

**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD  
SAN DIEGO REGION**

**Amendment to the Water Quality Control Plan for the San Diego Basin (9) to Incorporate Implementation Provisions for Indicator Bacteria Water Quality Objectives to Account for Loading from Natural Uncontrollable Sources Within the Context of a Total Maximum Daily Load**



**TECHNICAL REPORT**

**May 14, 2008**

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**Technical Report**

Adopted by the  
California Regional Water Quality Control Board  
San Diego Region  
on May 14, 2008.

Approved by the  
State Water Resources Control Board  
on \_\_\_\_\_  
and the  
Office of Administrative Law  
on \_\_\_\_\_  
and the  
United States Environmental Protection Agency  
on \_\_\_\_\_.

*Cover photographs from top left clockwise:  
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Elegant tern and seagull south of Children's Pool, San Diego County (2006),  
and Grunion run at Ocean Beach, San Diego County (2004) by Linda Pardy*

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## List of Acronyms and Abbreviations

Basin Plan	Water Quality Control Plan for the San Diego Basin (9)
BMPs	Best Management Practices
Caltrans	California Department of Transportation
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
Cfu	colony forming unit
CTR	California Toxics Rule
CWA	Clean Water Act
DEH	San Diego County Department of Environmental Health
DHS	Department of Health Services
E. coli	Escherichia coli
EIR	Environmental Impact Report
LAs	Load allocations
Los Angeles Water Board	California Regional Water Quality Control Board, Los Angeles Region
MEP	Maximum extent practicable
MP	Management Practice
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
NSEA	Natural sources exclusion approach
OAL	Office of Administrative Law
PRC	Public Resources Code
REC-1	Water contact recreation
REC-2	Non-contact water recreation
RSAA	Reference system and antidegradation approach
San Diego Water Board	California Regional Water Quality Control Board, San Diego Region
SCCWRP	Southern California Coastal Water Research Project
SHELL	Shellfish harvesting beneficial use
SIP	<i>Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California</i> (aka., State Implementation Policy)
SSM	Single sample maximum
State Water Board	State Water Resources Control Board
TMDL(s)	Total maximum daily load(s)
USEPA	United States Environmental Protection Agency
WDRs	Waste discharge requirements
WLAs	Waste load allocations
WQBEL(s)	Water quality based effluent limitation(s)
WQC	Water quality criteria
WQO(s)	Water quality objective(s)
WQS	Water quality standard

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## 1 Executive Summary

The *Water Quality Control Plan for the San Diego Basin (9)* (Basin Plan) amendment described in this technical report authorizes new implementation provisions for indicator bacteria water quality objectives within the context of total maximum daily loads (TMDLs). Changes to Chapter 3 (Water Quality Objectives) and Chapter 4 (Implementation) of the Basin Plan are proposed. The Basin Plan amendment authorizes the California Regional Water Quality Control Board, San Diego Region (San Diego Water Board) to use a reference system and antidegradation approach (RSAA) or natural sources exclusion approach (NSEA) during implementation of indicator bacteria water quality objectives for the contact water recreation (REC-1) and non-contact water recreation (REC-2) beneficial uses. The RSAA or NSEA only apply to municipal separate storm sewer system (MS4)<sup>1</sup>, concentrated animal feeding operations, and nonpoint source discharges during development and implementation of indicator bacteria TMDLs.

Implementation of indicator bacteria water quality objectives using the RSAA requires control of indicator bacteria from anthropogenic sources so that the bacteriological water quality that is achieved is consistent with that of a reference system. The reference system and antidegradation approach also requires that no degradation of existing bacteriological water quality in the targeted water body occurs when the existing bacteriological water quality is better than that of a water body in a reference system. A reference system is a watershed and the beach to which the watershed discharges that is minimally impacted by anthropogenic activities that can affect bacterial densities in the water body. Under the reference system and antidegradation approach, a certain frequency of exceedances of the indicator bacteria water quality objectives is allowed. The allowed frequencies of exceedances are either the observed frequency of exceedances in the selected reference system or the targeted water body, whichever is less. In addition to incorporating these two approaches into the Basin Plan, the amendment clarifies and improves the readability of water quality objectives for indicator bacteria for protection of REC-1 and REC-2 beneficial uses.

Under the natural sources exclusion approach, dischargers must demonstrate they have implemented all appropriate best management practices to control all anthropogenic sources of indicator bacteria to the target water body such that they do not cause or contribute to exceedances of the indicator bacteria water quality objectives. The requirement to control all sources of anthropogenic indicator bacteria does not mean the complete elimination of all anthropogenic sources of bacteria as this is both impractical as well as impossible. Dischargers must also demonstrate that the residual indicator bacteria densities are not indicative of a human health risk. After all anthropogenic sources of indicator bacteria have been controlled such that they do not cause exceedances of the indicator bacteria water quality objectives, and natural sources have been identified and quantified, exceedances of the indicator bacteria water quality objectives may be allowed based on the residual exceedances in the

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<sup>1</sup> MS4 dischargers include Phase I and Phase II municipalities and Caltrans.

target water body. The residual exceedances shall define the background level of exceedance due to natural sources.

The need for use of an RSAA or NSEA was evaluated by looking at data from the mouth of San Onofre State Beach in northern San Diego County, as well as other beaches in southern California. The data show that exceedances of indicator bacteria water quality objectives frequently occur at beaches or in creeks that receive runoff from predominately undeveloped watersheds. This indicates that natural uncontrollable sources of indicator bacteria (e.g., wildlife feces, bacterial resuspension from disturbed sediment, regrowth on the beach wrack, etc.) can cause exceedances of indicator bacteria water quality objectives on their own, without contributions from anthropogenic sources. Since control of such sources is infeasible, possibly detrimental to important beneficial uses, and could impact other resources during construction of treatment works, an allowance in the Basin Plan for exceedances of indicator bacteria water quality objectives caused by natural uncontrollable sources is needed.

For indicator bacteria TMDLs incorporating the RSAA or NSEA, wasteload and load allocations calculated for municipal and nonpoint source dischargers will include allowances for natural uncontrollable sources of indicator bacteria. The RSAA and NSEA are designed to allow the San Diego Water Board to develop and implement TMDLs that result in exceedances of indicator bacteria water quality objectives that equate to the natural uncontrollable loading of indicator bacteria. In this manner, the RSAA and NSEA address circumstances where natural uncontrollable sources of indicator bacteria are the cause of exceedances of indicator bacteria water quality objectives. As such, these approaches provide that MS4 and nonpoint source dischargers subject to indicator bacteria TMDLs will not be required to control indicator bacteria from natural uncontrollable sources. However, the Basin Plan amendment does not obviate the need for MS4 and nonpoint source dischargers to control indicator bacteria from anthropogenic sources.

This approach acknowledges that the San Diego Water Board does not intend to require treatment or diversion of natural water bodies or to require treatment of natural sources of indicator bacteria. Such requirements, if imposed by the San Diego Water Board, could result in adverse impacts to valuable aquatic life and wildlife resources. The RSAA and NSEA will help ensure that potentially detrimental reductions in natural indicator bacteria levels do not occur, while also limiting requirements placed on dischargers to control sources of indicator bacteria not necessarily associated with human pathogens. These benefits are significant and demonstrate the need for the Basin Plan amendment.

### **1.1 RSAA**

The RSAA requires that bacteriological water quality in a water body subject to an indicator bacteria TMDL be consistent with that of a water body in an undeveloped watershed (i.e., a reference system). It also requires that no degradation of existing bacteriological water quality occur where the water body's existing water quality is better than that of a reference system.

The RSAA is based upon the inference that the natural processes that generate indicator bacteria in reference systems also occur in urbanized watersheds. Under the RSAA, indicator bacteria levels occurring in reference systems can be measured and used to determine the anticipated indicator bacteria levels occurring in urbanized watersheds that are attributable to natural uncontrollable sources. Likewise, the frequency that natural uncontrollable sources cause exceedances of indicator bacteria water quality objectives in a reference system can be identified. This information can then be used during the calculation of TMDLs, wasteload allocations, and load allocations in order to account for indicator bacteria from natural uncontrollable sources. The information can also be used to develop compliance assessment strategies for indicator bacteria TMDLs, such as establishing an allowable indicator bacteria water quality objective exceedance frequency in the impaired water body based upon the exceedance frequency observed in the reference system.

### **1.2 NSEA**

Implementation of indicator bacteria water quality objectives using the NSEA requires that dischargers (1) control all anthropogenic sources of indicator bacteria to a water body; (2) demonstrate that all anthropogenic sources of indicator bacteria to a water body are controlled; and (3) demonstrate that the remaining indicator bacteria densities do not indicate a health risk.

Once control of all anthropogenic sources and demonstration of appropriate health risk levels have been achieved, the residual indicator bacteria loads in the water bodies that are attributable to uncontrollable sources can be identified and measured. Likewise, the frequency that uncontrollable sources cause exceedances of indicator bacteria water quality objectives in the water body can be identified. As with the RSAA, this information can then be used during the recalculation of TMDLs, wasteload allocations, and load allocations in order to account for indicator bacteria from natural uncontrollable sources. The information can also be used to develop compliance assessment strategies for indicator bacteria TMDLs, such as establishing an allowable indicator bacteria water quality objective exceedance frequency in the impaired water body based upon the residual exceedance frequency observed.

Note that use of the NSEA is contingent upon control of all anthropogenic sources of indicator bacteria to the water bodies subject to an indicator bacteria TMDL. Since this task is likely to be formidable, use of the NSEA is not expected to occur immediately. Rather, the NSEA is used to recalculate TMDLs at some point after their initial adoption, following control of all anthropogenic sources.

### **1.3 RSAA AND NSEA APPLICATION**

Numerous development steps will be necessary prior to use of the RSAA or NSEA. This Technical Report provides examples of the steps that are expected to be necessary for RSAA or NSEA use, based on the San Diego Water Board's current practices for TMDL development. However, the inclusion of these examples in the

Technical Report does not preclude the use of other methods that may be developed in the future. Following adoption of the Basin Plan amendment, the primary steps that are expected to be needed in order for the RSAA to be used for wet weather TMDLs include: (1) characterization of the target water body and identification of an appropriate reference system; (2) determination of what constitutes a wet weather event; (3) identification of the critical wet weather condition; (4) determination of the allowable number of exceedance days; (5) calculation or recalculation of TMDLs; and (6) development of TMDL implementation provisions. The primary steps that are expected to be needed in order for the RSAA to be used for dry weather TMDLs include: (1) characterization of the target water body and identification of an appropriate reference system; (2) identification of dry weather days; (3) determination of the allowable exceedance frequency; (4) calculation or recalculation of TMDLs; and (5) development of TMDL implementation provisions. The primary steps that are expected to be needed in order for the NSEA to be used include: (1) control all anthropogenic sources of indicator bacteria to a water body; (2) demonstrate that all anthropogenic sources of indicator bacteria to a water body are controlled; (3) demonstrate that the remaining indicator bacteria densities do not indicate a health risk; (4) identification of indicator bacteria loads attributable to natural uncontrollable sources; and (5) recalculation of TMDLs.

#### **1.4 CEQA**

The San Diego Water Board must comply with the California Environmental Quality Act (CEQA) when amending the Basin Plan. Under the CEQA, the San Diego Water Board is the Lead Agency responsible for evaluating the environmental impacts of the reasonably foreseeable methods of compliance with the proposed Basin Plan amendment.

The Basin Plan amendment will essentially be complied with through discharger implementation of municipal storm water and nonpoint source programs designed to attain the wasteload and load allocations specified by various indicator bacteria TMDLs. Potential environmental impacts associated with the Basin Plan amendment have been analyzed by assessing the impacts that will result from dischargers complying with indicator bacteria TMDL wasteload and load allocations using the RSAA or NSEA provided in the Basin Plan amendment, as opposed to dischargers complying with indicator bacteria TMDL wasteload and load allocations without using the RSAA or NSEA.

These two approaches for complying with indicator bacteria TMDL wasteload and load allocations are expected to have the same reasonably foreseeable methods of compliance. The most reasonably foreseeable methods of compliance are for dischargers to implement best management practices (BMPs) for point source discharges, and management practices (MPs) for nonpoint sources. Typical BMPs that may be chosen by dischargers to comply with indicator bacteria TMDL wasteload and load allocations are often divided into non-structural and structural controls. Since the Basin Plan amendment will result in an increase in TMDL wasteload and load

allocations for MS4 and nonpoint source dischargers, it will result in a reduction in implementation of non-structural and structural BMPs.

Of the 61 reasonably foreseeable environmental impact categories that were assessed, only three potential environmental impacts were identified. All three of these potential environmental impacts were found to be “Less Than Significant.” For the rest of the categories assessed, the Basin Plan amendment was found to have “No Impact” on the environment.

## 2 Introduction

This document discusses an amendment to the *Water Quality Control Plan for the San Diego Basin (9)* (Basin Plan). The Basin Plan sets the water quality standards for the water bodies within the San Diego Region. Water quality standards include the beneficial uses of the Region's water bodies, the numeric and narrative water quality objectives necessary to support the water bodies' beneficial uses, as well as an antidegradation policy. The Basin Plan also includes implementation provisions designed to achieve the identified water quality standards.

When a water body is not achieving the Basin Plan's water quality standards, the California Regional Water Quality Control Board, San Diego Region (San Diego Water Board) is required to develop a total maximum daily load (TMDL) for the water body. A TMDL specifies the maximum amount of a pollutant that a water body can receive and still meet water quality standards, then allocates the acceptable pollutant load to point and nonpoint sources discharging to the water body. TMDLs are incorporated into the Basin Plan as implementation plans for achieving the Region's water quality standards. The Basin Plan amendment discussed in this document is to be applied during development of TMDLs for indicator bacteria. It modifies the Basin Plan's implementation provisions for indicator bacteria, as they pertain to the contact water recreation (REC-1)<sup>2</sup> and non-contact water recreation (REC-2)<sup>3</sup> beneficial uses. Indicator bacteria are used as surrogates to express potential human health risk from pathogens associated primarily with fecal material. However, the indicator bacteria species used for the REC-1 and REC-2 water quality objectives may also come from sources that are non-anthropogenic or not linked to pathogens.

Essentially, the Basin Plan amendment incorporates into the Basin Plan two approaches for implementing indicator bacteria water quality objectives for REC-1 and REC-2 beneficial uses within the context of a TMDL. The Basin Plan amendment authorizes the San Diego Water Board to interpret the indicator bacteria water quality objectives that protect REC-1 and REC-2 using a reference system and antidegradation approach (RSAA) or a natural sources exclusion approach (NSEA). Implementation of indicator bacteria water quality objectives using a RSAA requires control of indicator bacteria from anthropogenic sources so that the bacteriological water quality that is achieved is consistent with that of a reference system. A reference system is a water body that is minimally impacted by anthropogenic activities that can affect bacterial densities in the water body. In contrast, implementation of indicator bacteria water quality objectives using the NSEA also requires control of indicator bacteria from anthropogenic sources, but rather than requiring achievement of reference system

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<sup>2</sup> REC-1 includes the use of water for recreational activities involving body contact with water, where immersion in, or ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and self-contained underwater breathing apparatus (SCUBA) diving, surfing, kayaking, and fishing.

<sup>3</sup> REC-2 includes the uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.

bacteria levels, the NSEA requires evidence that remaining indicator bacteria densities do not indicate a human health risk. The NSEA is expected to be used in cases where an appropriate reference system cannot be identified or when use of a reference system is inappropriate.

Both of these approaches recognize that there are uncontrollable natural sources of indicator bacteria that may cause or contribute to exceedances of water quality objectives. They also acknowledge that it is not the intent of the San Diego Water Board to require treatment or diversion of natural water bodies or to require treatment of natural sources of indicator bacteria. Such requirements, if imposed by the San Diego Water Board, could adversely affect valuable aquatic life and wildlife beneficial uses supported by natural water bodies in the Region. Treating natural uncontrollable sources of indicator bacteria is also not in the public interest because the construction of treatment works can cause environmental harm, with the potential to do little to eliminate human pathogens from receiving waters.

In addition to these provisions, the Basin Plan amendment clarifies and improves the readability of water quality objectives for indicator bacteria for protection of REC-1 and REC-2 beneficial uses.

This Basin Plan amendment project is ranked seventh in importance on the 2004 Triennial Review list of priority projects.<sup>4</sup> It is important because it clarifies Basin Plan indicator bacteria water quality objectives and provides the San Diego Water Board with new approaches for implementing indicator bacteria water quality objectives in TMDLs.

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<sup>4</sup> Prioritized List of Basin Plan Issues for Investigation from September 2004 to September 2007 (Attachment 1 to Resolution No. R9-2004-0156).

### **3 Need for the Basin Plan Amendment**

The need for use of an RSAA or NSEA was evaluated by looking at data from the mouth of San Onofre State Beach in northern San Diego County, as well as other beaches in southern California. The data show that exceedances of indicator bacteria water quality objectives frequently occur at beaches or in creeks that receive runoff from predominately undeveloped watersheds. This indicates that natural uncontrollable sources of indicator bacteria can cause exceedances of indicator bacteria water quality objectives on their own, without contributions from anthropogenic sources. Since control of natural uncontrollable sources is infeasible, and possibly detrimental to important beneficial uses, an allowance in the Basin Plan for exceedances of indicator bacteria water quality objectives caused by natural uncontrollable sources is needed.

Indicator bacteria measurements during the winter of 2004-2005 showed that at four beaches, 27 percent of the total number of samples collected within 24-hours of rainfall exceeded single sample maximum water quality thresholds for at least one indicator bacteria (see table 1). The four beaches were: 1) Deer Creek Beach located at the mouth of Deer Creek in Ventura County; 2) Leo Carrillo State Beach located at the mouth of Arroyo Sequit in Los Angeles County; 3) Dan Blocker Beach located at the mouth of Solstice Creek in Los Angeles County; and 4) San Onofre State Beach located at the mouth of San Onofre Creek in San Diego County. The indicator bacteria load from these beaches is presumed to originate primarily from natural, non-human sources because the beach and watershed are comprised of mostly undeveloped land. In fact, the monitoring sites were selected for study as reference beaches because the beach and upstream watershed consist of at least ninety-five percent (95%) undeveloped land (Schiff et al., 2005).



*Table 1. Wet weather monitoring sites sampled during the period October 2004 - February 2005 showing the number (#), and percent (%) of sites sampled which exceeded the REC-1 single sample maximum indicator bacteria water quality objectives.*

Wet Weather Monitoring Site	# Samples	Total Coliform (REC-1)		E. coli* (REC-1)		Enterococci (REC-1)		Total Coliform, E. coli, and/or Enterococci	
		#	%	#	%	#	%	#	%
Deer Creek Beach at Deer Creek	16	0	0	0	0	0	0	0	0
Leo Carrillo State Beach at Arroyo Sequit Creek	16	0	0	1	6	2	13	3	19
Dan Blocker Beach at Solstice Creek	16	1	6	2	13	2	13	3	19
San Onofre State Beach at San Onofre Creek	16	5	31	8	50	5	31	11	69
<b>Total</b>	<b>64</b>	<b>6</b>	<b>9</b>	<b>11</b>	<b>23</b>	<b>9</b>	<b>19</b>	<b>17</b>	<b>27</b>

\*E. coli data were compared to fecal coliform water quality objectives, since the Basin Plan does not include E. coli water quality objectives for saltwater. Since E. coli is a subset of fecal coliform indicator bacteria, exceedances of water quality objectives were identified conservatively. Comparison of E. coli data to fecal coliform water quality objectives at a 1:1 ratio is a data analysis approach practiced by the Southern California Coastal Water Research Project (Schiff et al., 2005).

Dry weather monitoring during 2004-2005 within the undeveloped San Onofre Creek watershed also exhibited frequent exceedances of single sample maximum water quality objectives for indicator bacteria. Frequent exceedances of REC-1 water quality objectives were observed upstream in San Onofre Creek for enterococcus, while the San Onofre lagoon frequently exceeded the objectives for total coliform. However, note that frequent exceedances of the REC-1 water quality objectives were not observed at San Onofre beach during dry weather (see Table 2).

*Table 2. Single sample maximum measurements during dry weather within the period November 2004 – February 2005 at monitoring sites located at San Onofre Creek showing the REC-1 single sample maximum indicator bacteria water quality objectives were frequently exceeded.\**

Dry Weather Monitoring Site	Site Type	# Samples	Total Coliform		E. Coli**		Enterococcus		Total Coliform, E. Coli, and/or Enterococci	
			#	%	#	%	#	%	#	%
San Onofre wavewash	Beach	12	0	0	0	0	0	0	0	0
San Onofre beach (75 m right of discharge)		12	0	0	0	0	0	0	0	0
San Onofre beach (75 m left of discharge)		12	1	8	0	0	1	8	1	8
San Onofre discharge	Creek	6	NA	NA	0	0	2	33	2	33
San Onofre lagoon	Lagoon	11	11	100	3	27	8	73	11	100
San Onofre upstream	Creek	11	NA	NA	2	18	7	64	7	64
<b>Total</b>		<b>64</b>	<b>12</b>	<b>19</b>	<b>5</b>	<b>8</b>	<b>18</b>	<b>30</b>	<b>21</b>	<b>33</b>

\*Sample measurements were not compared to geometric mean water quality objectives due to the erratic frequency of sample collection.

\*\*For the “beach” site type, E. coli data were compared to fecal coliform water quality objectives, since the Basin Plan does not include E. coli water quality objectives for saltwater. Since E. coli is a subset of fecal coliform indicator bacteria, exceedances of water quality objectives were identified conservatively. Comparison of E. coli data to fecal coliform water quality objectives at a 1:1 ratio is a data analysis approach practiced by the Southern California Coastal Water Research Project (Schiff et al., 2005).

While much of the indicator bacteria in receiving waters originates from natural uncontrollable sources, note that there is some risk posed to humans as a result of exposure to microorganisms from non-human fecal contamination – particularly those animal sources with which humans regularly come into contact (i.e., livestock and domestic animals) (USEPA, 2002). As a result, the U.S. Environmental Protection Agency (USEPA) guidance on bacteriological criteria states that broad exemptions from bacteriological criteria for waters designated for primary contact recreation should not be used based on the presumption that high levels of indicator bacteria originating from non-human fecal contamination present no risk to human health (USEPA, 2002). Accordingly, the USEPA guidance indicates that states should account for indicator bacteria from all non-wildlife sources in water quality standards (USEPA, 2002). The RSAA and NSEA account for non-wildlife sources by defining domesticated animals as “anthropogenic sources,” which must be controlled.

While non-wildlife sources must be accounted for, the USEPA guidance also provides that in situations where high levels of indicator bacteria are found to be from wildlife sources, a limited exemption from bacteriological criteria can be used (USEPA, 2002). Such conditions have been observed in the San Diego Region (San Onofre Beach) and elsewhere in southern California, as discussed above. As another example, in a recent

study at Mission Bay, the majority of indicator bacteria present during dry weather was determined to be from wildlife (avian) sources. The study utilized ribotyping and host-specific polymerase chain reaction to identify the host origin of the indicator bacteria found in Mission Bay. The Mission Bay study found that avian sources amounted to 67 percent, canine sources amounted to 9 percent, human sources amounted to 5 percent, marine mammal sources amounted to 5 percent, other mammal sources amounted to 4 percent, and unknown sources amounted to 10 percent of the indicator bacteria contained within study samples (City of San Diego, 2004).

As is observed from the above data, natural uncontrollable sources of indicator bacteria cause exceedances of water quality objectives on their own, without contributions from anthropogenic sources. Since control of natural uncontrollable sources of indicator bacteria is infeasible, and can be harmful to important aquatic life and wildlife beneficial uses, an allowance for exceedances of indicator bacteria water quality objectives caused by natural uncontrollable sources is needed. The Basin Plan amendment provides such an allowance by incorporating into the Basin Plan the RSAA and NSEA as options for implementing indicator bacteria water quality objectives within the context of TMDLs. This is appropriate, since the San Diego Water Board does not intend to require control of natural uncontrollable sources of indicator bacteria. Likewise, the RSAA and NSEA will help ensure that potentially detrimental reductions in natural indicator bacteria levels do not occur, while also limiting requirements placed on dischargers to control sources of indicator bacteria not necessarily associated with human pathogens. These benefits are significant and demonstrate the need for the Basin Plan amendment.

## 4 Basin Plan Amendment Components

The Basin Plan amendment described in this technical report authorizes new implementation provisions for indicator bacteria water quality objectives in the context of TMDLs. Changes to Chapter 3 (Water Quality Objectives) and Chapter 4 (Implementation) of the Basin Plan are proposed. The Basin Plan amendment authorizes the San Diego Water Board to use a RSAA or NSEA during implementation of indicator bacteria water quality objectives for the REC-1 and REC-2 beneficial uses within the context of a TMDL. The RSAA and NSEA only apply to municipal separate storm sewer system (MS4)<sup>5</sup>, concentrated animal feeding operations, and nonpoint source discharges. The RSAA or NSEA will authorize the San Diego Water Board to develop and implement TMDLs that allow water bodies receiving such discharges to exceed indicator bacteria water quality objectives, provided that the source of the indicator bacteria causing any exceedance is a natural uncontrollable source.

The RSAA and NSEA will be implemented within the context of indicator bacteria TMDLs. For indicator bacteria TMDLs incorporating the RSAA and/or NSEA, wasteload and load allocations calculated for municipal and nonpoint source dischargers will include allowances for natural uncontrollable sources of indicator bacteria (e.g., wildlife feces, bacterial resuspension from disturbed sediment, regrowth on the beach wrack,<sup>6</sup> etc). In this manner, the RSAA and NSEA recognize that there are natural uncontrollable sources of indicator bacteria that can cause exceedances of indicator bacteria water quality objectives on their own. As such, these approaches provide that MS4 and nonpoint source dischargers subject to indicator bacteria TMDLs will not be required to control indicator bacteria from natural uncontrollable sources. However, note that the Basin Plan amendment does not obviate the need for MS4 and nonpoint source dischargers to control indicator bacteria from anthropogenic sources.

In addition to incorporation of the RSAA and NSEA into the Basin Plan, this amendment clarifies and improves the readability of the water quality objectives for indicator bacteria for protection of the REC-1 and REC-2 beneficial uses, as found in Chapter 3 (Water Quality Objectives) of the Basin Plan. This includes the following changes:

- Clarification of the text on indicator bacteria water quality objectives in the section on *Inland Surface Waters, Enclosed Bays and Estuaries, Coastal Lagoons and Ground Water*, by rewriting the section.
- Addition of graphics and updates to the indices, tables of contents, and page footers. These updates improve the readability of the section.

### 4.1 RSAA Description

The RSAA requires that bacteriological water quality in a water body subject to an indicator bacteria TMDL be consistent with that of a water body in an undeveloped

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<sup>5</sup> MS4 dischargers include Phase I and Phase II municipalities and Caltrans.

<sup>6</sup> Wrack consists of seaweed, eel grass, kelp, and other marine vegetation that washes up on shore and accumulates at the high tide line. The "wrack line" is essentially the high tide line.

watershed (i.e., a reference system). It also requires that no degradation of existing bacteriological water quality occur where the water body's existing water quality is better than that of a reference system.

The RSAA is based upon the inference that the natural processes that generate indicator bacteria in reference systems also occur in urbanized watersheds. Under the RSAA, indicator bacteria levels occurring in reference systems can be measured and used to determine the anticipated indicator bacteria levels occurring in urbanized watersheds that are attributable to natural uncontrollable sources. Likewise, the frequency that natural uncontrollable sources cause exceedances of indicator bacteria water quality objectives in a reference system can be identified. This information can then be used during the calculation of TMDLs, wasteload allocations, and load allocations in indicator bacteria TMDLs in order to account for indicator bacteria from natural uncontrollable sources. The information can also be used to develop compliance assessment strategies for indicator bacteria TMDLs, such as establishing an allowable indicator bacteria water quality objective exceedance frequency in the impaired water body based upon the exceedance frequency observed in the reference system.

The RSAA can be used to implement single sample maximum water quality objectives or geometric mean water quality objectives. In general, single sample maximum water quality objectives serve as numeric targets for wet weather TMDLs, while geometric mean water quality objectives serves as numeric targets for dry weather TMDLs. As such, the RSAA is an option to be used during calculation or recalculation of both wet and dry weather TMDLs. However, the data needs and methods of calculation or recalculation of TMDLs for wet and dry weather will differ. These differences are discussed in Sections 5.1 and 5.2.

#### **4.2 NSEA Description**

Under the NSEA, all anthropogenic sources (defined as human, domesticated animal, or resulting from human activity) of indicator bacteria to the water bodies subject to an indicator bacteria TMDL must be controlled. Therefore, before a TMDL can be calculated using the NSEA, dischargers must demonstrate that all appropriate best management practices have been implemented to control all anthropogenic sources of indicator bacteria to the target water body. Dischargers must also demonstrate that remaining indicator bacteria densities do not indicate a human health risk.

Once control of all anthropogenic sources and demonstration of appropriate health risk levels have been achieved, the residual indicator bacteria loads in the water bodies attributable to uncontrollable sources can be identified and measured. Likewise, the frequency that uncontrollable sources cause exceedances of indicator bacteria water quality objectives in the water body can be identified. As with the RSAA, this information can then be used during the calculation of TMDLs, wasteload allocations, and load allocations in order to account for indicator bacteria from uncontrollable sources. The information can also be used to develop compliance assessment strategies for indicator bacteria TMDLs, such as establishing an allowable indicator

bacteria water quality objective exceedance frequency in the impaired water body based upon the residual exceedance frequency observed.

Note that use of the NSEA is contingent upon demonstration of control of all anthropogenic sources of indicator bacteria to the water bodies subject to an indicator bacteria TMDL. Since this task is likely to be formidable, use of the NSEA is not expected to occur immediately. Rather, the NSEA is used to recalculate TMDLs at some point after their initial adoption, following demonstration of control of all anthropogenic sources.

The NSEA can be used for REC-1 and REC-2 single sample maximum or geometric mean water quality objectives for indicator bacteria, as they are implemented in wet and dry weather indicator bacteria TMDLs. However, the NSEA is primarily expected to be applied for those water bodies where an appropriate reference system cannot be identified due to the water bodies' unique characteristics.

## **5 Summary of RSAA and NSEA Application**

The RSAA and NSEA can be differentiated based upon the data needs of the approaches and when in the TMDL process the approaches are used. The RSAA will typically be used to calculate TMDLs at the beginning of the TMDL process, prior to commencement of TMDL implementation plans. As such, substantial data about the impaired water body and an appropriate reference system is needed early in the TMDL process for the RSAA to be used. The NSEA, on the other hand, is used to recalculate TMDLs following execution of the TMDL implementation plan and control of all anthropogenic sources. Use of the NSEA relies upon collection of data demonstrating that all anthropogenic sources of indicator bacteria have been controlled.

Indicator bacteria TMDLs in the San Diego Region are frequently divided into wet and dry weather TMDLs. Wet weather indicator bacteria TMDLs typically use single sample maximum water quality objectives as numeric targets, while dry weather indicator bacteria TMDLs typically use geometric mean water quality objectives as numeric targets. The RSAA can be applied to both single sample maximum and geometric mean water quality objectives, so it is an option for both wet and dry weather TMDLs. However, use of the RSAA may not be particularly beneficial in certain circumstances. For situations where a reference system has low levels of indicator bacteria that do not exceed indicator bacteria water quality objectives, the RSAA can be expected to have a minimal impact on calculation of TMDLs. For example, as seen in Table 2, reference beaches may not exceed REC-1 water quality objectives during dry weather. Use of the RSAA to account for indicator bacteria from natural sources in these cases will not significantly alter TMDL calculations. For this reason, the RSAA is not expected to be used in such situations.

Based on the limitations of its utility and restrictions on its use, the RSAA likely will be used for wet weather TMDLs for beaches and inland waters that use REC-1 or REC-2 water quality objectives as numeric targets. The RSAA can also be expected to be used for dry weather TMDLs for inland waters that rely on numeric targets based on REC-1 and REC-2 water quality objectives. For those TMDLs where the RSAA is not likely to be applied, use of the NSEA may be appropriate. The types of indicator bacteria TMDLs where the NSEA can be expected to be used include dry weather TMDLs for beaches and TMDLs for water bodies where an appropriate reference system cannot be identified.

### ***5.1 Implementation of the RSAA for Wet Weather TMDLs***

The following is a description of the steps that can be taken to implement the RSAA for wet weather TMDLs. The description serves only as an example, based upon the San Diego Water Board's current practices for indicator bacteria TMDL development. For wet weather TMDLs developed according to the San Diego Water Board's current practices, the steps discussed below are likely to be necessary. However, changes to the methods used to develop TMDLs may result in changes to the steps necessary for implementation of the RSAA. Other options for applying the RSAA are likely to be developed; their omission from this Technical Report does not preclude their future use.

### 5.1.1 *Characterization of Target Water Body and Identification of the Reference System*

In order for the RSAA to be appropriately used, the conditions of the impaired water body and watershed to which the RSAA is to be applied (i.e., the “target water body”) must be characterized. This will help ensure that the correct reference system is chosen for the target water body. Characterization of the target water body and reference system should include consideration of conditions such as geography, biology, climate, and land use in the developed portion of a reference system. Once the target water body and watershed have been characterized, an appropriate reference system can be identified. The conditions of the reference system should be representative of the pre-development conditions of the target water body and watershed. To determine the appropriateness of a reference system for a target water body, the indicator bacteria conditions (density, sources, etc.) within the reference system can be compared to the indicator bacteria conditions of open space areas unimpacted by development of the target water body’s watershed. Similar indicator bacteria conditions in these cases can indicate similar natural sources within the watersheds, which can provide information on the general appropriateness of the reference system for the target water body. Reference systems should also be beaches and/or upstream watershed areas that are minimally impacted by anthropogenic activities. For example, the *Total Maximum Daily Load for Indicator Bacteria Project I - Beaches and Creeks in the San Diego Region (Beaches and Creeks TMDL)* (San Diego Water Board, 2007a) and the *Santa Monica Bay Beaches Wet-Weather Bacteria TMDL* (Los Angeles Water Board, 2002) both used a reference system that consisted of at least 95 percent open space. Reference systems must have representative data for the bacterial water quality conditions within the systems. A weight of evidence approach demonstrating the absence of human fecal contamination is also necessary. To the extent that more representative reference systems are ultimately identified for the *Beaches and Creeks TMDL*, those more representative reference systems are expected to be used for recalculation of those final TMDLs.

### 5.1.2 *Identification of the Wet Weather Event*

Prior to implementation of the RSAA, wet weather TMDLs need to be calculated (for new TMDLs) or recalculated (for existing TMDLs) to incorporate the RSAA. In order for these calculations to be made, the conditions that constitute wet weather should first be identified for the target water body. By defining the conditions that constitute wet weather, the weather conditions that will be modeled to calculate the wet weather TMDLs are identified. Wet weather events can be defined by the quantity of rainfall (e.g., depth in inches) which results in runoff into the stream. For instance, the San Diego Water Board has defined TMDL wet weather events for indicator bacteria in the *Beaches and Creeks TMDL*. In that document, a wet weather event is defined as those days with 0.2 inch or more of rain, as well as the 3 days following the rain event. This time period is the same as the County of San Diego Department of Environmental Health’s general advisory, which is the time period when people are advised to avoid



contact with ocean and bay water within 300 feet on either side of any storm drain, river, or lagoon outlet (San Diego Water Board, 2007a).<sup>7</sup>

### 5.1.3 Identification of the Critical Wet Weather Condition

The next primary step in incorporating the RSAA into wet weather TMDLs is for the critical wet weather condition to be identified. The critical wet weather condition is a time period associated with extreme wet conditions. The critical wet weather condition is used to calculate wet weather TMDLs in order to ensure that water bodies meet indicator bacteria water quality objectives during the majority of wet weather events. Wet weather TMDLs are calculated by modeling the annual indicator bacteria levels generated during the critical wet weather year. Models have been used to develop wet weather TMDLs because wet weather flow and indicator bacteria density data were too sparse to calculate the TMDLs directly. In the *Beaches and Creeks TMDL*, the year 1993 was selected as the critical wet weather condition because it was the wettest year of the 12 years of record (1990 through 2002) evaluated in the TMDL analysis (San Diego Water Board, 2007a).

### 5.1.4 Determination of the Allowable Number of Wet Weather Exceedance Days

Once the wet weather event and critical wet weather conditions have been defined, this information is used to determine an allowable number of days that water quality objectives can be exceeded during wet weather. TMDLs using the RSAA are calculated for the target water body by accounting for the allowable number of wet weather exceedance days in the calculations.

The allowable number of wet weather exceedance days is based upon the RSAA's principal criteria, which are as follows: (1) the bacteriological water quality of the target water body must be consistent with that of a reference system, and (2) there must be no degradation of the existing bacteriological water quality of the target water body.

The allowable number of wet weather exceedance days is determined by using the smaller exceedance probability observed in either the reference system or the target water body under the critical wet weather condition. An exceedance probability is the probability that one or more indicator bacteria water quality objective will be exceeded at a particular site, based on historical data. The exceedance probability for a reference system is calculated by taking the number of days that water quality objectives were exceeded divided by the sum of the days that objectives were exceeded and the days objectives were met. The smaller of the two exceedance probabilities is multiplied by the number of wet days that occur at the target water body under the critical wet weather condition<sup>8</sup> in order to determine the number of allowable wet-weather exceedance days.

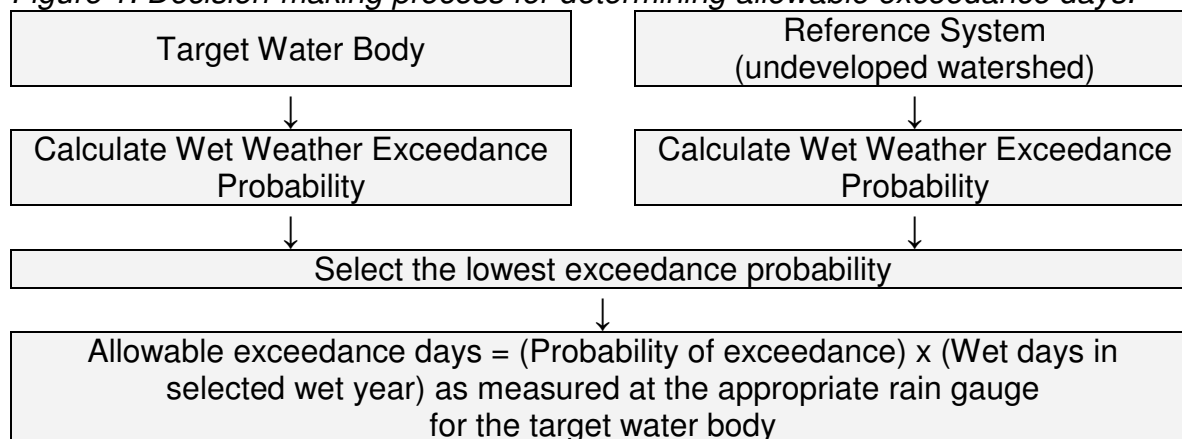
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<sup>7</sup> If data demonstrate that a smaller wet weather event generates runoff into the target water body, it may be appropriate to use the rainfall total of the smaller wet weather event as the criterion for identifying wet weather events.

<sup>8</sup> The number of wet days that occur at the target water body under the critical wet weather condition should be determined using data from an appropriate rain gauge for the target water body.

The decision-making process for determining allowable exceedance days is illustrated in Figure 1.

Figure 1. Decision-making process for determining allowable exceedance days.



#### 5.1.5 Calculation of TMDLs

Once the appropriate number of allowable exceedance days is determined, TMDLs for the target water body can be calculated (or recalculated if a TMDL already exists). Using modeling, indicator bacteria TMDLs can be calculated by multiplying daily wet weather flows during the critical year by the appropriate water quality objectives. For the allowable exceedance days associated with the RSAA to be accounted for in the TMDL, the sum of the highest daily exceedance loads in the target water body corresponding to the number of allowable exceedance days will be added to the TMDL. This resulting increase in the TMDL will be correspondingly reflected in the TMDL's wasteload and load allocations for MS4 and nonpoint source dischargers.

#### 5.1.6 Development of TMDL Implementation Provisions

In addition to calculation of TMDLs, a TMDL project includes provisions for implementation of the TMDLs. In order to ensure that anthropogenic sources of indicator bacteria will be controlled, the TMDL implementation provisions will include components addressing activities necessary to control anthropogenic sources of indicator bacteria, as well as provisions for demonstrating that anthropogenic sources have been controlled. The types of activities that can be expected to be necessary for the control of anthropogenic sources of indicator bacteria are discussed in section 5.3.1. The types of activities that can be expected to be necessary to demonstrate control of anthropogenic sources of indicator bacteria are discussed in section 5.3.2.

### 5.2 Implementation of the RSAA for Dry Weather TMDLs

The following is a description of the steps that can be taken to implement the RSAA for dry weather TMDLs. The description serves only as an example, based upon current methods used by the San Diego Water Board to develop wet and dry weather TMDLs. For dry weather TMDLs developed according to the San Diego Water Board's current wet and dry weather TMDL practices, the steps discussed below are likely to be

necessary if the RSAA is to be used. However, if other approaches are used to develop dry weather TMDLs, other steps may be necessary for implementation of the RSAA. Other options for applying the RSAA are likely to be developed; their omission from this Technical Report does not preclude their future use.

#### *5.2.1 Characterization of Target Water Body and Identification of the Reference System*

The steps necessary to characterize the target water body and identify an appropriate reference system are essentially the same for both wet and dry weather TMDLs. However, the weather conditions during which characterization and identification will occur will differ. See section 5.1.1 for further discussion of characterization of target water bodies and identification of reference systems.

#### *5.2.2 Identification of Dry Weather Days*

The approach to calculating dry weather TMDLs involves using daily flows and indicator bacteria densities observed in the target water body and reference system during dry weather. For this to be achieved, the dry weather days from which data will be used to calculate TMDLs must be identified. Dry weather days are those days that do not meet the criteria for wet weather days, as discussed in section 5.1.2.

#### *5.2.3 Determination of the Allowable Exceedance Frequency*

The RSAA is applied to dry weather TMDLs using geometric mean objectives as numeric targets. To determine an exceedance frequency for the reference system during dry weather, weekly water quality data will be needed for a statistically sufficient number of 30-day periods. The reference system exceedance frequency will be determined by dividing these dry days into discrete 30-day intervals. A 30-day interval must consist entirely of dry days, with no days of significant rainfall (or the three days following significant rainfall) occurring during the interval. Next, the number of 30-day intervals during which water quality exceeded the geometric mean water quality objective will be determined. The exceedance frequency is equal to the number of 30-day intervals exceeding the water quality objective divided by the total number of 30-day intervals.

#### *5.2.4 Calculation of TMDLs*

Calculation of dry weather TMDLs first involves identifying the target water body's allowable exceedances. In the target water body, the dry period or periods for which weekly flow and water quality samples are available will be divided into discrete 30 day intervals, with no days of wet weather (as described in Section F.1.2) in the interval. The number of 30-day periods in which the geometric mean water quality objective can be exceeded will be determined using the reference system exceedance frequency. This value is equal to the number of 30-day periods in the target water body times the exceedance frequency of the reference system.

For example, assume the target water body has 300 consecutive dry days, or 10 discrete dry 30-day intervals. If the reference system exceedance frequency is

30 percent, then water quality can exceed the geometric mean water quality objective in three 30-day intervals in the target water body, but must meet the water quality objective in seven of the 30-day intervals.

The allowable load for seven of the 30-day intervals will be calculated by multiplying the average daily flow for the 30-day interval times the geometric mean water quality objective (to get the daily load) times 30 days (to get the 30-day load). The allowable exceedance load for the three 30-day intervals will be equal to the average water quality measured in the target water body for the 30-day interval times the average daily flow times 30 days. The allowable load for the seven 30-day intervals is combined with the allowable exceedance load for the three 30-day intervals to calculate the TMDL.

#### *5.2.5 Development of TMDL Implementation Provisions*

In addition to calculation of TMDLs, a TMDL project includes provisions for implementation of the TMDLs. In order to ensure that anthropogenic sources of indicator bacteria will be controlled, the TMDL implementation provisions will include components addressing activities necessary to control anthropogenic sources of indicator bacteria, as well as provisions for demonstrating that anthropogenic sources have been controlled. The types of activities that can be expected to be necessary for the control of anthropogenic sources of indicator bacteria are discussed in section 5.3.1. The types of activities that can be expected to be necessary to demonstrate control of anthropogenic sources of indicator bacteria are discussed in section 5.3.2.

### **5.3 Implementation of the NSEA**

The following is a description of the steps that can be taken to implement the NSEA for TMDLs. The description serves only as an example, based upon the San Diego Water Board's current practices for indicator bacteria TMDL development. For TMDLs developed according to the San Diego Water Board's current practices, the steps discussed below are likely to be necessary. However, changes to the methods used to develop TMDLs may result in changes to the steps necessary for implementation of the NSEA. Other options for applying the NSEA are likely to be developed; their omission from this Technical Report does not preclude their future use.

#### *5.3.1 Control of All Anthropogenic Sources of Indicator bacteria*

Before a TMDL can be calculated using the NSEA, dischargers must demonstrate that all appropriate best management practices (BMPs) have been implemented to control all anthropogenic sources of indicator bacteria to the target water body. Completely eliminating the discharge of all anthropogenic sources of indicator bacteria (defined as human, domesticated animal, or resulting from human activity) to receiving waters is likely not feasible and is not required under the NSEA. For example, storm water runoff from landscaped areas can have high indicator bacteria densities and would be considered anthropogenic. However, landscape vegetation is not necessarily a significant source of human pathogens. Although BMPs must be implemented to manage fertilizer applications, remove pet waste, and reduce storm water and dry weather runoff from landscaped areas, complete elimination of this runoff is probably

infeasible. Another example is bacteria loading from resuspension of sediment by swimmers. Although this source would be considered anthropogenic, the only way to completely eliminate resuspension of sediment is to ban swimming which would be inappropriate since this Basin Plan amendment is intended to protect the REC-1 beneficial use. Furthermore some human sources of bacteria, such as bacterial shedding from swimmers, are impractical, if not impossible to control through BMPs. To account for uncontrollable anthropogenic sources before NSEA can be used, dischargers must also demonstrate that the remaining sources, as a whole, do not pose a human health risk.

This technical report does not attempt to list all of the activities that will be necessary to control all anthropogenic sources of indicator bacteria. This is because the activities that must be implemented to achieve this step are extensive and are the responsibility of the dischargers subject to indicator bacteria TMDLs. In addition, there is a wide array of methods that can be used to implement each necessary activity. Moreover, the effectiveness of various activities that can be implemented to achieve this step is not conclusive at this time. As such, the necessary activities will be identified, implemented, and assessed over time by the MS4 and nonpoint source dischargers, in collaboration with the San Diego Water Board. Examples of the types of activities that can be expected to be necessary include the following:

- Source tracking studies to identify indicator bacteria sources;
- Effective enforcement of all applicable ordinances, such as pet waste disposal and nuisance flow elimination ordinances;
- Implementation of an effective and compliant illicit discharge detection and elimination program;
- Implementation of an effective and compliant Standard Urban Storm Water Mitigation Plan for new development and redevelopment;
- Effective prevention and collaboration to prevent discharges of sewage into and from MS4s;
- Control of waste from homeless encampments;
- Control of waste from livestock and animal feeding operations;
- Education and outreach on requirements for proper disposal of all pet waste;
- Discouragement of feeding of urban animals (e.g., semi-wild ducks, geese, or gulls) in areas where they are highly concentrated;
- Implementation of effective BMPs to manage manure fertilizer use; and
- Achievement of full compliance with waste discharge requirements and waiver conditions that pertain to the discharge of indicator bacteria from anthropogenic sources.

In summary, the requirement to “control all sources of anthropogenic indicator bacteria” means dischargers must demonstrate they have implemented all appropriate best management practices to control anthropogenic sources such that they do not cause or contribute to exceedances of water quality objectives. The requirement to “control all sources of anthropogenic indicator bacteria” does not mean the complete “elimination”

of all anthropogenic sources of bacteria as this is both impractical as well as impossible. Some anthropogenic sources of bacteria, such as shedding during swimming are infeasible, impractical, or inappropriate to control.

### *5.3.2 Demonstration of Control of Anthropogenic Sources*

For the NSEA to be used, control of all anthropogenic sources of indicator bacteria to the water body must be demonstrated. Such demonstration is expected to occur using a weight of evidence approach. Numerous factors will be weighed to determine if control of all anthropogenic sources has been achieved. One important line of evidence to be considered is monitoring of the indicator bacteria conditions of the target water body. The monitoring design is expected to be developed by the MS4 and nonpoint source dischargers in collaboration with the San Diego Water Board. Monitoring should include sampling for fecal coliform, total coliform, and enterococcus for saltwater, and fecal coliform, *E. coli*, and enterococcus for freshwater. Dischargers may also need to conduct ribotyping and host-specific polymerase chain reaction or other similar analyses to identify the host origin of collected indicator bacteria. Direct monitoring for pathogens associated with humans could also be useful in demonstrating control of anthropogenic sources. In addition, dischargers may need to conduct sanitary surveys and other investigations to identify any ongoing discharges of indicator bacteria from anthropogenic sources and demonstrate that such discharges have been controlled. If the weight of evidence demonstrates that indicator bacteria from anthropogenic sources has been reduced to levels consistent with those attributable to uncontrollable anthropogenic sources (such as shedding during swimming), demonstration of control of anthropogenic sources is expected to be considered sufficient.

### *5.3.3 Demonstration of No Health Risks*

For the NSEA to be applied to TMDLs using REC-1 and REC-2 water quality objectives as numeric targets, the *Water Quality Standards for Coastal and Great Lakes Recreation Waters* (USEPA, 2004) requires that dischargers demonstrate that remaining indicator bacteria densities do not indicate a health risk to those swimming in the water body. However, since the USEPA water quality standards incorporate an acceptable level of risk, it is assumed that remaining indicator bacteria densities should not indicate a human health risk. In order to demonstrate that elevated risks are not present, epidemiological studies may be necessary. The *Water Quality Standards for Coastal and Great Lakes Recreation Waters* provides options for achieving this requirement, stating that it is “reasonable for a State or Territory to use existing epidemiological studies rather than conduct new or independent epidemiological studies for every water body if it is scientifically appropriate to do so” (USEPA, 2004). Conducting epidemiological studies in inland streams is problematic in the San Diego Region because the number of recreational users of a creek most likely is too low to produce a statistically valid sample population for the study. At this time, the San Diego Water Board does not expect dischargers to conduct epidemiological studies in inland streams where recreational usage rates are too low. In this situation, other methods would need to be used to assess the health risk to recreational users associated with a TMDL developed using the natural sources exclusion approach.

#### *5.3.4 Identification of Indicator Bacteria Loads Attributable to Natural Uncontrollable Sources*

Once all anthropogenic indicator bacteria sources have been shown to be controlled, the residual indicator bacteria conditions in the target water bodies attributable to uncontrollable sources must be measured. For the purposes of using a modeling approach to calculate a TMDL, the number of days water quality objectives are exceeded due to uncontrollable sources must also be identified. The monitoring program to obtain this information is anticipated to be developed by the MS4 and nonpoint source dischargers, in collaboration with the San Diego Water Board. The data the monitoring program generates must be representative of the wet and/or dry weather conditions to which the NSEA will be applied. The monitoring data will be used during the recalculation of indicator bacteria TMDLs in order to account for indicator bacteria from uncontrollable sources.

#### *5.3.5 Recalculation of TMDLs*

In order for the NSEA to be implemented, indicator bacteria TMDLs must be recalculated incorporating the NSEA. Wet weather TMDLs incorporating the NSEA likely will be recalculated in much the same manner as wet weather TMDLs incorporating the RSAA. Using modeling, wet weather indicator bacteria TMDLs will be recalculated by multiplying daily flows during the critical wet weather year by the appropriate water quality objectives. For allowable exceedance days to be accounted for in the TMDL, the sum of the highest daily exceedance loads corresponding to the number of exceedance days observed in the target water body will be added to the TMDL.<sup>9</sup> This resulting increase in the TMDL will be correspondingly reflected in the TMDL's wasteload and load allocations for MS4 and nonpoint source dischargers.

Dry weather TMDLs that incorporate the NSEA are expected to be conducted differently than wet weather TMDLs. The dry weather flows and indicator bacteria densities measured in the target water body following control of all anthropogenic sources will serve as the basis for dry weather TMDLs. A statistical approach will likely be used for dry weather TMDL recalculation, whereby the average daily flows of the target water body will be multiplied by the average density of the remaining indicator bacteria in the target water body and the number of dry days occurring during the critical wet year. Resulting wasteload and load allocations will reflect the conditions that were observed in the target water body following control of all anthropogenic sources of indicator bacteria.

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<sup>9</sup> Exceedance loads are typically modeled using estimated parameters based on regional conditions. In the case of TMDLs incorporating the NSEA, it may be possible to model exceedance loads using estimated parameters based on data collected from the target water body and watershed, due to the data collected to meet the criteria of the NSEA.

## **6 Antidegradation**

The Basin Plan amendment is consistent with state and federal antidegradation policies (State Water Board Resolution No. 68-16 and 40 CFR 131.12). The RSAA ensures consistency with antidegradation policy by requiring that allowable exceedance days associated with a reference system cannot be used in the calculation of a TMDL if the frequency of exceedance days in the reference system is greater than the frequency of exceedance days in the target water body. This prevents the use of the RSAA to develop TMDLs that are greater than the indicator bacteria loading that already exists in the target water body. The NSEA ensures consistency with antidegradation policy by ensuring that all anthropogenic sources of indicator bacteria are controlled. Control of all anthropogenic sources of indicator bacteria will result in an improvement in water quality, rather than degradation of water quality.



## 7 Special Studies

Implementation of the RSAA and NSEA raises several questions. Special studies addressing these questions have the potential to improve implementation of the RSAA and NSEA over the long-term. These questions are:

- What is the risk of illness from swimming in water contaminated with urban runoff that is devoid of sewage?
- How can we tell if sewage and sewage-associated pathogens are present and where they originate in surface water systems?
- Do exceedances of the indicator bacteria water quality objectives from wildlife sources increase the risk of illness?
- Are there other, more appropriate surrogates for measuring the risk of illness than the indicator bacteria water quality objectives currently used?

Addressing these uncertainties is needed to maximize effectiveness of strategies to reduce the risk of illness, which is currently measured by indicator bacteria densities. Dischargers may work with the San Diego Water Board to determine if such special studies are appropriate. Additionally, the San Diego Water Board supports the idea of measuring pathogens (the agents causing impairment of beneficial uses) rather than indicator bacteria (surrogates for pathogens). However, indicator bacteria have been used to measure water quality historically because measurement of pathogens is both difficult and costly. The San Diego Water Board is supportive of any efforts by the scientific community to perform epidemiological studies and/or investigate the feasibility of measuring pathogens directly.

## 8 Public Participation

Public participation is an important component of Basin Plan planning projects. The federal regulations require that Basin Planning projects be subject to public review. Public participation was provided through the San Diego Water Board's Basin Plan amendment process, which included a California Environmental Quality Act (CEQA) scoping meeting and public workshop, a public hearing, and a formal public comment period. These public hearings and meetings have been conducted as stipulated in the regulations (40 CFR 25.5 and 25.6), for all programs under the Clean Water Act.

*Table 4. Public Participation Milestones.*

Date	Event
January 24, 2006	Notice for CEQA Scoping Meeting
March 13, 2006	CEQA Scoping Meeting
July 20, 2006	Notice for Technical Advisory Committee meeting
July 25, 2006	Technical Advisory Committee meeting
July 16, 2007	Release of Basin Plan amendment and Technical Report for Stakeholder Advisory Group review
August 22, 2007	Stakeholder Advisory Group meeting to discuss comments
September 13, 2007	Release of Basin Plan amendment and Technical Report for Peer Review
October 2, 2007	Stakeholder Advisory Group teleconference to discuss comments
January 22, 2008	Release of Basin Plan amendment and Technical Report for Stakeholder Advisory Group review
February 19, 2008	Stakeholder Advisory Group teleconference to discuss comments
February 29, 2008	Release of Basin Plan amendment and Technical Report with Environmental Checklist for public review
May 14, 2008	Public and Adoption Hearing

## **9 Environmental Analysis, Environmental Checklist, and Economic Factors**

The San Diego Water Board must comply with the CEQA when amending the Basin Plan. Under the CEQA, the San Diego Water Board is the Lead Agency for evaluating the environmental impacts of the reasonably foreseeable methods of compliance with the proposed Basin Plan amendment. The following section summarizes the environmental analysis conducted to fulfill the CEQA requirements. The complete environmental analysis, including the environmental checklist and discussion of economic factors, is found in Appendix 1.

### **9.1 California Environmental Quality Act Requirements**

The CEQA authorizes the Secretary of the Resources Agency to certify state regulatory programs, designed to meet the goals of the CEQA, as exempt from its requirements to prepare an Environmental Impact Report (EIR), Negative Declaration, or Initial Study. The State Water Board's and San Diego Water Board's Basin Plan amendment process is a certified regulatory program and is therefore exempt from the CEQA's requirements to prepare such documents.

The State Water Board's CEQA implementation regulations describe the environmental documents required for Basin Plan amendment actions. These documents consist of a written report that includes a description of the proposed activity, alternatives to the proposed activity to lessen or eliminate potentially significant environmental impacts, and identification of mitigation measures to minimize any significant adverse impacts.

The CEQA and CEQA Guidelines limit the scope to an environmental analysis of the reasonably foreseeable methods of compliance with the Basin Plan amendment. The State Water Board CEQA Implementation Regulations for Certified Regulatory Programs require the environmental analysis to include at least the following:

1. A brief description of the proposed activity. In this case, the proposed activity is the Basin Plan amendment.
2. Reasonable alternatives to the proposed activity.
3. Mitigation measures to minimize any significant adverse environmental impacts of the proposed activity.

Additionally, the CEQA and CEQA Guidelines require the following components, some of which are repetitive of the list above:

1. An analysis of the reasonably foreseeable environmental impacts of the methods of compliance.
2. An analysis of the reasonably foreseeable feasible mitigation measures relating to those impacts.
3. An analysis of reasonably foreseeable alternative means of compliance with the rule or regulation, which would avoid or eliminate the identified impacts.

Additionally, the CEQA Guidelines require the environmental analysis take into account a reasonable range of:

1. Environmental factors.
2. Economic factors.
3. Technical factors.
4. Population.
5. Geographic areas.
6. Specific sites.

## ***9.2 Analysis of Reasonably Foreseeable Methods of Compliance***

The Basin Plan amendment will essentially be complied with through discharger implementation of municipal storm water and nonpoint source programs designed to attain the wasteload and load allocations specified by various indicator bacteria TMDLs. Potential environmental impacts associated with the Basin Plan amendment are analyzed by assessing the impacts that will result from dischargers complying with indicator bacteria TMDL wasteload and load allocations using the RSAA or NSEA provided in the Basin Plan amendment, as opposed to dischargers complying with indicator bacteria TMDL wasteload and load allocations without using the RSAA or NSEA.

These two approaches for complying with indicator bacteria TMDL wasteload and load allocations are expected to have the same reasonably foreseeable methods of compliance. The most reasonably foreseeable methods of compliance are for dischargers to implement BMPs for point source discharges, and management practices (MPs) for nonpoint sources. Typical BMPs that may be chosen by dischargers to comply with indicator bacteria TMDL wasteload and load allocations are often divided into non-structural and structural controls. Since the Basin Plan amendment will result in an increase in TMDL wasteload and load allocations, it will result in a reduction in implementation of non-structural and structural BMPs.

## ***9.3 Possible Environmental Impacts***

The CEQA and CEQA Guidelines require an analysis of the reasonably foreseeable environmental impacts of the methods of compliance with the Basin Plan amendment. The environmental checklist identifies the potential environmental impacts associated with these methods with respect to earth, air, water, plant life, animal life, noise, light, land use, natural resources, risk of upset, population, housing, transportation, public services, energy, utilities and services systems, human health, aesthetics, recreation, and archeological/historical concerns.

From the 61 reasonably foreseeable environmental impact categories identified in the checklist, only three potential environmental impacts were identified. All three of these potential environmental impacts were considered "Less Than Significant." For the rest of the categories, the Basin Plan amendment was considered to have "No Impact" on

the environment. See sections 4 and 5 in Appendix 1 for a complete discussion of the potential environmental impacts.

In addition to the potential impacts mentioned above, mandatory finding of significance regarding short-term, long-term, cumulative, and substantial impacts were evaluated. Based on this review, the San Diego Water Board concluded that the Basin Plan amendment will result in no cumulative impacts as discussed in Appendix 1.

#### **9.4 *Alternative Means of Compliance***

Since the Basin Plan amendment does not result in significant impacts to the environment, an analysis of alternative means of compliance with the Basin Plan amendment is not required. The purpose of an alternative means of compliance analysis is to assess alternative means of compliance that will avoid or eliminate identified impacts (14 CCR section 15187(c)(3)). Since no significant impacts resulting from the Basin Plan amendment have been identified, this analysis is not necessary.

#### **9.5 *Reasonably Foreseeable Methods of Compliance at Specific Sites***

The Basin Plan amendment will essentially be complied with through implementation of municipal storm water and nonpoint source programs designed to attain the wasteload and load allocations specified by various indicator bacteria TMDLs. Potential environmental impacts associated with the Basin Plan amendment are analyzed by assessing the impacts that will result from complying with indicator bacteria TMDL wasteload and load allocations using the RSAA or NSEA identified in the Basin Plan amendment, as opposed to complying with indicator bacteria TMDL wasteload and load allocations without using the RSAA or NSEA.

These two approaches for complying with indicator bacteria TMDL wasteload and load allocations are expected to have the same reasonably foreseeable methods of compliance at specific sites. The most reasonably foreseeable methods of compliance at specific sites are for dischargers to implement structural and non-structural BMPs to reduce pollutant loads in their discharges. However, the Basin Plan amendment will result in a reduction in implementation of non-structural and structural BMPs than would otherwise occur without the Basin Plan amendment.

#### **9.6 *Economic Factors***

The environmental analysis required by the CEQA must take into account a reasonable range of economic factors. However, the methods of achieving compliance with indicator bacteria TMDLs while utilizing the Basin Plan amendment is essentially the same as the methods of achieving compliance with indicator bacteria TMDLs without the Basin Plan amendment. For compliance to be achieved in both cases, non-structural and structural BMPs must be implemented and monitoring must be conducted. The only difference between the two approaches is that implementation of fewer non-structural and structural BMPs can be expected under the Basin Plan amendment approach, thereby reducing economic impacts of indicator bacteria TMDLs. However, the level of reductions in non-structural and structural BMP implementation

attributable to the Basin Plan amendment can only be known once discharger implementation of programs to meet indicator bacteria TMDL wasteload and load allocations begins.

### ***9.7 Reasonable Alternatives to the Proposed Activity***

The Basin Plan amendment does not result in any significant or potentially significant impacts to the environment. Therefore, no alternatives to the Basin Plan amendment are proposed, since they are not necessary to avoid or reduce any significant or potentially significant impacts. An analysis of alternatives to the project is not required when review of the project shows that the project would not have any significant or potentially significant effects on the environment (14 CCR section 15252(a)(2)(B)).

## 10 Necessity of Regulatory Provisions

The Office of Administrative Law (OAL) is responsible for reviewing administrative regulations proposed by state agencies for compliance with standards set forth in the Administrative Procedure Act, Government Code section 11340 et seq., for transmitting these regulations to the Secretary of State and for publishing regulations in the California Code of Regulations. Following State Water Board approval of this Basin Plan amendment establishing implementation provisions for indicator bacteria water quality objectives within the context of TMDLs, any regulatory portions of the amendment must be approved by the OAL per Government Code section 11352. The State Water Board must include in its submittal to the OAL a summary of the necessity for the regulatory provision.<sup>10</sup>

Amendment of the Basin Plan is necessary because there are natural sources of indicator bacteria that may cause or contribute to exceedances of indicator bacteria Water quality objectives. Control of many of these natural sources of indicator bacteria in order to achieve Water quality objectives is infeasible. In addition, control of these natural sources of indicator bacteria can be harmful to important aquatic life and wildlife beneficial uses. Moreover, requirements to control the natural sources of indicator bacteria can result in a significant and unnecessary economic burden on dischargers.

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<sup>10</sup> "Necessity" means the record of the rulemaking proceeding demonstrates by substantial evidence the need for a regulation to effectuate the purpose of the statute, court decision, provision of law that the regulation implements, interprets, or makes, taking into account the totality of the record. For purposes of this standard, evidence includes, but is not limited to, facts, studies, and expert opinion. [Government Code section 11349(a)].

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