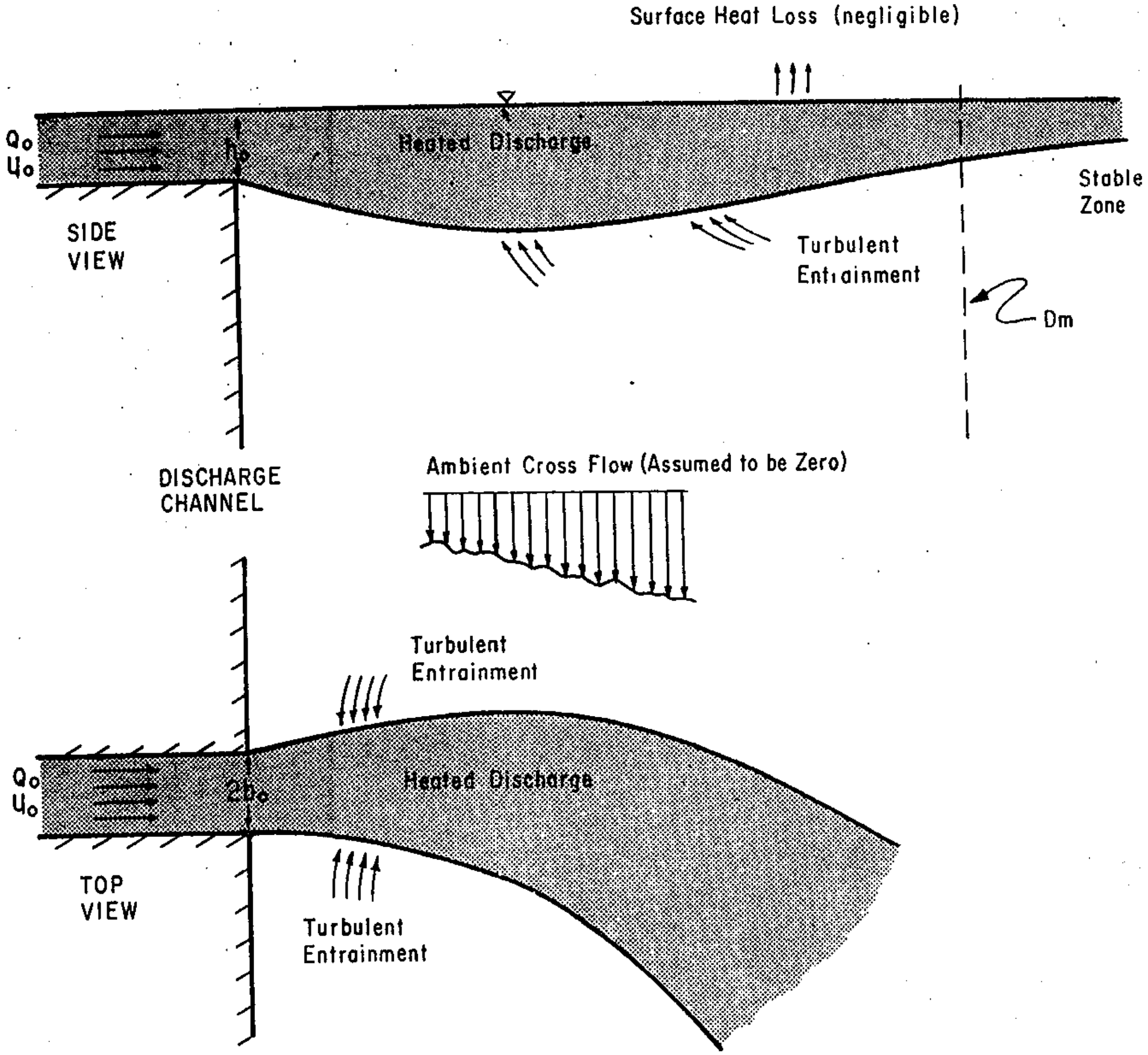


Figure 1

SCHEMATIC OF HEATED SURFACE DISCHARGE

A chart for determining D_m can also be used and is included here as Figure 2 (Page 13).

The following parameters are required to determine values for dimensionless parameters "A" and "IF_o" and to solve equation (C) above:

Q_o = Discharge flow (cfs)

b_o = Half-width of discharge channel (ft)

h_o = Depth of flow in discharge channel where it enters the receiving water (ft)

U_o = Velocity of discharge in channel = $\frac{Q_o}{2\ h_o b_o}$ (fps)

ΔT_o = Temperature of wastewater (T_o) - Ambient Ocean Temperature (T_a) (^oF)

g = Gravitation constant = 32.2 ft/sec^2

β = Coefficient of thermal expansion for given salinity and temperature $(^oF)^{-1}$. Use Figure 3 (Page 14) with an average temperature of T = ("Discharge Temperature" + "Ambient Ocean Temperature")/2 and an average salinity. Ocean water is approximately 33 ppt salinity.

If a channel shape other than rectangular is analyzed, use the following procedure for calculation of the input parameters related to channel geometry:

a) Let h_o be the actual maximum discharge channel depth (flow depth) so that calculation of IF_o is not affected by the schematization.

b) Let b_o be such that the correct discharge channel flow area is preserved:

$$b_o = \frac{\text{channel area}}{2h_o}$$

Then the aspect ratio is given by:

$$A = \frac{h_o}{b_o} = \frac{2h_o^2}{\text{channel area}}$$

As an example, the aspect ratio of a pipe flowing full is $8/\pi = 2.55$. See Attachment J (Page 57) for a sample calculation of D_m.

Note that this method can be used to predict dilution for surface discharge from other than powerplants. Dilution of almost any heated surface discharge or discharge of wastewater with a lesser density to a large body of receiving water can be analyzed. The technique appears to work well for $IF_o \geq 1$, $P_o < P_a$, and $T_o > T_a$. IF $\Delta T_o = 0$ and $P_a > P_o$, use the ratio $(P_a - P_o)/P_a$ for $\beta\Delta T$ in calculating IF_o (see Page 9). If $IF_o < 1$ or $\Delta T_o \leq 0$, and $\Delta P \leq 0$ another prediction technique must be used (see Part C, page 15).

Regional Board staff having received the required information from the discharger may perform the calculations required to determine minimum initial dilution for surface discharge based on the above method or may submit Form 1 (Attachment J) to Legal Division for determination.

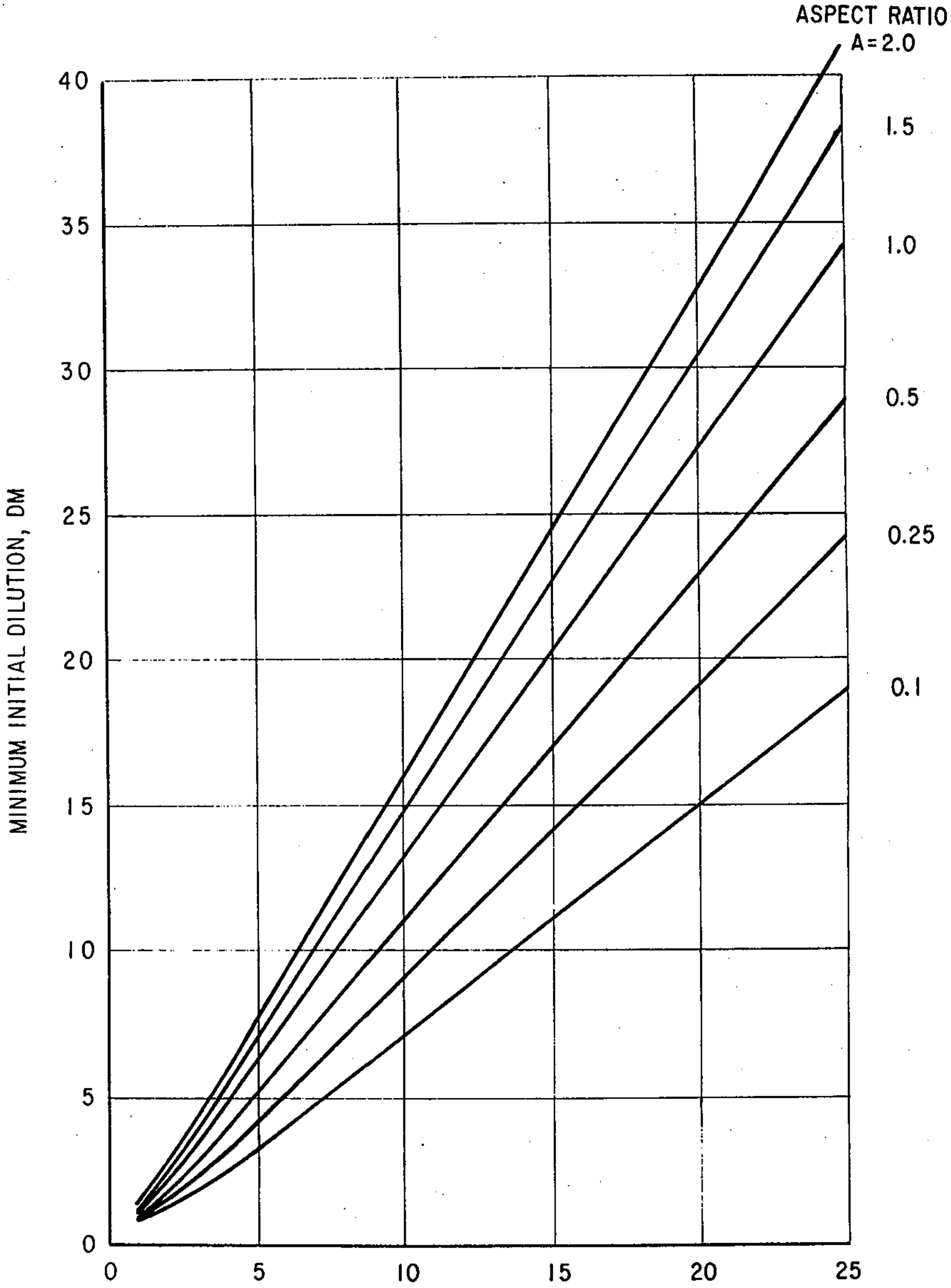


Figure 2 - Dilution, Dm in the Stable Region for $k/u_o = V/u_o = 0$

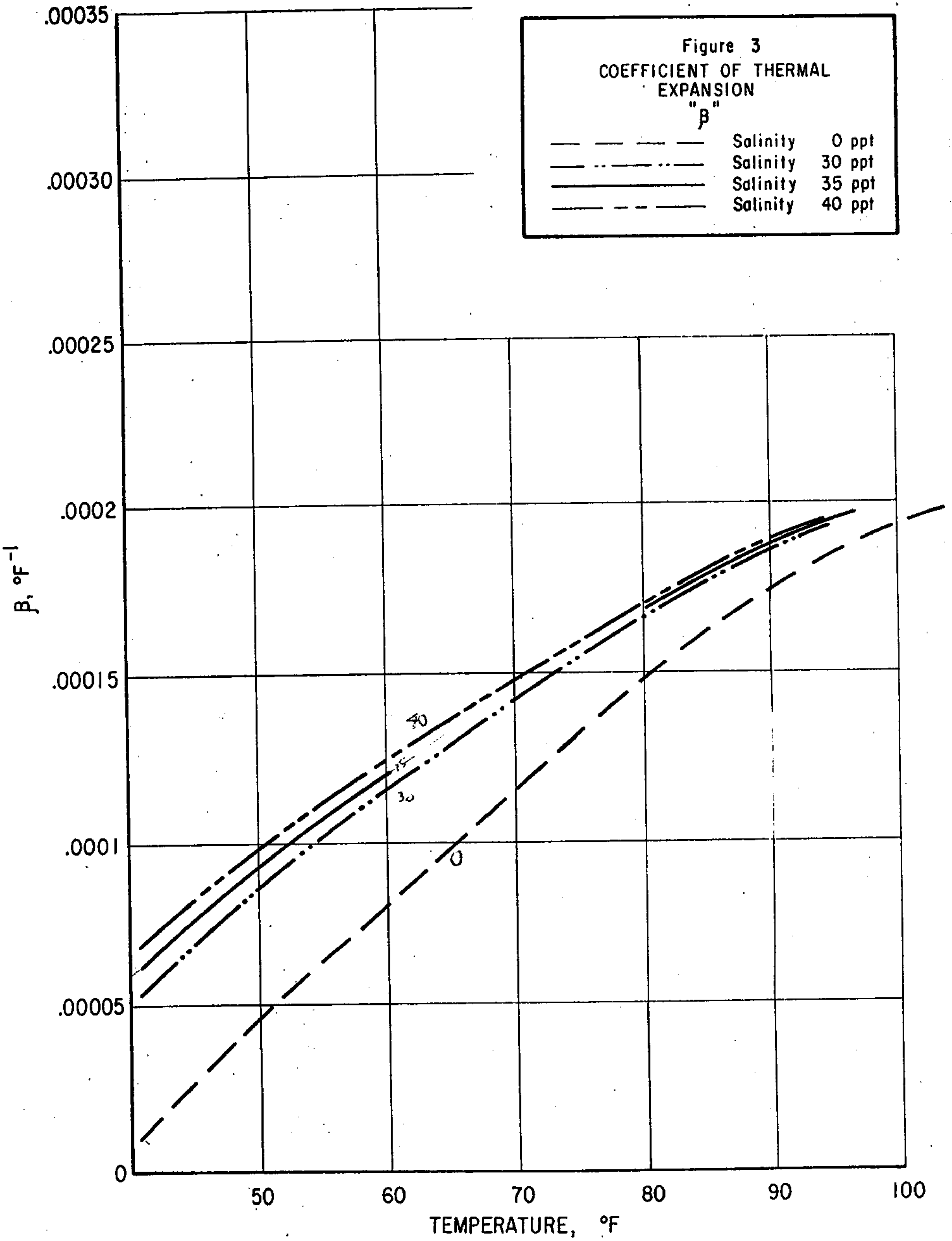


Figure 3
COEFFICIENT OF THERMAL EXPANSION
"β"

As stated on Page 8 the Executive Director of the State Board will determine the acceptability of any proposed technique other than the one described here for prediction of D_m.

C. Procedure If Models Do Not Apply

If neither of the preceding methods apply to the specific case to be analyzed, the discharger is faced with two positive alternatives. He can propose another numerical prediction model with justifying data or he can supply the results of a site specific physical modeling study.

In either case all supporting data and a complete description of the methodology used must be submitted to Legal Division and the appropriate Regional Board for analysis. Staff will review the physical data relative to outfall configuration, discharge flow, and the natural morphology of the surrounding ocean bottom and shoreline as well as the justifying literature and verification data for the method used. The Executive Director for Water Quality will approve or disapprove the proposed alternative minimum initial dilution calculation method.

SECTION III

TABLE B EFFLUENT LIMITATIONS

Effluent limitations will be developed from the Table B water quality objectives and the calculated initial dilution. Effluent limitations will be included in waste discharge requirements both in terms of concentration and mass. It is noted, however, that in particular industrial applications imposition of effluent concentration limitations results in a severe handicap in water conservation programs. Hence, a discharger contemplating any significant modification of his operation that could affect water conservation should notify the Regional Board. The Regional Board should obtain all necessary information, and if justified, prepare modified limitations based upon reduced water useage that would allow water reclamation.

Compliance with effluent limitations shall be determined through sampling and the analytical methods outlined by EPA for use in the NPDES permit program (40 CFR 136). Median and daily maximums shall be determined based upon the results of analyzing 24-hour flow weighted composite samples. Instantaneous maximum values apply only to grab samples.

SECTION IV

MODIFICATION OF OCEAN PLAN TABLE B LIMITATIONS

Limited modification of Table B limitations by the Regional Boards is provided for under special limited circumstances. Such modification is to be only done on a case specific basis. To obtain a modification, a discharger must submit an application to the Regional Board demonstrating that:

1. Reasonable control technologies will not provide compliance; or,
2. Any less stringent provision would encourage reclamation.

The discharger should also include in the application proposed alternative limitations. The Regional Board at a public meeting should consider any such request and obtain the comments of all interested parties. The Regional Board may approve a request when it meets the above criteria and provides for compliance with the Table B toxicity objective of .05 tu. The Regional Board should establish alternative water quality objectives provided such objectives are below the conservative estimates of chronic toxicity and the alternative objectives provide adequate protection for the marine environment. The estimates of chronic toxicity used in the development of the Plan are as follows:

Constituent	Estimate of Chronic Toxicity (mg/l)
Arsenic	*
Cadmium	0.01
Chromium	0.02
Copper	0.01
Lead	0.1
Mercury	0.001
Nickel	0.1

(con't)

Constituent	Estimate of Chronic Toxicity (mg/l)
Silver	0.0006
Zinc	0.04
Cyanide	*
Phenol	*
Ammonia	4.0
Total Chlorine Residual	0.01

* There is insufficient data for arsenic, cyanide, and phenolics to characterize concentrations representing thresholds of chronic effect. Requests for modification of water quality objectives for any of these three waste constituents must be supported by threshold effect data for representative sensitive species. In such cases, applicants seeking modification of water quality objectives should consult the State Board and Regional Water Quality Control Board to determine the species and test conditions necessary to evaluate chronic thresholds.

The Regional Boards may not modify the objective for total chlorinated hydrocarbon pesticides and PCBs, and the objective for radioactivity contained in Table B.

Any modification approved by a Regional Board should be sent to the State Board for concurrence. The transmittal from the Regional Board should contain a copy of the application for modification, a copy of the record before the Regional Board and a Regional Board Resolution outlining the basis for granting the request for modification and the alternative objectives which will be imposed.

If the State Board concurs with the Regional Board action, the matter including the complete record will be transmitted to EPA for concurrence.

A modification can only be made after receipt of a letter indicating EPA concurrence.

The State Board has somewhat broader authority to grant exceptions to other specific provisions of the Plan. Such exceptions are intended to be case specific. The Board will not approve an exception without a public hearing having been held. Persons wishing to obtain an exception which can only be approved by the State Board should submit a request to the appropriate Regional Board with a copy to the State Board. The request shall outline the modification requested and document why such exception is necessary because of:

1. Unusual circumstances which were not anticipated by the Board, and
2. Alternate provisions will provide for protection of beneficial uses, and
3. The public interest will be served.

Any request should contain alternative provisions suggested by the discharger and a justification of why such an alternative is necessary and desirable. If the State Board approves an exception granted by the Regional Board, the decision must be concurred with by EPA to be effective.

SECTION V

RECEIVING WATER MONITORING

Intensive receiving water monitoring for Table B pollutants should not be required as a general rule. Because of the fact that many water quality objectives approach natural seawater concentration, special analytical and sampling techniques are required. This specialized work is costly and difficult and generally beyond the capability of small dischargers to perform.

Periodic ocean waters sampling should be conducted by the larger dischargers and the state and federal agencies having responsibility for monitoring the quality of these waters.

SECTION VI

STATISTICAL INTERPRETATION OF MONITORING DATA

The 1978 Ocean Plan contains water quality objectives requiring that waste discharges not cause significant differences in certain physical and chemical water quality characteristics. The term "significant difference" as utilized in Chapters II.B.3. and II.C.3. in the Plan is defined in Footnote 5 of the Plan as "a statistically significant difference in the means of two distributions of sampling results at the 95 percent confidence level". Definition by a statistical distribution is appropriate in most cases and other means should not be used unless it is shown to be more appropriate. Methods available for making this statistical determination are described below:

A. Choosing the Appropriate Test

Four common statistical tests which may be used to evaluate differences between discharge and control stations are described in the table below:

Test	Use	Conditions for Use
Group Data - t	Parametric test for differences in station means	1) Data must be normally distributed 2) Variances at the two stations must be equal
Paired Observation - t	Parametric test for differences in station means	1) Observations at the two stations must be paired in time 2) Differences between paired measurements must be normally distributed
Rank - t	Nonparametric test for differences in station medians	No special conditions

Test	Use	Conditions for Use
Signed Rank - T	Nonparametric test for differences in station medians	Observations at two stations must be paired in time

These tests are basically two-sample comparisons and can be directly applied when there is only one discharge and one control station. However, there may be cases where a number of stations have been established to characterize discharge and control areas. It is possible, in such cases, to perform multiple tests by comparing each discharge station with each of the control stations in a series of 2-sample comparison tests. However, multiple tests on the same set of data normally increase the possibility of making one of two possible statistical errors, either claiming a statistical significant difference when none actually exists, or failing to find a statistical difference when the stations' being compared are actually different. While multiple testing may be helpful in exploratory evaluations which might suggest possible impacts, to be confirmed by additional analyses, the limitations of multiple testing are such that it should not be utilized as the sole basis for enforcement actions. More satisfactory statistical methods for evaluating data from multiple discharge and control stations are described in Section VI-D.

The parametric tests (t tests) are used to evaluate differences in station means while the nonparametric tests (T tests) are designed to evaluate differences in station medians, Parametric statistics are normally more powerful than nonparametric statistics in the sense that the former are more likely to detect differences between station measurements when, in fact, there are true differences. Parametric tests are preferred but require normally distributed data (see VI-B).

Statistical tests applying to paired observations (Paired Observation t, Signed Rank Test) are often more powerful than group data test (Group t, Rank T), and hence preferred, provided the data are suitable. Paired observation tests are based on the presumption that extraneous factors, in this case those that are not related to waste discharge, affect measurements made at the two stations in a similar way. Hence, by evaluating the difference between individual pairs of measurements made at the two stations at the same time, the effects of extraneous factors are eliminated. The question naturally arises as to how close in time must measurements be made to be considered paired observations. The answer will depend on the time course of the extraneous factor(s) that is thought to affect station measurements. For example, if the factor(s) is seasonal and follows an annual cycle, it would seem reasonable to pair measurements taken at the two stations within weeks but less than say two months apart. If the extraneous factor(s) follows a daily cycle then it would be advisable to pair measurements at the stations only if they were taken within a few hours, say 3 hours, of each other. If the factor is entirely random and unpredictable then measurement would have to be virtually simultaneous to be considered paired observations.

With the information provided above it should be possible to choose the appropriate test for a particular data set. The mechanics for calculating the various statistics are given in Section C. Once the statistical t or T values have been calculated, the level of significance; that is statistical probability (α), must be determined. The tables in Appendices C, E, and G relate statistical values to probability α.

The tables are set up to give either a one-sided or two sided α probability. A one-sided probability should be used when there is reason to believe that the effect of waste discharge is to either increase or decrease the level of a receiving water measurement. The two-sided probability should be used in cases where there is no basis for believing that discharge would affect the measurement in any specific direction, either up or down. In other words, a statistical claim based on a one-sided test asserts that the discharge either increases or decreases the level of a receiving water measurement and specifies the direction of change, while a claim based on a two-sided test only asserts that the discharge has caused a change without specifying the director of that change. In the context of evaluating the effects of waste discharge the distinction between a one-sided and two-sided claim is largely academic. There is normally a basis for believing that the discharge would either increase or decrease a receiving water property and a one-sided test would be appropriate.

When a probability table is set up for one-sided probability, α values are double to give a two-sided probability. When a table is given for two-sided probability, α values are halved for a one-sided probability.

The value of α for given t or T values represents the probability that differences in the mean or medians of two stations are not actually different and can be accounted for by chance alone. When α is small, which by convention is normally taken to be less than or equal to 0.05, the odds that the difference between stations is due to chance is only 1 in 20. Such low odds are generally considered sufficient to reject the hypothesis that differences are due to chance and claim that the discharge has had an effect.

B. Evaluating Data for Normality

The use of any parametric statistic, of which the t test is one, requires that the data follow a normal distribution. To test for normality of data the measurements are arranged in increasing order and the percentage of the total number of measurements less than or equal to each individual measurement is calculated resulting in a cumulative percent distribution. The cumulative percent distribution is then plotted on normal probability paper of the sort provided in Attachment A. If the plotted points fall along a straight line the data are considered to be normally distributed. Quite often field data are not normally distributed but the logarithms of the data are normal. If the cumulative percent frequency distribution of log transformed data plot as a straight line on log-normal probability paper (provided in Attachment B), the t test may be used on log transformed data.

For the Group Data t Test the measurements at each station must be normally distributed and should be plotted separately on probability paper. For the Paired Observations t Test the <u>differences</u> in paired observations must be normally distributed.

It is not valid to test differences in station means when the basic data (or their transformations) are not normally distributed. However, it is possible to evaluate differences in another measure of central tendency, the station medians, using non-parametric statistics which do not require normally distributed data.

C. Computations

1. Parametric Tests

a) <u>The Group Data t Tests</u>. The t distribution may be used to evaluate the differences in means between two stations (waste field station and control station) and takes the form:

$$t_{(N_A + N_B - 2)} = \frac{\overline{X}_A - \overline{X}_B}{\sqrt{\frac{S_A^2}{N_A} + \frac{S_B^2}{N_B}}} \qquad (1)$$

where; N_A and N_B are the numbers of measurements taken at Station A and Station B, respectively;

$(N_A + N_B - 2)$ is the degree of freedom associated with the t value;

$\overline{X}_A$ and $\overline{X}_B$ are the means of the respective station measurements, that is

$$\overline{X}_A = \frac{\sum_{i=1}^{i=N_A} X_A}{N_A} \quad \text{and} \quad \overline{X}_B = \frac{\sum_{i=1}^{i=N_B} X_B}{N_B}; \text{ and}$$

S_A^2 and S_B^2 are the variances of the measurements at the respective stations determined as;

$$S_A^2 \quad \sum_{i=1}^{i=N_A} \quad \frac{(X_{Ai} - \overline{X}_A)^2}{N_A - 1} \text{ ; and}$$

$$S_B^2 \quad \sum_{i=1}^{i=N_B} \quad \frac{(X_{Bi} - \overline{X}_B)^2}{N_B - 1}$$

Many electronic calculators will, upon entering station measurements, directly compute the t statistic or at least station variances, thus greatly reducing the need for hand computations.

To assess the significance of a calculated t value enter the table in Attachment C at the appropriate degree of freedom (d.f.) and read across. If the calculated t is equal to or greater than the table value under column heading t.95 ($\alpha = .05$) then it may be concluded that the stations means are signficantly different at the 0.05 probability level.

Use of the t statistic given in equation 1 assumes that the variances of the measurements at the two stations are euqal, that is $S_A^2 = S_B^2$. The F statistic should be computed to determine if this is or is not a correct assumption:

$$F\ (N_h-1,\ N_l-1) = \frac{S_h^2}{S_l^2}$$

Where; S_h^2 is the higher of the variances calculated for the two stations, and S_l^2 is the lower variance; and N_h is the number of measurement at the station with higher variance and N_l the number of measurements at the station with lower variance; and N_h-1, N_l-1 are the degrees of freedom associated with the F statistic.

After calculating the F statistic, enter the table in Attachment D and identify the table value corresponding to the N_h-1 degrees of freedom in the numerator and N_l-1 degrees of freedom in the denominator of the F expression. If the calculated F is greater than or equal to the table value then it may be concluded that the station variances are not equal (at the 0.05 probability level). If the assumption of equal station variances is rejected then the test of differences in means using the t statistic of equation 1 is invalid. The alternatives in this case are to use the t test for paired observations if possible, or nonparametric tests for differences in medians which will be subsequently described; neither of the alternatives assumes equal station variances.

b) The Pair Observation t Test. A powerful form of the t statistic capcity of detecting small yet real differences in station means can be applied when the measurements at the two stations are made simultaneously or nearly simultaneously in time (See Section II-A). In this case the t statistic takes the form:

$$t_{(N-1)} = \frac{\bar{d} - 0}{\sqrt{\frac{s_d^2}{N}}}$$

Where: (N-1) is the degree of freedom associated with the test and N is the number of paired observations; $\bar{d}$ is the mean of the differences between paired observations, that is

$$\bar{d} = \sum_{i=1}^{i=N} \frac{(X_{Ai} - X_{Bi})}{N}; \text{ and}$$

s_d^2 is the variance of the differences in paired measurements, that is

$$s_d^2 = \frac{\overset{i=N}{\underset{i=1}{}}\left[(X_{Ai} - X_{Bi}) - \bar{d}\right]^2}{N-1}$$

The significance of the computed t value is determined by reference to the table in Attachment C in the same manner as was previously described for the Group Data t Test.

2. Nonparametric Tests

The median is a measure of central tendency of a data set, defined as the value which is neither smaller or larger than 50 percent of the measurement, that is:

The Median Value = value of the $\frac{N+1}{2}$ ranked measurement.

For example the median of an odd number of measurements, say 11, is the value of the 6th ranked measurement when the values are arranged and ranked in order. The median of an even number of observations, say 10, is the value of the hypothetical 5½ ranked measurement which, in practice, is calculated as the value of the 5th ranked measurement plus the value of the 6th ranked measurement divided by 2.

a) Rank Test - T. The Rank Test for differences in sample medians is sometimes called the Wilcoxin T test and sometimes the Mann-Whitney U test. To use this test the measurements at the two sampling stations are ranked together in an ordered series with a rank of 1 assigned to the smallest value, through a rank of $N_1 + N_2$ for the highest value. If the number of measurements at the two stations is not equal then N_1 will designate the lesser number of station measurements and N_2 the greater number of station measurements. The T statistic is calculated as the sum of ranks for the station with the lesser number of measurements, that is:

$$T = \sum_{i=1}^{i=N_1} R_{N_1}$$

Because it is possible to rank the data in either direct order, from smallest to largest value, or in reverse order, from largest to smallest value, a second statistic T^1, representing the sum of ranks of the smaller sample in reverse order, must also be computed before evaluating statistical probability. Rather than re-rank the data in reverse order, T^1 can be directly calculated as follows:

$$T^1 = N_1 \ (N_i + N_2 + 1) - T$$

To evaluate statistical probability use the <u>smaller</u> of T or T^1 and enter the table provided in Attachment E at the series of values for sample sizes of N_1 and N_2.

If the smaller of the calculated T or T^1 is equal to or less than the table value corresponding to $\alpha = .05$ then the medians of the stations are significantly different at the 0.05 probability level.

A sample calculation of the rank sum test is provided in Attachment F.

b) <u>Signed Rank Test</u>. This test may be used to evaluate the differences in station medians when measurements at the two stations are simultaneous or nearly simultaneous in time. The differences between simultaneous paired station measurements ($X_{Ai} - X_{Bi}$) are first computed and then ranked in order of <u>absolute size</u> disregarding sign. After the differences are ranked, their original signs are considered and the sum of positive ranks and negative ranks are computed. The sum of the positive ranks or the negative ranks, <u>whichever is smaller</u> is taken as the T value and referred to the table in Attachment G. If the computed T is less than or equal to the table value corresponding to the number of paired observations (N) under the column $\alpha = .05$, then the medians of the stations are different at the 0.05 probability level.

A sample calculation for the Signed Rank T test is provided in Attachment H.

D. Evaluating Data from Multiple Control and Discharge Stations

The statistics described in Section A involve 2 - sample comparisons and can be applied directly when there is only one control and one discharge station. However, there may be cases when not just one, but a number of stations have been established for the purpose of characterizing water quality in either discharge or control areas. For reasons previously discussed, multiple testing, wherein each of the individual discharge stations is compared separately with each of the control stations, is normally an unsatisfactory method of analyses. One alternative is to pool all measurements made at the several discharge stations and to consider this a single sample, doing likewise for the control stations, and then performing the appropriate 2-sample comparison test. However, before combining data in this way, the implicit assumptions that all of the discharge stations are similar to each other, and all of the control stations are similar to each other, must be verified.

The analysis-of-variance (ANOVA) provides a method for determining whether or not the assumed internal similarities of stations within discharge areas, and within control areas, are correct assumptions. There are a number of forms of the analysis-of-variance. The ANOVA test, appropriate to the particular problem at hand, is called the single classification ANOVA. This ANOVA is designed to evaluate the hypothesis that the means u, u_2 --- u_k of k populations (i.e., sets of measurements at k stations) are similar, that is to say not significantly different on a statistical basis.

Two separate applications of the ANOVA should be performed: 1) evaluating the similarity of means for stations identified as discharge stations; and 2) evaluating the similarity of means for stations identified as control stations. For the sake of brevity, the ANOVA will be described in terms of discharge stations, with the understanding that it would be applied in a similar way for control stations.

Consider as an example a situation where four stations, identified as A, B, C, and D are considered to characterize the discharge area, and 3 to 4 measurements of a water quality property have been made at each of the stations. The data should be arranged in accordance with the example display presented below, with stations as column headings and measurements entered under the appropriate station column:

	Station (k = 4)				
	A	B	C	D	
	7	6	8	7	
	2	4	4	4	
	4	6	5	2	
				5	
Total	C_A=13	C_B=16	C_C=17	C_D=18	Grand Total, G = 64
Observations, n	n_A= 3	n_B= 3	n_C= 3	n_D= 4	N = 13

The characteristic properties of the data display are defined as:

X_i = the individual measurements entered in the display;

k = number of discharge station;

C = column totals representing the sum of measurements at particular discharge station;

G = the grand total or sum of measurements for all discharge stations;

n = number of measurements at a particular discharge station; and

N = total number of measurements at all discharge stations.

These characteristic properties of the data are used to compute three basic ANOVA quantities referred to as the (1) Between Stations Sum of Squares, (2) Within Stations Sum of Squares, and (3) the Total Sum of Squares, where:

$$\text{Between Stations SS} = \frac{C_A{}^2}{n_A} + \frac{C_B{}^2}{n_B} + \frac{C_C{}^2}{n_C} + \frac{C_D{}^2}{n_D} - \frac{(G)^2}{N},$$

or in this case, $\frac{13^2}{3} + \frac{16^2}{3} + \frac{17^2}{3} + \frac{18^2}{4} - \frac{64^2}{13} = 3.92$

$$\text{Within Stations SS} = \left[\sum_{i=1}^{i=n} X_i\right] - \left[\frac{C_A{}^2}{n_A} + \frac{C_B{}^2}{n_B} + \frac{C_C{}^2}{n_C} + \frac{C_D{}^2}{n_D}\right].$$

or in this case, $7^2 + 2^2 + 4^2 + 6^2 + 4^2 + 6^2 + 8^2 + 4^2$
$+5^2 + 7^2 + 4^2 + 2^2 + 5^2 + - \left[\frac{13^2}{3} + \frac{16^2}{3} + \frac{17^2}{3} + \frac{18^2}{4}\right] =$
37.00

$$\text{Total SS} = \left[\sum_{i=1}^{i=n} X_i{}^2\right] - \frac{G^2}{N},$$

or in this case, $7^2 + 2^2 + 4^2 + 6^2 + 4^2 + 6^2 + 8^2 + 4^2$
$+5^2 + 7^2 + 4^2 + 2^2 + 5^2 - \frac{64^2}{13} = 40.92$

It is possible to reduce calculation time by first determining the Between Stations Sum of Squares and the Total Sum of Squares, and then computing the Within Stations Sum of Squares by the difference, since:

"Within Stations SS" = "Total SS" - "Between Stations SS".

The ANOVA table indicated below is the customary format for reporting the computed results:

ANOVA

	Sum of Squares	df	Mean Square	F Ratio*
Between Stations	3.92	3	1.31	$F = \frac{1.31}{4.11} = .32$
Within Stations	37.00	9	4.11	
Total	40.92	12		

---

* Minimum F ratio to claim a statistically significant difference in station means ($p \leq 0.5$) is $F_{.95}$ (3.9) = 3.86, as given in Attachment D.

The number of degrees of freedom, df, associated with Between Sum of Squares is (k-1), in this case 3, or one less than the number of stations. The degrees of freedom associated with the Within Stations Sum of Squares is (N-k), in this case 9. The number of degrees of freedom for the Total Sum of Squares is N-1, or 13 in this case. The entries in the row identified as "Total" are used only for computation of other numbers in the table. The numbers in the mean square column are obtained by dividing the corresponding sum of squares by the degrees of freedom. Finally, an F ratio is computed as the Between Stations Mean Square divided by the Within Stations Mean Square or in this case 1.31/4.11 = 0.32. If the computed F is less than or equal to the appropriate probability table F value (refer to Table in Attachment D) in this case, look up F for 3 degrees of freedom in the numerator and 9 degrees of freedom in the dominator) then the station means are not significantly different. In the example case, the computed F = 0.32, is less than the probability table F = 3.86, and so it would appear that the means of measurements at the four discharge stations are similar, or more properly, not significantly different at the 0.05 probability level. If, after applying the ANOVA to the control stations, it is also apparent that the means of measurements for the control station are not significantly different, then it would be proper to pool data from the various discharge stations, doing likewise for control stations, and perform the appropriate 2-sample comparison test described in Section A.

For the paired observation tests in Section A the average of measurements taken at a particular time for the set of discharge stations, and a similarly derived average for the control stations, would constitute a pair.

In the event that the ANOVA indicates that the means of stations either within the discharge area, or within the control area, are significantly different, it would not be proper to pool data.

A significant ANOVA finding means that the stations are not homogenious, suggesting that there are stations which though initially considered to be characteristic of discharge or control conditions are, in fact, not so. The problem then becomes one of identifying and separating out the anomolous stations from those that properly characterize discharge and control conditions.

Consider the following sets of data for three discharge stations as an example:

STATIONS $(k = 3)$

	A	B	C	
	1	2	6	
	4	3	9	
	3	4	8	
	4	2	9	
Totals, C	$C_A=12$	$C_B=11$	$C_C=32$	$G = 55$
Numbers, n	$n_A= 4$	$n_A= 4$	$n_B= 4$	$N = 12$
Means, $\overline{X}=\frac{C}{n}$	$\overline{X}_A= 3$	$\overline{X}_B= 2.75$	$\overline{X}_C= 8$	

for which the resulting ANOVA table appears as follows:

	Sum of Squares	df	Mean Square	F Ratio*
Between Stations	70.17	2	35.09	$F = 21.40$
Within Stations	14.75	9	1.64	
Total	84.92	11		

---

* Minimum F ratio to claim a statistically significant difference station means $(p \leq .05)$ is $F_{.95}\ (2,9) = 4.26$ as given in Attachment D.

The results of the ANOVA indicate that there are significant differences in the station means. The statistical inference that may be directly drawn from the ANOVA is limited to the latter statement: The ANOVA itself does not distinguish which station is different from one of the other stations. However, it is possible to compare and evaluate the differences between all possible individual pairs of stations by determining confidence limits for the difference between station means using the Within Stations Mean Square determined in the ANOVA computation. There are three possible comparisons in the example case, $\overline{X}_A-\overline{X}_B$, $\overline{X}_B-\overline{X}_C$, and $\overline{X}_A-\overline{X}_C$.

More generally, the number of possible comparisons between pairs of stations is k!/2 (k-2)! where k is the number of stations and the notation ! means factorial (i.e., the serial product of integers from 1 up to the indicated factorial digit, for example 3! = 1 x 2 x 3 = 6).

Ninety-five percent confidence limits for the difference between station means are determined as:

$$\Delta\overline{X} \pm \quad q \sqrt{y} / \sqrt{n}$$

where:

ΔX = the difference in the means between the two stations being compared;

q = a value determined from the table in Attachment I, with k and v degrees of freedom (k is the number of stations considered in the ANOVA, and v is the number of degrees of freedom associated with the Within Stations Sum of Squares) and a cumulative probability of 0.95;

y = the Within Station Mean Square as determined in the ANOVA; and

n = the number of measurement made at one of two stations being compared (if the number of measurement at the two stations is not equal, use the lesser number of measurements as n).

In the example case the 95%:

$$\Delta\overline{X} \pm 3.95 \sqrt{1.64} / \sqrt{4} = \Delta\overline{X} \pm 2.53$$

Ninety-five percent confidence limits on the differences between station means for the three possible station comparisons are set out for the example case in the table below:

Station Comparisons, Observed Mean Difference = $\Delta\overline{X}$	95% Confidence Limits for the Differences between Station Means = $\Delta\overline{X} \pm q\sqrt{y}\ /\ \sqrt{h}$
$\overline{X}_A - \overline{X}_B =$ $3 - 2.75 = + 0.25$	$+ .25 \pm 2.53 = -2.28 +$ to $+ 2.78$
$\overline{X}_B - \overline{X}_C =$ $2.75 - 8 = -5.25$	$-5.25 \pm 2.53 = -7.78$ to -2.72
$\overline{X}_A - \overline{X}_C =$ $3 - 8 = -5$	$-5 \pm 2.53 = -7.53$ to -2.47

When confidence intervals for the mean difference between two stations encompass the value 0 (zero) it may be concluded that the station means are not significantly different (i.e., the difference could be zero). Conversely, if the confidence intervals do not bracket the value zero, the statistical inference is that the station means are signficantly different. Accordingly, it would appear that for the example case, Stations A and B are similar to each other and Station C is significantly different from both Station A and Station B.

The question then becomes which of the station groups, Station A and B group or Station C, are most characteristic of discharge conditions? Factual knowledge of the receiving water would be needed to answer this question. For example, prevailing currents may disperse the waste in a direction which would cross Station C but not Stations A and B, in which case only the data for Station C should be utilized in statistical comparisons between discharge and control areas. Similarly, the ANOVA and individual station comparisons may indicate that all of what were originally thought of as control stations are actual dissimilar groups of stations. It may be that some station groups are influenced by such factors as nonpoint source discharges, changes in bottom topography, water masses, and current patterns or other distinction which could form the basis for identifying which of the station groups would most properly characterize control conditions.

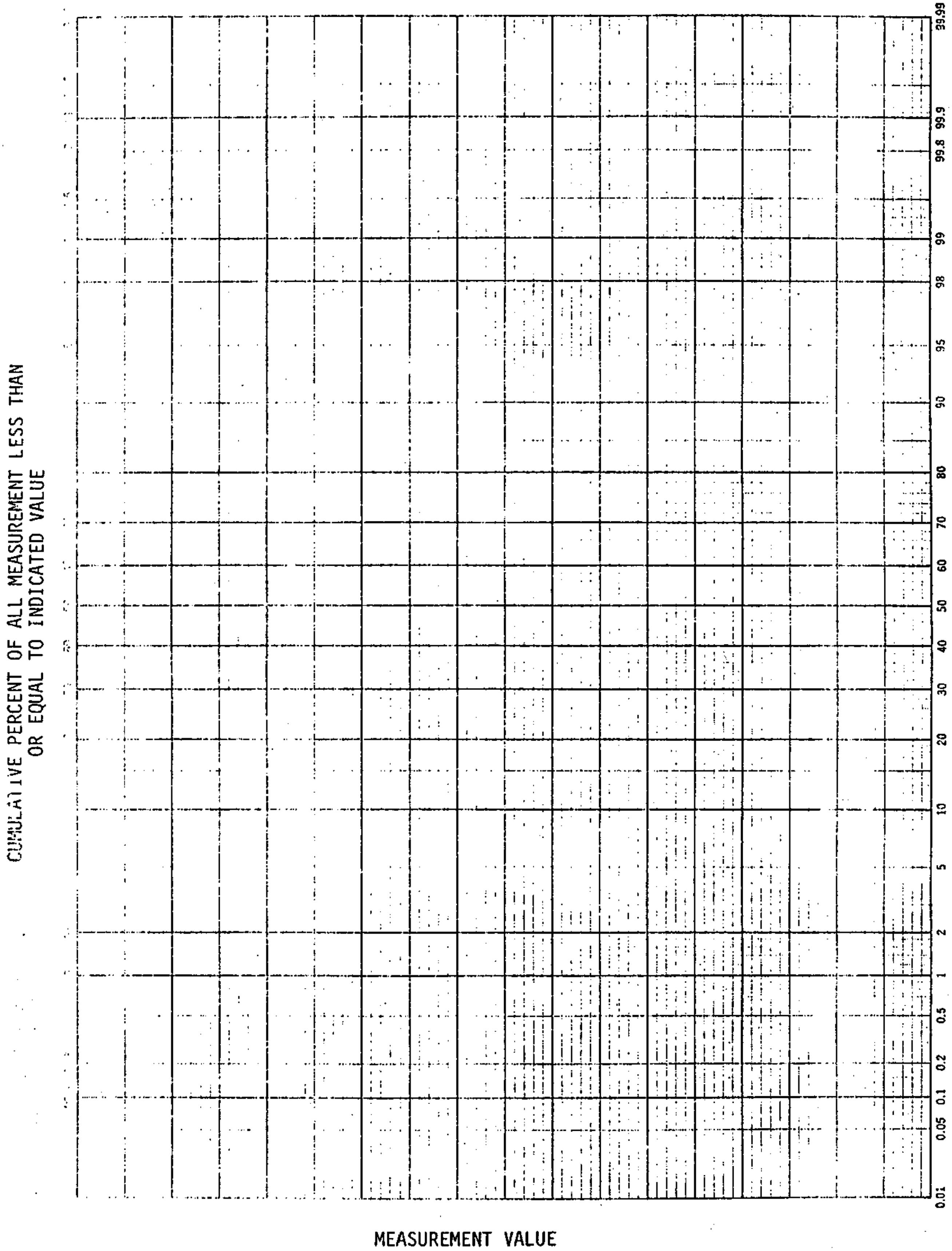
Without knowing the factors that could plausibly account for statistical significant differences in station groups within discharge and control areas, much of the station data cannot be utilized. In the latter situation the only practical decision would be to simply use data from the single discharge station closest to the point of discharge (where water quality objectives apply) and compare these with data from the single most distant control station.

SECTION VII

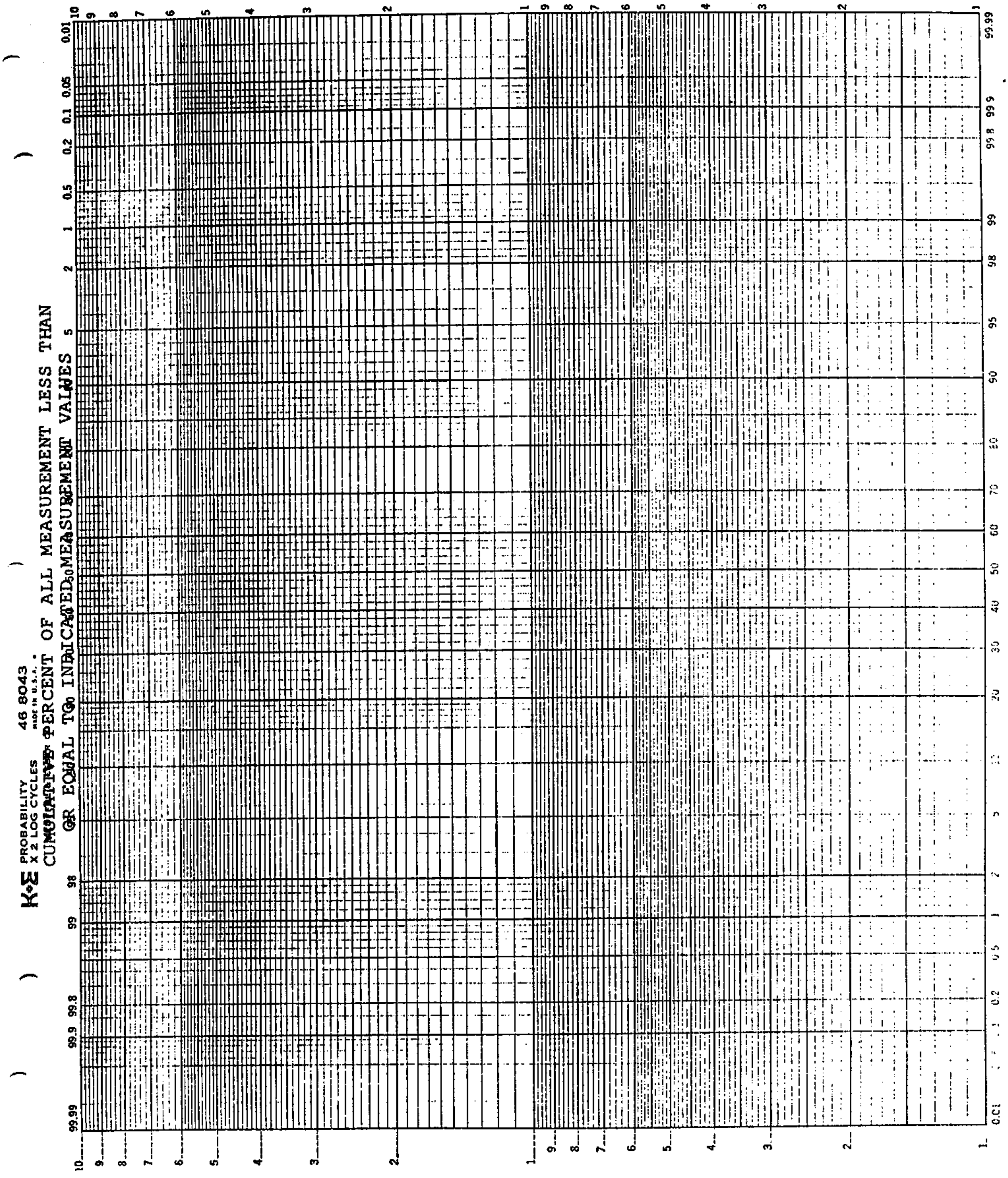
ATTACHMENTS

ATTACHMENT A

ARITHMETIC NORMAL PROBABILITY PAPER



ATTACHMENT B
LOG-NORMAL PROBABILITY PAPERS



ATTACHMENT C

PERCENTILES OF THE t DISTRIBUTION*

df	$t_{.60}$	$t_{.70}$	$t_{.80}$	$t_{.90}$	$t_{.95}$	$t_{.975}$	$t_{.99}$	$t_{.995}$
1	.325	.727	1.376	3.078	6.314	12.706	31.821	63.657
2	.289	.617	1.061	1.886	2.920	4.303	6.965	9.925
3	.277	.584	.978	1.638	2.353	3.182	4.541	5.841
4	.271	.569	.941	1.533	2.132	2.776	3.747	4.604
5	.267	.559	.920	1.476	2.015	2.571	3.365	4.032
6	.265	.553	.906	1.440	1.943	2.447	3.143	3.707
7	.263	.549	.896	1.415	1.895	2.365	2.998	3.499
8	.262	.546	.889	1.397	1.860	2.306	2.896	3.355
9	.261	.543	.883	1.383	1.833	2.262	2.821	3.250
10	.260	.542	.879	1.372	1.812	2.228	2.764	3.169
11	.260	.540	.876	1.363	1.796	2.201	2.718	3.106
12	.259	.539	.873	1.356	1.782	2.179	2.681	3.055
13	.259	.538	.870	1.350	1.771	2.160	2.650	3.012
14	.258	.537	.868	1.345	1.761	2.145	2.624	2.977
15	.258	.536	.866	1.341	1.753	2.131	2.602	2.947
16	.258	.535	.865	1.337	1.746	2.120	2.583	2.921
17	.257	.534	.863	1.333	1.740	2.110	2.567	2.898
18	.257	.534	.862	1.330	1.734	2.101	2.552	2.878
19	.257	.533	.861	1.328	1.729	2.093	2.539	2.861
20	.257	.533	.860	1.325	1.725	2.086	2.528	2.845
21	.257	.532	.859	1.323	1.721	2.080	2.518	2.831
22	.256	.532	.858	1.321	1.717	2.074	2.508	2.819
23	.256	.532	.858	1.319	1.714	2.069	2.500	2.807
24	.256	.531	.857	1.318	1.711	2.064	2.492	2.797
25	.256	.531	.856	1.316	1.708	2.060	2.485	2.787
26	.256	.531	.856	1.315	1.706	2.056	2.479	2.779
27	.256	.531	.855	1.314	1.703	2.052	2.473	2.771
28	.256	.530	.855	1.313	1.701	2.048	2.467	2.763
29	.256	.530	.854	1.311	1.699	2.045	2.462	2.756
30	.256	.530	.854	1.310	1.697	2.042	2.457	2.750
40	.255	.529	.851	1.303	1.684	2.021	2.423	2.704
60	.254	.527	.848	1.296	1.671	2.000	2.390	2.660
120	.254	.526	.845	1.289	1.658	1.980	2.358	2.617
∞	.253	.524	.842	1.282	1.645	1.960	2.326	2.576

When the table is read from the foot, the tabled values are to be prefixed with a negative sign. Interpolation should be performed using the reciprocals of the degrees of freedom.

* The data of this table extracted from Table III of Fisher and Yates, *Statistical Tables*, with the permission of the authors and publishers, Oliver & Boyd, Ltd., Edinburgh and London.

α = (1 - Subscript of column heading t) for a one sided test

ATTACHMENT D

F DISTRIBUTION, UPPER 5% POINTS ($F_{.95}$)*

Degrees of freedom for numerator

Degrees of freedom for denominator	1	2	3	4	5	6	7	8	9	10	12	15	20	24	30	40	60	120	∞
1	161	200	216	225	230	234	237	239	241	242	244	246	248	249	250	251	252	253	254
2	18.5	19.0	19.2	19.2	19.3	19.3	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.5	19.5	19.5	19.5	19.5	19.5
3	10.1	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79	8.74	8.70	8.66	8.64	8.62	8.59	8.57	8.55	8.53
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96	5.91	5.86	5.80	5.77	5.75	5.72	5.69	5.66	5.63
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74	4.68	4.62	4.56	4.53	4.50	4.46	4.43	4.40	4.37
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06	4.00	3.94	3.87	3.84	3.81	3.77	3.74	3.70	3.67
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64	3.57	3.51	3.44	3.41	3.38	3.34	3.30	3.27	3.23
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35	3.28	3.22	3.15	3.12	3.08	3.04	3.01	2.97	2.93
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14	3.07	3.01	2.94	2.90	2.86	2.83	2.79	2.75	2.71
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98	2.91	2.85	2.77	2.74	2.70	2.66	2.62	2.58	2.54
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	2.85	2.79	2.72	2.65	2.61	2.57	2.53	2.49	2.45	2.40
12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75	2.69	2.62	2.54	2.51	2.47	2.43	2.38	2.34	2.30
13	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71	2.67	2.60	2.53	2.46	2.42	2.38	2.34	2.30	2.25	2.21
14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65	2.60	2.53	2.46	2.39	2.35	2.31	2.27	2.22	2.18	2.13
15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59	2.54	2.48	2.40	2.33	2.29	2.25	2.20	2.16	2.11	2.07
16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	2.49	2.42	2.35	2.28	2.24	2.19	2.15	2.11	2.06	2.01
17	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49	2.45	2.38	2.31	2.23	2.19	2.15	2.10	2.06	2.01	1.96
18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46	2.41	2.34	2.27	2.19	2.15	2.11	2.06	2.02	1.97	1.92
19	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42	2.38	2.31	2.23	2.16	2.11	2.07	2.03	1.98	1.93	1.88
20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	2.35	2.28	2.20	2.12	2.08	2.04	1.99	1.95	1.90	1.84
21	4.32	3.47	3.07	2.84	2.68	2.57	2.49	2.42	2.37	2.32	2.25	2.18	2.10	2.05	2.01	1.96	1.92	1.87	1.81
22	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34	2.30	2.23	2.15	2.07	2.03	1.98	1.94	1.89	1.84	1.78
23	4.28	3.42	3.03	2.80	2.64	2.53	2.44	2.37	2.32	2.27	2.20	2.13	2.05	2.01	1.96	1.91	1.86	1.81	1.76
24	4.26	3.40	3.01	2.78	2.62	2.51	2.42	2.36	2.30	2.25	2.18	2.11	2.03	1.98	1.94	1.89	1.84	1.79	1.73
25	4.24	3.39	2.99	2.76	2.60	2.49	2.40	2.34	2.28	2.24	2.16	2.09	2.01	1.96	1.92	1.87	1.82	1.77	1.71
30	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21	2.16	2.09	2.01	1.93	1.89	1.84	1.79	1.74	1.68	1.62
40	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12	2.08	2.00	1.92	1.84	1.79	1.74	1.69	1.64	1.58	1.51
60	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10	2.04	1.99	1.92	1.84	1.75	1.70	1.65	1.59	1.53	1.47	1.39
120	3.92	3.07	2.68	2.45	2.29	2.18	2.09	2.02	1.96	1.91	1.83	1.75	1.66	1.61	1.55	1.50	1.43	1.35	1.25
∞	3.84	3.00	2.60	2.37	2.21	2.10	2.01	1.94	1.88	1.83	1.75	1.67	1.57	1.52	1.46	1.39	1.32	1.22	1.00

Interpolation should be performed using reciprocals of the degrees of freedom.

* This table is reproduced with the permission of Professor E. S. Pearson from M. Merrington, C. M. Thompson, "Tables of percentage points of the inverted beta (*F*) distribution," *Biometrika*, vol. 33 (1943), p. 73.

ATTACHMENT E

VALUES OF T OR T', WHICHEVER IS SMALLER, SIGNIFICANT AT THE 20, 10, 5, AND 1 PER CENT LEVELS[a]

		N_1^b (Smaller Sample)																			
N_2^t	α^c	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
3	.20		3	7																	
	.10			6																	
	.05																				
	.01				(4)																
4	.20		3	7	13																
	.10			6	11																
	.05				10																
	.01					(5)															
5	.20		4	8	14	20															
	.10		3	7	12	19															
	.05			6	11	17															
	.01					15	(6)														
6	.20		4	9	15	22	30														
	.10		3	8	13	20	28														
	.05			7	12	18	26														
	.01				10	16	23	(7)													
7	.20		4	10	16	23	32	41													
	.10		3	8	14	21	29	39													
	.05			7	13	20	27	36													
	.01				10	16	24	32	(8)												
8	.20		5	11	17	25	34	44	55												
	.10		4	9	15	23	31	41	51												
	.05		3	8	14	21	29	38	49												
	.01				11	17	25	34	43	(9)											
9	.20	1	5	11	19	27	36	46	58	70											
	.10		4	9	16	24	33	43	54	66											
	.05		3	8	14	22	31	40	51	62											
	.01			6	11	18	26	35	45	56	(10)										
10	.20	1	6	12	20	28	38	49	60	73	87										
	.10		4	10	17	26	35	45	56	69	82										
	.05		3	9	15	23	32	42	53	65	78										
	.01			6	12	19	27	37	47	58	71	(11)									
11	.20	1	6	13	21	30	40	51	63	76	91	106									
	.10		4	11	18	27	37	47	59	72	86	100									
	.05		3	9	16	24	34	44	55	68	81	96									
	.01			6	12	20	28	38	49	61	73	87	(12)								
12	.20	1	7	14	22	32	42	54	66	80	94	110	127								
	.10		5	11	19	28	38	49	62	75	89	104	120								
	.05		4	10	17	26	35	46	58	71	84	99	115								
	.01			7	13	21	30	40	51	63	76	90	105	(13)							
13	.20	1	7	15	23	33	44	56	69	83	98	114	131	149							
	.10		5	12	20	30	40	52	64	78	92	108	125	142							
	.05		4	10	18	27	37	48	60	73	88	103	119	136							
	.01			7	14	22	31	41	53	65	79	93	109	125	(14)						
14	.20	1	7	16	25	35	46	59	72	86	102	118	136	154	174						
	.10		5	13	21	31	42	54	67	81	96	112	129	147	166						
	.05		4	11	19	28	38	50	62	76	91	106	123	141	160						
	.01			7	14	22	32	43	54	67	81	96	112	129	147	(15)					
15	.20	1	8	16	26	37	48	61	75	90	106	123	141	159	179	200					
	.10		6	13	22	33	44	56	69	84	99	116	133	152	171	192					
	.05		4	11	20	29	40	52	65	79	94	110	127	145	164	134					
	.01			8	15	23	33	44	56	69	84	99	115	133	151	171	(16)				
16	.20	1	8	17	27	38	50	64	78	93	109	127	145	165	185	206	229				
	.10		6	14	24	34	46	58	72	87	103	120	138	156	176	197	219				
	.05		4	12	21	30	42	54	67	82	97	113	131	150	169	190	211				
	.01			8	15	24	34	46	58	72	86	102	119	136	155	175	196	(17)			
17	.20	1	9	18	28	40	52	66	81	97	113	131	150	170	190	212	235	259			
	.10		6	15	25	35	47	61	75	90	106	123	142	161	182	203	225	249			
	.05		5	12	21	32	43	56	70	84	100	117	135	154	174	195	217	240			
	.01			8	16	25	36	47	60	74	89	105	122	140	159	180	201	223	(18)		
18	.20	1	9	19	30	42	55	69	84	100	117	135	155	175	196	218	242	266	291		
	.10		7	15	26	37	49	63	77	93	110	127	146	166	187	208	231	255	280		
	.05		5	13	22	33	45	58	72	87	103	121	139	158	179	200	222	246	270		
	.01			8	16	26	37	49	62	76	92	108	125	144	163	184	206	228	252	(19)	
19	.20	2	10	20	31	43	57	71	87	103	121	139	159	180	202	224	248	273	299	325	
	.10	1	7	16	27	38	51	65	80	96	113	131	150	171	192	214	237	262	287	313	
	.05		5	13	23	34	46	60	74	90	107	124	143	163	182	205	228	252	277	303	
	.01		3	9	17	27	38	50	64	78	94	111	129	147	168	189	210	234	258	283	(20)
20	.20	2	10	21	32	45	59	74	90	107	125	144	164	185	207	230	255	280	306	333	361
	.10	1	7	17	28	40	53	67	83	99	117	135	155	175	197	220	243	268	294	320	348
	.05		5	14	24	35	48	62	77	93	110	128	147	167	188	210	234	258	283	309	337
	.01		3	9	18	28	39	52	66	81	97	114	132	151	172	193	215	239	263	289	315

[a] Computed from Donavon Auble's Extended Tables of the Mann-Whitney Statistic, Bloomington: Indiana University Institute of Educational Research, 1953.

[b] When $N_1 > 2$ and $N_2 > 20$, significance values are given to a good approximation by

$$N_1(N_1 + N_2 + 1)/2 - z\sqrt{N_1N_2(N_1 + N_2 + 1)/12}$$

where z is 1.28 for the 20% level, 1.64 for the 10%, 1.96 for the 5%, and 2.58 for the 1%.

[c] The probability figures given are for a two-sided test. For a one-sided test, α is halved.

ATTACHMENT F

Example Calculation of the Rank Test - T for Testing Differences in Sample Medians:

Station A		Station B	
Measurement	Rank	Measurement	Rank
3.1	5	2.2	3
2.4	4	1.1	1
5.6	8	5.7	9.5*
7.8	11	3.2	6
3.3	7	2.0	2
5.7	9.5*		
	Σ44.5		Σ21.5

* Tied values - When two or more values are tied, assign to each a rank = sum of consecutive ranks that would have applied if the values had not been tied, divided by the number of tied values. The rank of the next untied measurement in the series is then equal to the next consecutive rank not used in the calculation for tied values. For example two values tied for the ninth rank are each assigned a rank = $\frac{9 + 10}{2}$ = 9.5 and the next untied measurement in the series is assigned a rank of 11.

N_1 = The less number of measurement at one of the stations, which in this case is Station B, $N_1 = 5$.

N_2 = The greater number of measurements at one of the stations, which in this case is Station A, $N_2 = 6$.

$T = \propto$ ranks N_1 in direct order = $\propto$ranks Station B = 21.5.

$T_1 = \propto$ ranks N_1 in reverse order = $N_1 (N_1 + N_2 + 1) - T =$

$5 (5 + 6 + 1) - 21.5 = 38.5.$

Since T is less than T^1, T is referred to the probability table in Attachment E. Since the calculated T = 21.5 is greater than the table value, 18, (for $N_1 = 5$, $N_2 = 6$, $\alpha = 0.05$), the medians of the two sets of station measurements are not significantly different at the 0.05 probability level for a two-sided test. For a one-sided the α values in the table are halved. In this particular example, the calculated T would have to be less than or equal to the table value 20 to claim a significant difference at the 0.05 in a one-sided test. It is not, and so no claim of a statistically significant difference can be made.

ATTACHMENT G

VALUES[a] OF T FOR SIGNED-RANK TEST SIGNIFICANT AT THE 20, 10, 5 AND 1 PER CENT LEVELS

	Level of Significance α [b]			
N	.20	.10	.05	.01
4	0			
5	2	0		
6	3	2	0	
7	5	3	2	
8	8	5	3	0
9	10	8	5	1
10	14	10	8	3
11	17	14	10	5
12	21	17	13	7
13	26	21	17	9
14	31	25	21	12
15	36	30	25	16
16	42	35	29	19
17	49	41	34	23
18	56	47	40	27
19	63	53	46	32
20	70	60	52	37
21	78	67	58	43
22	86	75	65	49
23	95	83	73	55
24	104	91	81	61
25	114	100	89	68
26	124	110	97	75
27	135	120	106	83
28	146	130	116	91
29	157	141	126	100
30[c]	169	152	136	109

[a] The rank totals in the .01 column for all N's and those in the other columns for N's less than 21 were calculated by the method described by Wilcoxon (1945). Rank totals elsewhere were obtained from the normal approximation given in c below.

[b] For a one-sided test, the α's must be halved. Use of table is discussed on p. 102.

[c] For $N > 30$, use $T = N(N + 1)/4 - 1 - z\sqrt{N(N + 1)(2N + 1)/24}$, setting z equal to 1.28 for the .20 level, 1.64 for the .10 level, 1.96 for the .05 level, and 2.58 for the .01 level.

ATTACHMENT H

EXAMPLE CALCULATION OF THE SIGNED RANK T TEST FOR EVALUATING DIFFERENCES IN SAMPLE MEDIANS

Station A surements, X_{Ai}	Station B Measurements, X_{Bi}	Difference $(X_{Ai} - X_{Bi})$	Rank of Absolute Difference	Positive Ranks	Negative Ranks
3	2	+ 1	2	2	
4	1	+ 3	4	4	
5	10	− 5	6		6
6	6.5	− 0.5	1		1
9	7	+ 2	3	3	
12	2	+10	8	8	
8	4	+ 4	5	5	
6	0	+ 6	7	7	
				$\Sigma = 29$	$\Sigma = 7$

smaller of sum of positive rank or sum of negative ranks, in this case = 7 for the negative ranks.

computed T value is greater than the table value 3 (Attachment G), for a sample size N = 8, d $\alpha = 0.05$. Hence, the medians of Station A and Station B are not significantly different . the 0.05 probability level in a two-sided test. For a one-sided test the computed T would ve to be equal to or less than the table value 5, which it is not, to claim a significant fference at the 0.05 level.

ATTACHMENT I

PERCENTILES* OF THE DISTRIBUTION OF $q = w/s$

w is the range of k observations, and ν is the number of degrees of freedom in the independent standard deviation s.

ν	k cum. prop.	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	.95	18.0	27.0	32.8	37.1	40.4	43.1	45.4	47.4	49.1	50.6	52.0	53.2	54.3	55.4	56.3	57.2	58.0	58.8	59.6
	.99	90.0	135	164	186	202	216	227	237	246	253	260	266	272	277	282	286	290	294	298
2	.95	6.09	8.3	9.8	10.9	11.7	12.4	13.0	13.5	14.0	14.4	14.7	15.1	15.4	15.7	15.9	16.1	16.4	16.6	16.8
	.99	14.0	19.0	22.3	24.7	26.6	28.2	29.5	30.7	31.7	32.6	33.4	34.1	34.8	35.4	36.0	36.5	37.0	37.5	37.9
3	.95	4.50	5.91	6.82	7.50	8.04	8.48	8.85	9.18	9.46	9.72	9.95	10.2	10.4	10.5	10.7	10.8	11.0	11.1	11.3
	.99	8.26	10.6	12.2	13.3	14.2	15.0	15.6	16.2	16.7	17.1	17.5	17.9	18.2	18.5	18.8	19.1	19.3	19.5	19.8
4	.95	3.93	5.04	5.76	6.29	6.71	7.05	7.35	7.60	7.83	8.03	8.21	8.37	8.52	8.66	8.79	8.91	9.03	9.13	9.23
	.99	6.51	8.12	9.17	9.96	10.6	11.1	11.5	11.9	12.3	12.6	12.8	13.1	13.3	13.5	13.7	13.9	14.1	14.2	14.4
5	.95	3.64	4.60	5.22	5.67	6.03	6.33	6.58	6.80	6.99	7.17	7.32	7.47	7.60	7.72	7.83	7.93	8.03	8.12	8.21
	.99	5.70	6.97	7.80	8.42	8.91	9.32	9.67	9.97	10.2	10.5	10.7	10.9	11.1	11.2	11.4	11.6	11.7	11.8	11.9
6	.95	3.46	4.34	4.90	5.31	5.63	5.89	6.12	6.32	6.49	6.65	6.79	6.92	7.03	7.14	7.24	7.34	7.43	7.51	7.59
	.99	5.24	6.33	7.03	7.56	7.97	8.32	8.61	8.87	9.10	9.30	9.49	9.65	9.81	9.95	10.1	10.2	10.3	10.4	10.5
7	.95	3.34	4.16	4.68	5.06	5.36	5.61	5.82	6.00	6.16	6.30	6.43	6.55	6.66	6.76	6.85	6.94	7.02	7.09	7.17
	.99	4.95	5.92	6.54	7.01	7.37	7.68	7.94	8.17	8.37	8.55	8.71	8.86	9.00	9.12	9.24	9.35	9.46	9.55	9.65
8	.95	3.26	4.04	4.53	4.89	5.17	5.40	5.60	5.77	5.92	6.05	6.18	6.29	6.39	6.48	6.57	6.65	6.73	6.80	6.87
	.99	4.74	5.63	6.20	6.63	6.96	7.24	7.47	7.68	7.87	8.03	8.18	8.31	8.44	8.55	8.66	8.76	8.85	8.94	9.03
9	.95	3.20	3.95	4.42	4.76	5.02	5.24	5.43	5.60	5.74	5.87	5.98	6.09	6.19	6.28	6.36	6.44	6.51	6.58	6.64
	.99	4.60	5.43	5.96	6.35	6.66	6.91	7.13	7.32	7.49	7.65	7.78	7.91	8.03	8.13	8.23	8.32	8.41	8.49	8.57
10	.01	.02	.18	.42	.64	.81	.96	1.11	1.23	1.34	1.41	1.50	1.57	1.62	1.70	1.74	1.81	1.81	1.88	1.92
	.05	.09	.43	.75	1.01	1.20	1.37	1.52	1.63	1.74	1.83	1.91	1.98	2.05	2.12	2.17	2.22	2.26	2.30	2.34
	.95	3.15	3.88	4.33	4.65	4.91	5.12	5.30	5.46	5.60	5.72	5.83	5.93	6.03	6.11	6.20	6.27	6.34	6.40	6.47
	.99	4.48	5.27	5.77	6.14	6.43	6.67	6.87	7.05	7.21	7.36	7.48	7.60	7.71	7.81	7.91	7.99	8.07	8.15	8.22
11	.01	.02	.18	.42	.64	.82	.97	1.12	1.24	1.35	1.43	1.52	1.58	1.64	1.71	1.76	1.82	1.86	1.91	1.94
	.05	.09	.43	.76	1.01	1.21	1.38	1.52	1.64	1.75	1.84	1.92	2.00	2.07	2.13	2.18	2.24	2.28	2.33	2.37
	.95	3.11	3.82	4.26	4.57	4.82	5.03	5.20	5.35	5.49	5.61	5.71	5.81	5.90	5.99	6.06	6.14	6.20	6.26	6.33
	.99	4.39	5.14	5.62	5.97	6.25	6.48	6.67	6.84	6.99	7.13	7.26	7.36	7.46	7.56	7.65	7.73	7.81	7.88	7.95
12	.01	.02	.18	.42	.64	.82	.98	1.12	1.24	1.35	1.44	1.53	1.60	1.65	1.73	1.77	1.91	1.88	1.92	1.96
	.05	.09	.43	.75	1.01	1.21	1.38	1.53	1.65	1.76	1.85	1.93	2.01	2.08	2.14	2.20	2.26	2.30	2.34	2.38
	.95	3.08	3.77	4.20	4.51	4.75	4.95	5.12	5.27	5.40	5.51	5.62	5.71	5.80	5.88	5.95	6.03	6.09	6.15	6.21
	.99	4.32	5.04	5.50	5.84	6.10	6.32	6.51	6.67	6.81	6.94	7.06	7.17	7.26	7.36	7.44	7.52	7.59	7.66	7.73
13	.01	.02	.18	.42	.64	.83	.98	1.13	1.25	1.36	1.46	1.54	1.61	1.66	1.74	1.79	1.85	1.89	1.94	1.98
	.05	.09	.43	.75	1.01	1.22	1.39	1.53	1.65	1.76	1.86	1.94	2.02	2.09	2.15	2.21	2.27	2.31	2.36	2.40
	.95	3.06	3.73	4.15	4.45	4.69	4.88	5.05	5.19	5.32	5.43	5.53	5.63	5.71	5.79	5.86	5.93	6.00	6.05	6.11
	.99	4.26	4.96	5.40	5.73	5.98	6.19	6.37	6.53	6.67	6.79	6.90	7.01	7.10	7.19	7.27	7.34	7.42	7.48	7.55
14	.01	.02	.18	.42	.65	.83	.99	1.13	1.25	1.37	1.46	1.55	1.62	1.68	1.76	1.80	1.87	1.91	1.95	2.00
	.05	.09	.43	.75	1.01	1.22	1.39	1.54	1.66	1.77	1.86	1.95	2.03	2.10	2.16	2.22	2.28	2.32	2.37	2.41
	.95	3.03	3.70	4.11	4.41	4.64	4.83	4.99	5.13	5.25	5.36	5.46	5.55	5.64	5.72	5.79	5.85	5.92	5.97	6.03
	.99	4.21	4.89	5.32	5.63	5.88	6.08	6.26	6.41	6.54	6.66	6.77	6.87	6.96	7.05	7.12	7.20	7.27	7.33	7.39
15	.01	.02	.18	.42	.65	.83	.99	1.14	1.26	1.37	1.46	1.55	1.63	1.69	1.76	1.81	1.88	1.92	1.97	2.01
	.05	.09	.43	.75	1.01	1.22	1.39	1.54	1.66	1.77	1.87	1.95	2.03	2.11	2.17	2.23	2.29	2.34	2.38	2.43
	.95	3.01	3.67	4.08	4.37	4.60	4.78	4.94	5.08	5.20	5.31	5.40	5.49	5.58	5.65	5.72	5.79	5.85	5.90	5.96
	.99	4.17	4.83	5.25	5.56	5.80	5.99	6.16	6.31	6.44	6.55	6.66	6.76	6.84	6.93	7.00	7.07	7.14	7.20	7.26
16	.01	.02	.18	.42	.65	.83	.99	1.14	1.26	1.37	1.47	1.56	1.63	1.70	1.77	1.82	1.89	1.93	1.98	2.02
	.05	.09	.43	.75	1.01	1.22	1.39	1.54	1.67	1.78	1.87	1.96	2.04	2.11	2.18	2.24	2.30	2.34	2.39	2.44
	.95	3.00	3.65	4.05	4.33	4.56	4.74	4.90	5.03	5.15	5.26	5.35	5.44	5.52	5.59	5.66	5.72	5.79	5.84	5.90
	.99	4.13	4.78	5.19	5.49	5.72	5.92	6.08	6.22	6.35	6.46	6.56	6.66	6.74	6.82	6.90	6.97	7.03	7.09	7.15
17	.01	.02	.18	.42	.65	.84	1.00	1.14	1.27	1.38	1.48	1.57	1.64	1.70	1.78	1.83	1.90	1.94	1.99	2.04
	.05	.09	.43	.75	1.01	1.22	1.40	1.55	1.67	1.78	1.88	1.97	2.05	2.12	2.19	2.25	2.30	2.35	2.40	2.45
	.95	2.98	3.63	4.02	4.30	4.52	4.71	4.86	4.99	5.11	5.21	5.31	5.39	5.47	5.55	5.61	5.68	5.74	5.79	5.84
	.99	4.10	4.74	5.14	5.43	5.66	5.85	6.01	6.15	6.27	6.38	6.48	6.57	6.66	6.73	6.80	6.87	6.94	7.00	7.05
18	.01	.02	.18	.42	.65	.84	1.00	1.15	1.27	1.38	1.48	1.57	1.65	1.71	1.79	1.84	1.91	1.95	2.00	2.05
	.05	.09	.43	.75	1.02	1.22	1.40	1.55	1.67	1.79	1.88	1.97	2.05	2.12	2.19	2.25	2.31	2.36	2.41	2.45
	.95	2.97	3.61	4.00	4.28	4.49	4.67	4.82	4.96	5.07	5.17	5.27	5.35	5.43	5.50	5.57	5.63	5.69	5.74	5.79
	.99	4.07	4.70	5.09	5.38	5.60	5.79	5.94	6.08	6.20	6.31	6.41	6.50	6.58	6.65	6.72	6.79	6.85	6.91	6.96
19	.01	.02	.18	.43	.65	.84	1.00	1.16	1.28	1.39	1.48	1.58	1.65	1.72	1.80	1.85	1.91	1.96	2.01	2.06
	.05	.09	.43	.75	1.02	1.23	1.40	1.55	1.68	1.79	1.89	1.98	2.05	2.13	2.20	2.26	2.32	2.37	2.42	2.46
	.95	2.96	3.59	3.98	4.25	4.47	4.65	4.79	4.92	5.04	5.14	5.23	5.32	5.39	5.46	5.53	5.59	5.65	5.70	5.75
	.99	4.05	4.67	5.05	5.33	5.55	5.73	5.89	6.02	6.14	6.25	6.34	6.43	6.51	6.58	6.65	6.72	6.78	6.84	6.89
20	.01	.02	.18	.43	.66	.84	1.01	1.16	1.28	1.39	1.49	1.58	1.66	1.72	1.80	1.85	1.92	1.97	2.01	2.06
	.05	.09	.43	.75	1.02	1.23	1.40	1.55	1.68	1.79	1.89	1.98	2.06	2.13	2.20	2.27	2.32	2.37	2.42	2.47
	.95	2.95	3.58	3.96	4.23	4.45	4.62	4.77	4.90	5.01	5.11	5.20	5.28	5.36	5.43	5.49	5.55	5.61	5.66	5.71
	.99	4.02	4.64	5.02	5.29	5.51	5.69	5.84	5.97	6.09	6.19	6.29	6.37	6.45	6.52	6.59	6.65	6.71	6.76	6.82

FORM 1
INFORMATION NEEDED TO DETERMINE INITIAL DILUTION FOR SUBMERGED OR SURFACE DISCHARGE

The following information is needed to determine the initial dilution which is defined in the Ocean Plan as that process which results in the rapid and irreversible turbulent mixing of wastewater with ocean water around the point of discharge.

1. Discharger

   a. Name ____________________

   b. Address ____________________

   c. Contact Person & telephone number ____________________

II. Discharge Facilities

   a. Submerged Outfall(EPA plume model)

      i. Average rate of flow, cfs. ____________________

      ii. Average port depth at mean tide, feet ____________________

      iii. Port diameter, feet ____________________

      iv. Port angle from horizontal, degrees (horizontal=0^o, verticle=90^o) ____________________

      v. Number of ports ____________________

      vi. Port spacing, feet (if distance between ports varies, describe fully) ____________________

      vii. Length of diffuser ____________________

   b. Surface Discharge

      i. Average rate of flow, cfs. ____________________

ii. Channel dimensions

a. Diameter, feet or ____________________

b. Width, feet ____________________

c. Depth of flow at mean tide, feet ____________________

c. Angle of flow to shoreline, degrees (parallel=0°, perpendicular=90° ____________________

III. Effluent Characteristics

a. Temperature, degrees Fahrenheit ____________________

b. Salinity, mg/l TDS ____________________

IV. *Receiving Water Characteristics Temperature and Salinity Profile

Depth, feet below surface	June	July	Aug.	Sept.	
					Temp. °C Salinity, mg/l
					"
					"
					"
					"
					"
					"
					"
					"
					"

---

* The objective is to obtain the density profile through the water column which results in the minimum initial dilution for each month. Only surface temperatures and salinities are required for surface discharge calculations.

For outfalls submerged 50 feet or less, record at five equally spaced increments of depth. For outfalls submerged greater than 50 feet, record at ten equally spaced increments.

Entries are average temperatures at specified depths for each month. Generally, data need only be reported for the warmer months except for areas which are influenced by large freshwater discharges to coastal waters during the winter months.

Only one entry for salinity is necessary except for areas which are influenced by freshwater discharges.

ATTACHMENT K

SURFACE JET - MINIMUM INITIAL DILUTION
EXAMPLE CALCULATION

GIVEN: Sample Power Plant Discharge
Channel Width = 50' = W_o
Channel Depth = 3.1' = h_o = Depth of Flow at Outlet
Discharge = Q_o = 330 cfs
Discharge Temperature = 91.4°F = T_o
Ambient Temperature = 70°F = T_a

FIND: Dm

SOLUTION:

(1) Calculate Discharge Channel Geometry (Aspect Ratio)

$$b_o = \frac{W_o}{2} = \frac{50}{2} = 25'$$

$$\text{Aspect Ratio} = A = \frac{h_o}{b_o} = \frac{3.1'}{25'} = \underline{\underline{0.124}}$$

(2) Calculate Densimetric Froude Number (IF_o)

$$U_o = \text{Discharge Velocity} = \frac{Q_o}{h_o W_o} = \frac{330 \text{ cfs}}{(3.1)'(50)'} = \underline{\underline{2.13 \text{ fps}}}$$

B = coeff. of Thermal Expansion for seawater at 33 ppt and Average Temperature of 80.7°F.

= 0.000173 $^{o}F^{-1}$ from Figure 4-1_a

$$IF_o = \frac{2.13 \text{ fps}}{(.000173\ ^{o}F^{-1}\ (32.2 \text{ ft/Sec}^2)(21.4^{o}F\ (3.1'))^{\frac{1}{2}}} = \underline{\underline{3.5}}$$

(3) Calculate Dilution

$$D_m = 1.4\ [(IF_o)^2 (A)^{\frac{1}{2}} + 1]^{\frac{1}{2}} - 1$$

D_m = Minimum Initial Dilution

$$= 1.4\ [(3.5)^2 (.124)^{\frac{1}{2}} + 1]^{\frac{1}{2}} - 1 = \boxed{2.2}$$

STATE WATER RESOURCES CONTROL BOARD

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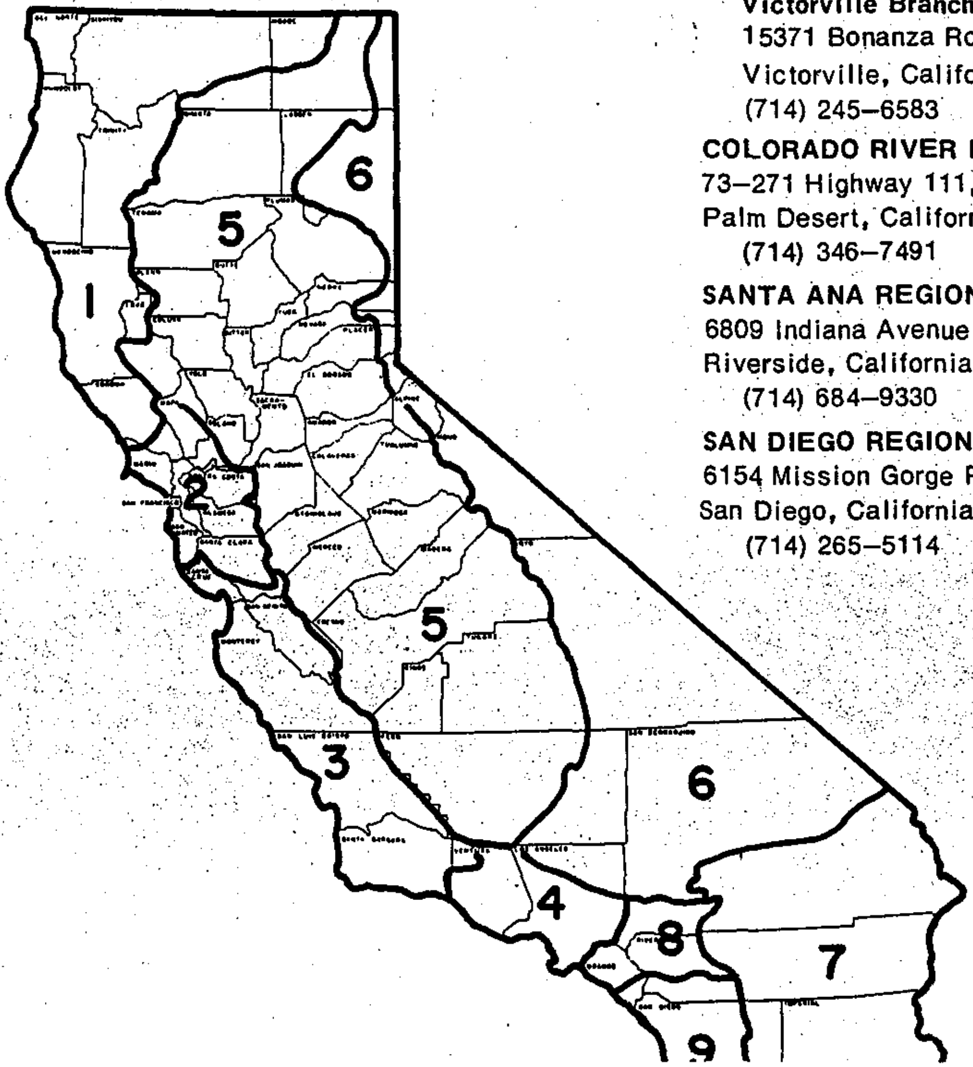

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WATER QUALITY CONTROL PLAN

Ocean Waters of California

STATE OF CALIFORNIA

STATE WATER RESOURCES CONTROL BOARD

25420

25421

State of California
The Resources Agency

STATE WATER RESOURCES CONTROL BOARD

WATER QUALITY CONTROL PLAN
FOR
OCEAN WATERS OF CALIFORNIA

Adopted and Effective

July 6, 1972

STATE OF CALIFORNIA

Ronald Reagan, Governor

The Resources Agency

STATE WATER RESOURCES CONTROL BOARD

W. W. Adams, Chairman
Edward F. Dibble, Vice Chairman
Ronald B. Robie, Member
Roy E. Dodson, Member
Mrs. Carl H. (Jean) Auer, Member

Bill B. Dendy, Executive Officer

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RESOLUTION NO. 72-45

25427

STATE WATER RESOURCES CONTROL BOARD
RESOLUTION NO. 72-45

WATER QUALITY CONTROL PLAN FOR OCEAN WATERS OF CALIFORNIA

WHEREAS:

1. The Board finds it necessary to promulgate water quality objectives and effluent quality requirements to govern the disposal of waste into the coastal waters of California;

2. The Board, after extensive review and analysis of testimony received at public hearings, has determined that protection of beneficial uses of the ocean waters of the State will require maximum practicable control of waste substances which may unreasonably impair those uses;

3. The Board finds that maximum practicable control of waste can be achieved through a comprehensive program which combines source control of waste and modern waste treatment technology;

4. The Board believes that application of current technology through intelligent design of control systems rather than irrational specification of arbitrary treatment methods can provide the highest degree of water quality protection without unreasonable cost;

5. The Board intends to implement monitoring programs to determine compliance with water quality objectives and effluent quality requirements, and to yield other information such as the effectiveness of source control programs and the identification of any short-term or long-term degradation of marine biota;

6. The Board intends to review all available data from time to time to determine the efficacy of control programs for protecting water quality;

THEREFORE, BE IT RESOLVED, that

1. The Board hereby adopts the "WATER QUALITY CONTROL PLAN FOR OCEAN WATERS OF CALIFORNIA"

2. The Board hereby directs all affected California Regional Water Quality Control Boards to implement the provisions of the PLAN.

3. The Board hereby directs its Executive Officer to issue guidelines for monitoring the effects of waste discharges to the ocean at the earliest possible date.

4. The Board hereby declares its intent to determine from time to time the need for revising the PLAN to assure that it reflects current knowledge of water quality objectives necessary to protect beneficial uses of ocean waters and that it is based on latest technological improvements.

CERTIFICATION

The undersigned, Executive Officer of the State Water Resources Control Board, does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the State Water Resources Control Board held on July 6, 1972.

Bill B. Dendy

Bill B. Dendy
Executive Officer

CALIFORNIA STATE WATER RESOURCES CONTROL BOARD

WATER QUALITY CONTROL PLAN FOR OCEAN WATERS OF CALIFORNIA

In furtherance of legislative policy set forth in Section 13000 of Division 7 of the California Water Code (Stats. 1969, Chap. 482) and pursuant to the authority contained in Section 13170 (Stats. 1971, Chap. 1288) the State Water Resources Control Board hereby finds and declares that protection of the quality of the ocean waters for use and enjoyment by the people of the State requires control of the discharge of waste[1] to ocean waters[2] in accordance with the provisions contained herein.

CHAPTER I.
BENEFICIAL USES

The beneficial uses of the ocean waters of the State that shall be protected include industrial water supply, recreation, esthetic enjoyment, navigation, and preservation and enhancement of fish, wildlife, and other marine resources or preserves.

CHAPTER II.
WATER QUALITY OBJECTIVES

This chapter sets forth limits or levels of water quality characteristics for ocean waters to ensure the reasonable protection of beneficial uses and the prevention of nuisance. The discharge of waste shall not cause violation of these objectives.[3]

A. Bacteriological Characteristics

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[4] outside this zone used for body-contact sports, the following bacteriological objectives shall be maintained throughout the water column:

    Samples of water from each sampling station shall have a most probable number of 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).

Adopted by the State Water R

2. At all areas[4] where shellfish may be harvested for human consumption, the following bacteriological objectives shall be maintained throughout the water column:

> The median total coliform concentration shall not exceed 70 per 100 ml, and not more than 10 percent of the samples shall exceed 230 per 100 ml.

B. Physical Characteristics

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

2. The concentration of grease and oil (hexane extractables) on the water surface shall not exceed 10 mg/m^2 more than 50 percent of the time, nor 20 mg/m^2 more than 10 percent of the time.[5]

3. The concentration of floating particulates of waste origin on the water surface shall not exceed 1.0 mg dry weight/m^2 more than 50 percent of the time, nor 1.5 mg dry weight/m^2 more than 10 percent of the time.[5]

4. The discharge of waste shall not cause esthetically undesirable discoloration of the ocean surface.

5. The transmittance of natural light shall not be significantly[6] reduced at any point outside the initial dilution zone.[7]

6. The rate of deposition of inert solids and the characteristics of inert solids in ocean sediments shall not be changed such that benthic communities are degraded.[8]

C. Chemical Characteristics

1. The dissolved oxygen concentration[9] shall not at any time be depressed more than 10 percent from that which occurs naturally.

2. The pH[9] shall not be changed at any time more than 0.2 units from that which occurs naturally.

3. The dissolved sulfide concentration of waters in and near sediments shall not be significantly[6] increased above that present under natural conditions.

4. The concentration of substances set forth in Chapter IV, Table B, in marine sediments shall not be significantly[6] increased above that present under natural conditions.

5. The concentration of organic materials in marine sediments shall not be increased above that which would degrade[8] marine life.

6. Nutrient materials shall not cause objectionable aquatic growths or degrade[8] indigenous biota.

D. Biological Characteristics

1. Marine communities, including vertebrate, invertebrate, and plant species, shall not be degraded.[8]

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

E. Toxicity Characteristics

1. The final toxicity concentration shall not exceed 0.05 toxicity units.[10]

F. Radioactivity

1. Radioactivity shall not exceed the limits specified in Title 17, Chapter 5, Subchapter 4, Group 3, Article 3, Section 30269 of the California Administrative Code.

CHAPTER III.
PRINCIPLES FOR MANAGEMENT OF WASTE DISCHARGES TO THE OCEAN

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

B. Waste discharged to the ocean must be essentially free[11] of:

1. material that is floatable or will become floatable upon discharge,
2. settleable material or substances that form sediments which degrade[8] benthic communities or other aquatic life,
3. substances toxic to marine life due to increases in concentrations in marine waters or sediments,
4. substances that significantly decrease the natural light to benthic communities and other marine life, and
5. materials that result in esthetically undesirable discoloration of the ocean surface.

C. Ocean outfalls and diffusion systems must be designed to achieve rapid initial dilution[12] and effective dispersion to minimize concentrations of substances not removed by treatment.

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

1. pathogenic organisms and viruses are not present in areas where shellfish are harvested for human consumption or in areas used for swimming or other body-contact sports,[13]

2. natural water quality conditions are not altered in areas designated as being of special biological significance, and

3. maximum protection is provided to the marine environment.

CHAPTER IV.
QUALITY REQUIREMENTS FOR WASTE DISCHARGES (EFFLUENT QUALITY REQUIREMENTS)

This chapter sets forth the quality requirements for waste discharges to the ocean.[3/]

TABLE A

	Unit of measurement	Concentration not to be exceeded more than: 50% of time	10% of time
Grease and Oil (hexane extractables)	mg/l	10.	15.
Floating Particulates (dry weight)	mg/l	1.0	2.0
Suspended Solids	mg/l	50.	75.
Settleable Solids	ml/l	0.1	0.2
Turbidity	JTU	50.	75.
pH	units	within limits of 6.0 to 9.0 at all times.	

TABLE B

	Unit of measurement	Concentration not to be exceeded more than: 50% of time	10% of time
Arsenic	mg/l	0.01	0.02
Cadmium	mg/l	0.02	0.03
Total Chromium	mg/l	0.005	0.01
Copper	mg/l	0.2	0.3
Lead	mg/l	0.1	0.2
Mercury	mg/l	0.001	0.002
Nickel	mg/l	0.1	0.2
Silver	mg/l	0.02	0.04
Zinc	mg/l	0.3	0.5
Cyanide	mg/l	0.1	0.2
Phenolic Compounds	mg/l	0.5	1.0
Total Chlorine Residual	mg/l	1.0	2.0
Ammonia (expressed as nitrogen)	mg/l	40.	60.
Total Identifiable Chlorinated Hydrocarbons[14/]	mg/l	0.002	0.004
Toxicity Concentration[10/]	tu	1.5	2.0
Radioactivity		not to exceed the limits specified in Title 17, Chapter 5, Subchapter 4, Group 3, Article 5, Section 30285 and 30287 of the California Administrative Code.	

CHAPTER V.
DISCHARGE PROHIBITIONS

A. Hazardous Substances

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

B. Areas of Special Biological Significance

Waste shall be discharged a sufficient distance from areas designated as being of special biological significance to assure maintenance of natural water quality conditions in these areas

C. Sludge

The discharge of municipal and industrial waste sludge and sludge digester supernatant directly to the ocean, or into a waste stream that discharges to the ocean without further treatment, shall be prohibited.

D. By-Passing

The by-passing of untreated waste to the ocean shall be prohibited.

CHAPTER VI.
GENERAL PROVISIONS

A. Effective Date

This plan is in effect as of the date of adoption by the State Water Resources Control Board. The less restrictive provisions of each of the extant policies and plans for the ocean shall be void and superseded by all applicable provisions of this plan.

B. Mass Emission Rates

In addition to receiving water objectives and effluent quality requirements, waste discharge requirements shall set forth the Maximum Allowable Daily Mass Emission Rate and the Maximum Allowable Monthly Mass Emission Rate for each effluent quality constituent included in the waste discharge requirements.

The Maximum Allowable Daily Mass Emission Rate for each constituent shall be calculated from the total waste flow occurring each specific day and the concentration specified in waste discharge requirements as that not to be exceeded more than 10 percent of the time. The mass emission rate of the discharge during any 24-hour period shall not exceed the Maximum Allowable Daily Mass Emission Rate.

The Maximum Allowable Monthly Mass Emission Rate for each constituent shall be calculated from the total waste flow occurring in each specific month and the concentration specified in waste discharge requirements as that not to be exceeded more than 50 percent of the time. The mass emission rate of the discharge during any monthly period shall not exceed the Maximum Allowable Monthly Mass Emission Rate.

C. Technical Reports

Persons responsible for existing waste discharges to the ocean shall be required by the Regional Board to submit a technical report prior to January 15, 1973. The technical report shall include but not be limited to:

1. A proposed program of improvement of waste treatment facilities necessary to assure compliance with all provisions of this plan.
2. A proposed time schedule for construction of necessary facilities.
3. An estimate of the capital cost of necessary facilities.
4. Any request, with supporting evidence, for less restrictive effluent quality requirements.
5. An analysis of all other factors deemed necessary by the Regional Board to permit establishment of waste discharge requirements.

For discharges exceeding 40 mgd the technical report shall include a correlation of the effluent quality requirements for the parameters set forth in Chapter IV, Table A, with all water quality objectives set forth in Chapter II, and with all effluent quality requirements set forth in Chapter IV, Table B.

D. Waste Discharge Requirements

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

Effluent quality requirements shall not be less restrictive than those set forth in Chapter IV, Table B, of this plan.

Effluent quality requirements may be less restrictive than those set forth in Chapter IV, Table A, of this plan provided the Regional Board finds that the discharge shall comply with all water quality objectives set forth in Chapter II and all effluent quality requirements set forth in Chapter IV, Table B. Less restrictive effluent quality requirements shall be effective only upon approval by the State Board.

E. Revision of Waste Discharge Requirements

The Regional Board shall revise the waste discharge requirements for existing discharges as necessary to achieve compliance with this plan and shall also establish a time schedule for compliance. Prior to adoption, but not later than April 15, 1973, the Regional Board shall submit to the State Board all technical reports provided by the waste dischargers, proposed waste discharge requirements, and time schedules for compliance for all discharges to the ocean.

F. State Board Review of Time Schedules

The State Board shall review proposed time schedules for all municipal discharges throughout the State and shall recommend to the Regional Boards specific schedules to assure the maximum benefit from, and equitable distribution of, available state and federal grant funds.

G. Monitoring Program

The Regional Board shall require dischargers to conduct self-monitoring programs and submit reports necessary to determine compliance with the waste discharge requirements, and may require dischargers to contract with agencies or persons acceptable to the Regional Board to provide monitoring reports. Such monitoring programs shall comply with Guidelines for Monitoring the Effects of Waste Discharges on the Ocean which shall be issued by the Executive Officer of the State Board.

H. Areas of Special Biological Significance

Areas of special biological significance shall be designated by the State Board after a public hearing by the Regional Board and review of its recommendations.

FOOTNOTES

1/ This plan is not applicable to vessel wastes, the control of dredging, or the disposal of dredging spoil. Provisions regulating the thermal aspects of waste discharged to the ocean are set forth in the Water Quality Control Plan for the Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California dated May 18, 1972.

2/ Ocean waters are waters of the Pacific Ocean adjacent to the California coast outside of enclosed bays, estuaries, and coastal lagoons.

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

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

Footnotes

3/ The Water Quality Objectives and Effluent Quality Requirements are defined by a statistical distribution when appropriate. This method recognizes the normally occurring variations in treatment efficiency and sampling and analytical techniques and does not condone poor operating practices. The 50 percentile value (concentration not to be exceeded more than 50 percent of the time) and 90 percentile value (concentration not to be exceeded more than 10 percent of the time) establish an acceptable distribution for any consecutive 30-day period. The distribution of actual sampling data for any consecutive 30-day period shall not have any percentile value exceeding that of the acceptable distribution.

4/ Body-contact sports areas outside the shoreline zone set forth in Chapter II. A.1. and all shellfishing areas shall be determined by the Regional Board on an individual basis.

5/ Surface samples shall be collected from stations representative of the area of maximum probable impact.

6/ The mean of sampling results for any consecutive 30-day period must be within one (1) standard deviation of the mean determined for natural levels for the same period.

7/ Initial Dilution Zone is the volume of water near the point of discharge within which the waste immediately mixes with ocean water due to the momentum of the waste discharge and the difference in density between the waste and the receiving water.

8/ Degradation shall be determined by analysis of the effects of waste discharge on species diversity, population density, growth anomalies, debility, or supplanting of normal species by undesirable plant and animal species.

9/ Compliance with water quality objectives shall be determined from samples collected at stations representative of the area within the waste field where initial dilution is completed. The 10 percent depression of dissolved oxygen may be determined after allowance for effects of induced upwelling.

Footnotes

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

a. Toxicity Concentration (Tc)

Expressed in Toxicity Units (tu)

$$\text{Tc (tu)} = \frac{100}{\text{96-hr. TLm\%}}$$

b. Median Tolerance Limit (TLm%)

The TLm shall be determined by static or continuous flow bioassay techniques using standard test species. If specific identifiable substances in wastewater can be demonstrated by the discharger as being rapidly rendered harmless upon discharge to the marine environment, the TLm may be determined after the test samples are adjusted to remove the influence of those substances.

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

$$\text{Tc (tu)} = \frac{\log (100 - S)}{1.7}$$

S = percentage survival in 100% waste.

c. Toxicity Emission Rate (TER)

Is the product of the effluent Toxicity Concentration (Tc) and the waste flow rate expressed as mgd.

$$\text{TER (tu·mgd)} = \text{Tc (tu)} \times \text{Waste Flow Rate (mgd)}$$

d. Final Toxicity Concentration

(FTc) expressed in toxicity units (tu) shall be determined by a bioassay and estimated by the following calculations:

$$\text{FTc (tu)} = \frac{\text{Toxicity Emission Rate}}{\text{Initial Dilution Water + Waste Flow}}$$

$$= \frac{\text{TER}}{\text{Qd + Qw}}$$

e. Initial Dilution Water (Qd)

Shall be calculated as the product of estimated current velocity, effective diffuser length normal to the prevailing current, and effective mixing depth.

11/ Essentially free means the specific limitations set forth in Chapter IV of this plan.

12/ Diffusion systems should provide an initial dilution of wastewater with seawater exceeding 100 to 1 at least 50 percent of the time, and exceeding 80 to 1 at least 90 percent of the time. If a waste is essentially identical to natural seawater, less restrictive dilution requirements may be permitted by the Regional Board.

13/ Waste that contains pathogenic organisms or viruses should be discharged a sufficient distance from shellfishing and body-contact sports areas to maintain applicable bacteriological standards without disinfection. Where conditions are such that an adequate distance cannot be attained, reliable disinfection in conjunction with a reasonable separation of the discharge point from the area of use must be provided. Consideration should be given to disinfection procedures that do not increase effluent toxicity and that constitute the least environmental and human hazard in their production, transport, and utilization.

14/ Total Identifiable Chlorinated Hydrocarbons shall be measured by summing the individual concentrations of DDT, DDD, DDE, aldrin, BHC, chlordane, endrin, heptachlor, lindane, dieldrin, polychlorinated biphenyls, and other identifiable chlorinated hydrocarbons.

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