

# PRELIMINARY DRAFT

## APPENDIX III

### PROPOSED STANDARD MONITORING PROCEDURES

#### 1- INTRODUCTION

The purpose of this appendix is to provide guidance to the Regional Water Boards on implementing the California Ocean Plan and to ensure the reporting of useful information. Monitoring should be question driven rather than just gathering data and should be focused on assuring compliance with narrative and numeric water quality standards, the status and attainment of beneficial uses, and identifying sources of pollution.

It is not feasible to prescribe requirements in the Ocean Plan that encompasses all circumstances and conditions that could be encountered by all dischargers. Nor is it desirable to limit the flexibility of the Regional Water Boards in the monitoring of ocean waters. Therefore, this appendix should be considered as the basis for the design of an ocean discharger monitoring program. Regional Water Boards are responsible for issuing monitoring and reporting programs (MRP) that will implement this monitoring guidance. Regional Boards can deviate from the procedures required in the appendix only with the approval of the State Water Resources Control Board.

This monitoring guidance utilizes a model monitoring framework. The model monitoring framework has three components that comprise a range of spatial and temporal scales: (1) core monitoring, (2) regional monitoring, and (3) special studies.

- 1) Core monitoring consists of the basic site-specific monitoring necessary to measure compliance with individual effluent limits and/or impacts to receiving water quality. Core monitoring is typically conducted in the immediate vicinity of the discharge examining local scale spatial effects.
- 2) Regional monitoring provides information necessary to make assessments over large areas and serves to evaluate cumulative effects of all anthropogenic inputs. Regional monitoring data also assists in the interpretation of core monitoring studies. It is recommended that the Regional Water Boards require participation by the discharger in an approved regional monitoring program, if available, for the receiving water. In the event that a regional monitoring effort takes place during a permit cycle in which the MRP does not specifically address regional monitoring, a Regional Water Board may allow relief from aspects of core monitoring components in order to encourage participation.
- 3) Special studies are directed monitoring efforts designed in response to specific management or research questions identified through either core or regional monitoring programs. Often they are used to help understand core or regional monitoring results, where a specific environmental process is not well understood

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or to address unique issues of local importance. Regional Water Boards may require special studies as appropriate. Special studies are not addressed further in this guidance because they are beyond its scope.

The Ocean Plan does not address all site-specific monitoring issues and allows the Regional Water Boards to select alternative protocols with the approval of the State Water Resources Control Board. If no direction is given in this appendix for a specific provision of the Ocean Plan, it is within the discretion of the Regional Water Boards to establish the monitoring requirements for that provision.

#### 2- QUALITY ASSURANCE

All monitoring conducted in compliance with MRPs must be comparable with the Quality Assurance requirements of the Surface Water Ambient Monitoring Program (SWAMP).

SWAMP comparable means that measurement quality objectives (MQOs) for the project must be equivalent to or better than SWAMP MQOs. Dischargers must use the SWAMP Quality Assurance Management Plan (QAMP) as a guideline for their project's requirements. The SWAMP QAMP is located at: [www.waterboards.ca.gov/swamp/qamp.html](http://www.waterboards.ca.gov/swamp/qamp.html). Refer to the EPA guidance document (EPA QA/G-4) for selecting data quality objectives and is located at [www.epa.gov/quality/qs-docs/g4-final.pdf](http://www.epa.gov/quality/qs-docs/g4-final.pdf).

Data must be formatted to match the database requirements of the SWAMP.

#### 3- TYPE OF WASTE DISCHARGE SOURCES

Discharges to ocean waters are highly diverse and variable, exhibiting a wide range of constituents, effluent quality and quantity, location and frequency of discharge. Different types of discharges will require different approaches. This Appendix provides specific direction for three broad types of discharges: 1) Point Sources, 2) Storm Water Point Sources and 3) Nonpoint Sources.

##### 3.1-Point Sources

Industrial, municipal, marine laboratory and other traditional point sources of pollution that discharge wastewater directly to surface waters and are required to obtain NPDES permits.

##### 3.2- Storm Water Point Sources

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Storm Water Point Sources, hereafter referred to as Storm Water Sources, are those NPDES permitted discharges regulated by Construction or Industrial Storm Water General Permits or separate storm sewer system (MS4s) Permits. MS4 Permits are further divided into Phase I and II Permits. A Phase I MS4 Permit is issued by a Regional Water Board for medium (serving between 100,000 and 250,000 people) and large (serving 250,000 people) municipalities. A Phase II MS4 General Permit is issued by the State Water Resources Control Board for the discharge of storm water for smaller municipalities, also including non-traditional Small MS4s, which are governmental facilities such as military bases, public campuses, prison and hospital complexes.

#### 3.3- Nonpoint Sources

A Nonpoint Source is any source of pollutants that is not a Point Source described in Section 3.1 or Storm Water Source as described in Section 3.2. Land use categories contributing to non point sources include but are not limited to:

- a. Agriculture
- b. Grazing
- c. Forestry/timber harvest
- d. Urban not covered under an NPDES permit
- e. Marinas and mooring fields
- f. Hydromodification
- g. Golf Courses not covered under an NPDES Permit

Only agricultural and golf course related nonpoint source discharge monitoring is addressed in this Appendix, but Regional Water Boards may issue MRPs for other Nonpoint Sources at their discretion. The Agriculture includes irrigated lands. Irrigated lands are where water is applied for purpose of producing crops, including, but limited to, row and field crop, orchards, vineyard, rice production, nurseries, irrigated pastures, and managed wetlands.

#### **4- INDICATOR BACTERIA**

##### 4.1 Point Sources

Primary questions to be addressed:

1. Does the effluent comply with the water quality standards in the receiving water?

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2. Does the sewage effluent reach water contact zones or commercial shellfish beds?

To answer these questions, core monitoring shall be conducted in receiving water for the indicator bacteria at a minimum five times per month for any point sources discharging treated sewage effluent:

- a. within one nautical mile of shore, or
- b. within one nautical mile of a commercial shellfish bed, or
- c. if the discharge is in excess of 10 MGD.

#### 4.2 Storm Water

Primary questions to be addressed:

1. Does the receiving water comply with water quality standards?
2. Is the condition of the receiving water protective of contact recreation and shellfish harvesting beneficial uses?
3. What is the extent and magnitude of current or potential receiving water indicator bacteria problems from storm water runoff?
4. Are the indicator bacteria levels in receiving water getting better or worse?
5. What are the sources of indicator bacteria in runoff?
6. What is the relative runoff contribution to the receiving water indicator bacteria waste load?

To answer these questions, core monitoring for indicator bacteria shall be required periodically on storm water discharges representative of the area of concern. At a minimum, for municipal storm water discharges, all receiving water at outfalls greater than 36 inches in diameter or width must be monitored (ankle depth, point zero) at the following frequencies:

- a. During wet weather with a minimum of three storms per year, and
- b. When flowing dry weather, and if located at an AB 411 beach, at least five times per month.

Alternatively, regional monitoring may be performed to assess the status of marine contact recreation water quality. If the permittee participates in a regional monitoring program, core monitoring may be suspended for that period at the discretion of the Regional Water Board.

#### 4.3 Nonpoint Sources

Primary questions to be addressed:

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1. Does the receiving water comply with water quality standards?
2. Do agricultural and golf course nonpoint sources discharges reach water contact or shellfish harvesting zones?
3. What is the extent and magnitude of current or potential receiving water indicator bacteria problems from agricultural and golf course nonpoint sources?
4. Are the indicator bacteria levels in receiving water getting better or worse?
5. What are the sources of indicator bacteria?
6. What is the relative agricultural and golf course nonpoint sources contribution to the receiving water indicator bacteria waste load?

To answer these questions, core monitoring of representative agricultural irrigation tail water and storm water runoff, at a minimum, will be conducted in receiving water (ankle depth, point zero) for indicator bacteria:

- a. During wet weather, at a minimum of two storm events per year, and
- b. When flowing during dry weather, and if located at an AB 411 beach or within one nautical mile of shellfish bed, at least five times per month.

Alternatively regional monitoring may be performed to assess the status of marine contact recreation water quality. If the discharger participates in a regional monitoring program, core monitoring may be suspended for that period at the discretion of the Regional Water Board.

#### 5- CHEMICAL CONSTITUENTS

##### 5.1 Point Sources:

Primary questions addressed:

1. Does the effluent meet permit effluent limits thereby ensuring that water quality standards are achieved in the receiving water?
2. What is the mass of the constituents that are discharged annually?
3. Is the effluent concentration or mass changing overtime?
4. What is the fate of the discharge plume?

Consistent with Appendix VI, the core monitoring for the substances in Table B (and Table A) shall be required periodically. For discharges less than 10 MGD (million gallons per day), 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.

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#### 5.2 Storm Water

Primary questions addressed:

1. Does the receiving water meet the water quality standards?
2. Are the conditions in receiving water getting better or worse?
3. What is the extent and magnitude of current or potential receiving water problems from storm water runoff?
4. What is the relative runoff contribution to pollutants loading in the receiving water?
5. What are the sources of the runoff problem?

For Phase I and Phase II municipal storm water discharges, core monitoring will be required at a minimum for 10% of all outfalls greater than 36 inches in diameter or width once per year. Monitoring shall be for total suspended solids, oil & grease, total organic carbon, pH, temperature, biochemical oxygen demand, turbidity, Table B metals, PAHs, and pesticides determined by the Regional Boards. Near shore receiving water monitoring shall be conducted at storm drains for Table B metals, PAHs, and pesticides.

For industrial storm water discharges, all outfalls must be monitored during two storm events per year. Effluent monitoring shall be conducted for total suspended solids, oil & grease, total organic carbon, pH, temperature, biochemical oxygen demand, turbidity, and Table B metals and PAHs. Near shore receiving water monitoring shall be conducted at industrial storm drains for oil and grease, Table B metals, and PAHs.

The requirement for receiving water monitoring for Table B metals, PAHs and pesticides may be waived at the discretion of the Regional Board, if the permittee participates in a regional monitoring program.

#### 5.3 Nonpoint Sources

The primary questions are:

1. Does the agricultural or golf course runoff meet water quality standards in the receiving water?
2. Are nutrients present that would contribute objectionable aquatic algal blooms or degrade indigenous biota?
3. Are the conditions in receiving water getting better or worse?
4. What is the relative agricultural runoff or golf course contribution to pollutants loading in the receiving water?
5. What are the sources of the agricultural runoff?

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To answer these questions, a statistically representative sample (determined by the Regional Board) of agricultural irrigation tail water and storm water runoff, and golf course runoff in each watershed will be monitored for Ocean Plan Table B metals, ammonia as N, nitrate as N, phosphate as P, and pesticides determined by the Regional Board:

- a. During wet weather, at a minimum of two storm events per year, and
- b. During dry weather, when flowing, at a frequency determined by the Regional Boards.

This requirement may be satisfied by core monitoring individually or through participation in a regional monitoring program at the discretion of the Regional Board.

**6 - SEDIMENT MONITORING**

All Sources:

- 1. Is the dissolved sulfide concentration of waters in sediments significantly increased above that present under natural conditions?
- 2. Is the concentration of substances set forth in Table B, for protection of marine aquatic life, in marine sediments at levels, which would degrade the benthic community?
- 3. Is the concentration of organic pollutants in marine sediments at levels that would degrade the benthic community?

6.1 Point Sources

For discharges greater than 10 MGD, acid volatile sulfides, OP Pesticides, Table B metals, ammonia N, PAHs, and chlorinated hydrocarbons will be measured in sediments annually in a core monitoring program approved by the Regional Water Board. Sediment sample locations will be determined by the Regional Board. If sufficient data exists from previous water column monitoring for these parameters the Regional Water Board at its discretion may reduce the frequency of monitoring, or may allow this requirement to be satisfied through participation in a regional monitoring program.

6.2 Storm Water

For Phase I MS4 permittees, acid volatile sulfides, OP Pesticides, Ocean Plan Table B metals, ammonia N, PAHs, and chlorinated hydrocarbons will be

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measured in sediments in a regional monitoring program. Sediment sample locations will be determined by the Regional Board.

#### 7- AQUATIC LIFE TOXICITY

Toxicity tests are another method used to assess risk to aquatic life. These tests assess the overall toxicity of the effluent, including the toxicity of unmeasured constituents and/or synergistic effects of multiple constituents.

##### 7.1 Point Sources

1. Does the effluent meet permit effluent limits for toxicity thereby ensuring that water quality standards are achieved in the receiving water?
2. If not:
  - a. Are unmeasured pollutants causing risk to aquatic life?
  - b. Are pollutants in combinations causing risk to aquatic life?

Core monitoring for Table B Water Column toxicity shall be required periodically. For discharges less than 10 MGD, the monitoring frequency for acute and chronic toxicity of the effluent should be at least annually. For discharges greater than 10 MGD, the monitoring frequency for acute and chronic toxicity of the effluent should be at least semiannually.

If a discharge consistently exceeds an effluent limitation based on a toxicity objective in Table B, a toxicity reduction evaluation (TRE) is required.

Core monitoring for acute sediment toxicity will utilize alternative amphipod species (*Eohaustorius estuarius*, *Leptocheirus plumulosus*, *Rhepoxynius abronius*) at a minimum once per year.

##### 7.2 Storm Water

1. Does the runoff meet water quality standards in the receiving water?
2. Does storm water runoff cause or contribute to aquatic toxicity?
3. What is the relative runoff contribution to the receiving water toxicity?
4. What are the causes of the toxicity and the sources of the constituents responsible?
5. Are the conditions in the receiving water getting better or worse?

For Phase I municipal, Phase II municipal, and industrial storm water discharges core toxicity monitoring will be required at a minimum for 10% of all outfalls greater than 36 inches in diameter or width once per year.

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Water column monitoring shall be for Table B acute and chronic toxicity. Sediment monitoring for acute sediment toxicity will utilize alternative amphipod species (*Eohaustorius estuarius*, *Leptocheirus plumulosus*, *Rhepoxynius abronius*). If toxicity is consistently observed in the discharge, a toxicity reduction evaluation (TRE) shall be required at the discretion of the Regional Board.

The requirement for core monitoring may be waived at the discretion of the Regional Board, if the permittee participates in a regional monitoring program.

#### 7.3 Nonpoint Sources

1. Does the agricultural and golf course runoff meet water quality standards in the receiving water?
2. Are the conditions in receiving water getting better or worse?
3. What is the relative agricultural and golf course runoff contribution to pollutants loading in the receiving water?
4. What are the causes of the toxicity, and the sources of the constituents responsible?
5. What is the relative runoff contribution to the receiving water toxicity?

Core water column monitoring shall include Table B acute and chronic toxicity. Core sediment monitoring shall include acute sediment toxicity utilizing alternative amphipod species (*Eohaustorius estuarius*, *Leptocheirus plumulosus*, *Rhepoxynius abronius*). If toxicity is consistently observed in the discharge, a toxicity reduction evaluation (TRE) shall be required at the discretion of the Regional Board.

The requirement for core monitoring may be waived at the discretion of the Regional Board, if the permittee participates in a regional monitoring program.

## **8 - BENTHIC COMMUNITY HEALTH**

#### 8.1 Point Sources

1. Are benthic communities degraded as a result of the discharge?

To answer this question, benthic community monitoring shall be conducted, at a minimum, once per permit cycle:

- a. for all discharges greater than 10 MGD, or
- b. those discharges one nautical mile or less from shore, or
- c. discharges one nautical mile or less from a State Water Quality Protection Area or a State Marine Reserve, Park or Conservation Area.

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This requirement may be satisfied by core monitoring individually or through participation in a regional monitoring program at the discretion of the Regional Board.

#### 9 - BIOACCUMULATION

##### 9.1 Point Sources

1. Does the concentration of pollutants in fish, shellfish\*, or other marine resources used for human consumption bioaccumulate to levels that are harmful to human health?
2. Does the concentration of pollutants in marine life bioaccumulate to levels that degrade marine communities?

To answer these questions, bioaccumulation monitoring by a mussel watch program shall be conducted, at a minimum, once per permit cycle for:

- a. discharges greater than 10 MGD, or
- b. those discharges one nautical mile or less from shore, or
- c. discharges one nautical mile or less from a State Water Quality Protection Area or a State Marine Reserve, Park or Conservation Area.

Constituents to be monitored must include pesticides at the discretion of the Regional Board, Table B metals, and PAHs. Resident mussels are preferred over transplanted mussels. Sand crabs may be added or substituted for mussels at the discretion at the Regional Board.

This requirement may be satisfied individually as core monitoring or through participation in a regional monitoring program at the discretion of the Regional Board.

##### 9.2 Storm Water

1. Does the concentration of pollutants in fish, shellfish\*, or other marine resources used for human consumption bioaccumulate to levels that are harmful to human health?
2. Does the concentration of pollutants in marine life bioaccumulate to levels that degrade marine communities?

For Phase I Municipal storm water discharges, bioaccumulation monitoring shall be conducted using a mussel watch program, at a minimum, once per permit cycle. Constituents to be monitored must include OP Pesticides, Ocean Plan Table B metals, PAHs, chlorinated hydrocarbons, and pyrethroids. Sand Crabs

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and/or Solid Phase Microextraction may be added or substituted for mussels at the discretion at the Regional Board.

This requirement may be satisfied individually as core monitoring or through participation in a regional monitoring program at the discretion of the Regional Board.

#### 10 - WATER COLUMN CHARACTERISTICS

##### All Sources:

1. Is natural light significantly reduced at any point outside the initial dilution zone as the result of the discharge of waste?
2. Does the discharge of waste cause a discoloration of the ocean surface?
3. Does the discharge of oxygen demanding waste cause the dissolved oxygen concentration to be depressed at any time more than 10 percent from that which occurs naturally?
4. Does the discharge of waste cause the pH to change at any time more than 0.2 units from that which occurs naturally?
5. Does the discharge of waste cause the salinity to change at any time more than 10 percent from that which occurs naturally?
6. Do nutrients cause objectionable aquatic growth or degrade indigenous biota?

##### 10.1 Point Sources

For discharges greater than 10 MGD, turbidity (alternatively light transmissivity or surface water transparency), color, dissolved oxygen and pH shall be measured, at a minimum seasonally, in a core monitoring program approved by the Regional Water Board. If sufficient data exists from previous water column monitoring for these parameters, the Regional Water Board, at its discretion, may reduce the frequency of water column monitoring, or may allow this requirement to be satisfied through participation in a regional monitoring program.

Salinity must also be monitored by all point sources discharging desalination brine as part of their core monitoring program.

##### 10.2 Storm Water

For representative Phase I Municipal storm water discharges, receiving water turbidity, color, dissolved oxygen, pH, nitrate, phosphate, and ammonia shall be measured in a core monitoring program approved by the Regional Water Board.

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The Regional Water Board at its discretion may allow this requirement to be satisfied through participation in a regional monitoring program.

10.3 Nonpoint Sources

Representative agricultural and golf course discharges shall be measured, at a minimum during two storm season and irrigation season for receiving water turbidity, color, dissolved oxygen, pH, nitrate, phosphate, ammonia in a core monitoring program approved by the Regional Water Board. The Regional Water Board, at its discretion, may allow this requirement to be satisfied through participation in a regional monitoring program.

**11- ANALYTICAL REQUIREMENTS**

Procedures, calibration techniques, and instrument/reagent specifications shall conform to the requirements of 40 CFR PART 136. Compliance monitoring shall be determined using an US EPA approved protocol as provided in 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 California Department of Health Services, in accordance with the provisions of Section 13176 CWC, and must include quality assurance quality control data with their reports.

Sample dilutions for all bacterial analyses shall range from 2 to 16,000. Each test method number or name (e.g., EPA 600/4-85/076, Test Methods for *Escherichia coli* and Enterococci in Water by Membrane Filter Procedure) used for each analysis shall be specified and reported with the results.

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

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Test 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. The Regional Board may allow analysis for *E. coli* by approved test methods to be substituted for fecal coliform if sufficient information exists to support comparability with approved methods and substitute the existing methods.

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. Because Storm Water and Nonpoint Sources are not giving a dilution factor, sufficient sampling and analysis shall be required to determine compliance with Table B Water Quality Objectives. 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.

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. 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.

Procedures and methods used to determine compliance with benthic monitoring shall conform to the requirements of the following federal guidelines when applicable:

Macroinvertebrate Field and Laboratory Methods for Evaluating the Biological Integrity of Surface Waters (1990) -- EPA/600/4-90/030 (PB91-171363). This manual describes guidelines and standardized procedures for the use of macroinvertebrates in evaluating the biological integrity of surface waters.

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Procedures used to determine compliance with bioaccumulation monitoring shall conform to the requirements of U.S. EPA. 1995. Methods for Sampling and Analyzing Contaminants in Fish and Shellfish Tissue, U.S. EPA document # 823-R-95-007, National distribution of chemical concentrations in mussels and oysters in the USA Marine Environmental Research 53:117-143, and/or State Mussel Watch Program, 1987–1993 Data Report. State Water Resources Control Board 94-1WQ.

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