

**ATTACHMENT A2 TO RESOLUTION NO. R8-2017-0014**  
("clean" version)

**Amendment to the Water Quality Control Plan for the Santa Ana River Basin to  
Incorporate Total Maximum Daily Loads for Selenium in Freshwater: Newport Bay  
Watershed, Orange County, California**

**[Note: Total Maximum Daily Loads established for waters in the Santa Ana Region are currently shown in Chapter 5 – Implementation. To enhance clarity and facilitate reader access to established TMDLs, a new separate chapter, to be called Chapter 6 – Total Maximum Daily Loads, is proposed to be added to the Basin Plan.**

**The current Chapter 6 - Monitoring and Assessment and Chapter 7 - Water Resources and Water Quality Management, would be re-numbered to Chapters 7 and 8, respectively. Text references to these chapters in the Plan would be modified as necessary to reflect the revised numbers, and the tables/figures in these Chapters would be renumbered appropriately. These changes would be accompanied by appropriate changes to the Table of Contents and Lists of Tables and Figures.**

**The Selenium TMDLs are proposed to be added to the new Chapter 6 with this amendment. Over time, the established TMDLs now shown in Chapter 5 of the Basin Plan will be moved to the new Chapter 6, with appropriate re-formatting and re-numbering of tables and figures and page numbers and headers/footers. No substantive changes to the TMDLs will be made absent a Basin Plan amendment.]**

**The following identifies the changes to the Basin Plan as they would appear in the Basin Plan. Attachment 1 shows these changes in underline/strike-out format.**

**Add to the Basin Plan after Chapter 5 - Implementation:**

**Chapter 6. Total Maximum Daily Loads (TMDLs)**

**6.1 Newport Bay Watershed TMDLs**

**6.1.Se: TMDLs for Selenium in Freshwater, Newport Bay Watershed**

These TMDLs were adopted by the Regional Water Quality Control Board, Santa Ana Region on **[insert date here]**.

These TMDLs were approved by:

- The State Water Resources Control Board on **[insert date here]**.
- The Office of Administrative Law on **[insert date here]**.
- The U.S. Environmental Protection Agency on **[insert date here]**.

The elements of the TMDLs are presented in Table 6.1.Se.1 and the Implementation Tasks and Compliance Schedule are presented in Table 6.1.Se.2. The documentation prepared to support the adoption of these TMDLs can be found at the Regional Board's website:

**[http://www.waterboards.ca.gov/santaana/water\\_issues/programs/tmdl/Se\\_tmdl.shtml](http://www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/Se_tmdl.shtml)**

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**Table 6.1.Se.1: Total Maximum Daily Load (TMDL) Summary - Newport Bay Watershed Selenium TMDLs**

<b>Phasing of the Selenium TMDLs</b>
<p>These selenium TMDLs are being established and implemented as phased TMDLs, consistent with USEPA guidance (USEPA, 2006b) and based upon a three-part structure:</p> <ul style="list-style-type: none"><li>• Phase I – Completion as soon as possible, but no later than 6 years from the effective date of the proposed selenium TMDLs<sup>1</sup>.</li><li>• TMDL Reconsideration – Completion as soon as possible, but no later than 2 years after Phase I. Reconsideration of the proposed selenium TMDLs will be no later than 8 years from the effective date of the proposed selenium TMDLs.</li><li>• Phase II – Completion as soon as possible, but no later than 30 years from the effective date of the reconsidered selenium TMDLs<sup>2</sup>. If reconsidered selenium TMDLs are not in effect 8 years after the effective date of the original proposed selenium TMDLs, Phase II actions will commence at this time. In this circumstance, changes in the reconsidered selenium TMDLs will be incorporated into Phase II at the time they become effective.</li></ul> <p>Phased TMDL Structure. Phase I and Phase II must be completed as soon as possible, but no later than, the specified timeframes.</p>
<b>Problem Statement</b>
<p>Selenium is a naturally occurring element that may bioaccumulate through the food chain to levels that can cause adverse effects on higher-level aquatic life and wildlife, including fish and birds that prey on fish and invertebrates.</p> <p>The beneficial uses most at risk from selenium bioaccumulation include warm freshwater habitat (WARM), estuarine habitat (EST), marine habitat (MAR), preservation of biological habitats of special significance (BIOL), wildlife habitat (WILD), rare, threatened, or endangered</p>

<sup>1</sup> Each individual action will be scheduled as a specific number of years/months from the effective date of the proposed selenium TMDL/reconsidered selenium TMDL (as applicable).

<sup>2</sup> *Ibid.*

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species (RARE), and spawning, reproduction, and development (SPWN).

The applicable narrative water quality objectives for toxic substances specify:

“Toxic substances shall not be discharged at levels that will bioaccumulate in aquatic resources to levels which are harmful to human health.

The concentrations of toxic substances in the water column, sediments or biota shall not adversely affect beneficial uses.”

The 2000 California Toxics Rule (CTR) establishes criteria for the protection of aquatic life for selenium for freshwater and enclosed bays and estuaries as follows:

- a chronic criterion for total recoverable selenium in freshwater of 5 µg/L;
- a chronic criterion for total dissolved selenium in saltwater (including enclosed bays and estuaries) of 71 µg/L; and
  - an acute criterion for total dissolved selenium in saltwater (including enclosed bays and estuaries) of 290 µg/L.

San Diego Creek Reach 1 is the only waterbody in the Newport Bay watershed listed as impaired for selenium on the 2010 303(d) list<sup>3</sup> (the most recent 303(d) list). This listing was based on water column data. Other areas of the Newport Bay watershed were not identified as impaired. The impairment assessment for these selenium TMDLs evaluated water and tissue data from 2001 – 2013 for several key areas within the Newport Bay watershed:

- San Diego Creek (SDC) Subwatershed
- Santa Ana-Delhi Channel (SADC) Subwatershed<sup>4</sup>
- Big Canyon Wash (BCW) Subwatershed<sup>5</sup>
- Other Freshwater Drainages Tributary to Upper Newport Bay (Costa Mesa and Santa Isabel Channels)<sup>6</sup>
- Salt Water / Estuarine

Since the primary route for selenium bioaccumulation is through diet, not water, the impairment assessment was completed using the numeric targets selected for these TMDLs for both freshwater fish tissue and bird egg tissue to assess conformance with the applicable narrative objective (see Numeric Targets section for the applicable tissue-based numeric targets). Selenium concentrations in fish tissue, bird egg tissue, and water were compared to the

<sup>3</sup>[http://www.waterboards.ca.gov/water\\_issues/programs/tmdl/2010state\\_ir\\_reports/category5\\_report.shtml](http://www.waterboards.ca.gov/water_issues/programs/tmdl/2010state_ir_reports/category5_report.shtml)

<sup>4</sup>[http://www.waterboards.ca.gov/santaana/water\\_issues/programs/basin\\_plan/docs/rec\\_standards/SWRCB/20140121\\_Attachment%202.pdf](http://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/docs/rec_standards/SWRCB/20140121_Attachment%202.pdf)

Attachment 1 to Resolution No. R8-2012-0001

The State Water Resources Control Board approved amendments to the Basin Plan that revise recreational standards for inland fresh surface waters in the Region, as well as adding the Santa Ana-Delhi Channel as a named waterbody with designated beneficial uses. The Regional Board adopted these amendments in 2012 and they were partially approved by USEPA Region IX on April 8, 2015. USEPA Region IX issued a letter clarifying the April 8, 2015 decision letter on August 3, 2015.

<sup>5</sup> Big Canyon Wash is not a named waterbody within this Basin Plan with directly assigned beneficial uses.

<sup>6</sup> There are no freshwater drainages tributary to Lower Newport Bay

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applicable tissue-based and water column-based concentrations as presented in the following table. This approach is consistent with Section 6.1.3 of the Listing Policy<sup>7</sup>. However, since the CTR criteria are the currently applicable numeric objectives, this impairment assessment also relies on the comparison of water column data for the freshwater and saltwater bodies in the watershed to the appropriate CTR criteria.

In addition, given that the approach to selenium at the local, state, and federal levels has evolved to focus more on tissue-based ecological risk rather than water column exceedances, and, as the SSOs under development for the watershed are based solely on bird egg and fish tissue, the impairment assessment includes a two-tiered approach. This approach is consistent with the structure of the numeric targets and includes:

- Tissue-based impairment: impairment based upon exceedances of the fish tissue and/or bird egg tissue numeric targets, which are established in these TMDLs to interpret the narrative water quality objective;
- Water column-based impairment: impairment based *solely* on exceedances of the CTR water column-based numeric targets (no evidence of exceedances of the tissue-based numeric targets). If and when the current selenium water quality objectives in the CTR cease to apply to these waters (e.g., if site-specific objectives are adopted for the waters) then waterbodies categorized as impaired solely due to CTR exceedances will no longer be considered to be impaired.

**Concentrations Used to Assess Selenium Impairment in Tissue and Water**

Media	Basis for Tissue-Based Impairment Ecological Risk		Basis for Water Column-Based Impairment CTR Ambient Water Quality Chronic Criteria	
	Freshwater (µg Se/g dw)	Saltwater (µg Se/g dw)	Freshwater (µg Se/L)	Saltwater (µg Se/L)
Water	--	--	5	71
Fish tissue	5 and 8.1 <sup>1</sup>	--	--	--
Egg tissue	8	8	--	--

<sup>1</sup> There are two applicable fish tissue numeric targets: (1) as a dietary item for the protection of birds (5 µg Se/g dw); and, (2) for the protection of fish (8.1 µg Se/g dw). The 5 µg Se/g dw fish tissue numeric target applies where bird eggs are not attaining the 8 µg Se/g dw bird egg tissue numeric target. The 8.1 µg Se/g dw fish tissue numeric target applies where birds are attaining the 8 µg Se/g dw bird egg tissue numeric target.

The assessment confirmed the impairment in San Diego Creek Reach 1 and for the San Diego Creek subwatershed as a whole, including Peters Canyon Wash, and identified additional impairments for selenium in the Big Canyon Wash subwatershed and the Santa Ana-Delhi Channel. Through the end of 2013 (the assessment period for these TMDLs), no nesting birds have been found and therefore, no bird egg tissue samples have been collected from the Santa Ana-Delhi Channel. Two composite mosquitofish tissue samples were collected from the Santa Ana-Delhi Channel in 2014, but as these data were collected after the data cutoff date of 2013, they were not included in the impairment assessment. These data will be considered during future impairment assessments. Future monitoring efforts will continue to

<sup>7</sup> Water Quality Control Policy for Developing California's Clean Water Act Section 303(d) List

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attempt to collect tissue samples from this subwatershed.

Veeh Creek is a small tributary drainage that is located at the extreme southeastern end of the San Diego Creek subwatershed and is hydrologically isolated from the lower San Diego Creek subwatershed assessment area. Though water column impairment based on the CTR chronic criterion for freshwater was found at three locations in Veeh Creek, no fish or bird egg tissue data are yet available to assess whether and to what degree these or other organisms are or may be impacted by selenium. (As discussed above, selenium is primarily accumulated in organisms through diet and in a highly site-specific manner; the CTR freshwater chronic criterion for selenium is, therefore, not a suitable indicator of the potential threat to organisms.). For these reasons, additional investigations are needed to determine the extent and any associated potential impacts to fish, birds or other organisms that may be occurring in this small tributary drainage as a result of selenium. Therefore, the implementation strategy for Veeh Creek during Phase I of these TMDLs will be to collect more data so that the area can be better evaluated. Once that information is available, it can be used during the TMDL reconsideration to determine what, if any, management actions would be feasible and appropriate to address selenium concentrations in that area. Those management actions would then be implemented during Phase II of the TMDLs.

Ambient selenium concentrations in Upper and Lower Newport Bay are orders of magnitude below the CTR saltwater chronic criterion of 71 µg Se/L. In addition, the tissue samples collected in Upper and Lower Newport Bay did not meet the listing criteria, were not available (e.g., no bird eggs have been collected from Lower Newport Bay<sup>8</sup>), or could not be assessed due to the lack of an appropriate screening value<sup>9</sup>. Thus, TMDLs for selenium do not need to be developed for Upper and Lower Newport Bay. It is also important to note that the primary sources of selenium to Newport Bay are the freshwater tributary drainages. Any reductions in selenium concentrations in the freshwater tributaries will also reduce selenium concentrations in the Bay.

Additionally, selenium concentrations in the Other Freshwater Drainages Tributary to Upper Newport Bay (Costa Mesa and Santa Isabel Channels) did not exceed the CTR freshwater chronic criterion of 5 µg Se/L. Although tissue samples have not been collected from these drainages, given their small areal extent, limited suitable habitat, and low selenium concentrations, it is not likely that fish or birds that may live or forage in these drainages are at risk from selenium. For these reasons, TMDLs do not need to be developed for these other freshwater drainages tributary to Upper Newport Bay.

**Numeric Targets**

As selenium is primarily accumulated in organisms through diet, and because bioaccumulation is highly site-specific, water column concentration-based criteria are not as suitable, especially for predicting chronic effects, as tissue-based targets. Recent efforts at revising selenium criteria at the federal, state, and local level have recognized that a tissue standard may be a more appropriate way to regulate selenium. For these reasons, tissue-based numeric targets for fish tissue and bird eggs are established in these selenium TMDLs. These targets are an interpretation of the narrative toxic substance objective (identified in the Problem Statement section). Since the CTR water column criteria are currently applicable numeric objectives, unless and until replaced by revised objectives (which could include SSOs), a water column

<sup>8</sup> No nesting aquatic-dependent birds have been found in Lower Newport Bay, likely as a result of the lack of available nesting habitat in this highly urbanized area.

<sup>9</sup> The fish tissue numeric targets apply only to freshwater fish.

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numeric target consistent with the CTR is also included. However, SSOs for selenium, expressed as numeric concentrations in fish tissue and bird egg tissue, are currently under development and are expected to be proposed for adoption within one to two years after the effective date of these selenium TMDLs. The selenium SSOs are expected to be consistent with the fish tissue and bird egg tissue numeric targets in these TMDLs. If the revised objectives are approved and replace the current CTR freshwater chronic criterion for the Newport Bay watershed, the numeric water column-based target will no longer be in effect and numeric targets for these selenium TMDLs will consist only of the recommended fish tissue and bird egg tissue concentrations.

The following table provides the bird egg tissue, fish tissue, and freshwater water column numeric targets for the selenium TMDLs in the Newport Bay Watershed. The numeric targets address beneficial uses related to aquatic life and aquatic-dependent wildlife, the most sensitive beneficial uses in the watershed. The applicable fish tissue numeric target depends upon the attainment of the bird egg target. Where the bird egg target is attained, the fish tissue target of 8.1 ug/Se g dry weight (dw) applies. This target serves as a protective target for fish as a separate endpoint. Where the bird egg tissue target is not attained, the fish tissue target of 5 µg Se/g dw applies<sup>10</sup>. This target serves as a protective dietary target for aquatic-dependent shorebirds and only applies if the bird egg tissue target is not being attained at a fish tissue concentration of 8.1 µg Se/g dw.

**Numeric Targets for Selenium in the Newport Bay Watershed**

<b>Tissue-based Numeric Targets Where Bird Egg Tissue Targets <u>Not Attained</u><sup>1,2</sup></b>		<b>Water Column-based Numeric Target<sup>3</sup></b>
<b>Bird Egg<sup>4</sup> Tissue</b>	<b>Fish Tissue</b>	<b>Freshwater Water Column</b>
8 µg Se/g dw	5 µg Se/g dw OR site-specific fish tissue concentration at which the bird egg target is met	5 µg Se/L
<b>Tissue-based Numeric Targets Where Bird Egg Tissue Targets <u>Attained</u><sup>1,2</sup></b>		<b>Water Column-based Numeric Target<sup>3</sup></b>
<b>Bird Egg<sup>4</sup> Tissue</b>	<b>Fish Tissue</b>	<b>Freshwater Water Column</b>
8 µg Se/g dw	8.1 µg Se/g dw	5 µg Se/L

<sup>1</sup> The tissue-based targets are subject to revision upon adoption and approval of revised objectives (e.g., site-specific objectives). Such revisions would require a Basin Plan Amendment.

<sup>2</sup> The applicable fish tissue numeric target depends upon the attainment of the bird egg target.  
 a. Where the bird egg target is attained, the fish tissue target of 8.1 µg Se/g dw applies. This target serves as a protective target for fish as a separate endpoint.  
 b. Where the bird egg tissue target is not attained, the fish tissue target of 5 µg Se/g dw, or a site-specific fish tissue concentration at which the bird egg target is met, applies. This target serves as a protective dietary target for aquatic-dependent shorebirds and only applies if the bird egg tissue target is not being attained at a fish tissue concentration of 8.1 µg Se/g dw.

<sup>3</sup> Target is based on CTR criterion for freshwater. This target will no longer be in effect once the CTR freshwater criterion has been replaced by revised objectives (e.g., SSOs).

<sup>10</sup> If the bird egg tissue target is attained at a fish tissue concentration other than 5 µg Se/g dw (i.e., at a concentration less than 5 µg Se/g dw or between 5 and 8.1 µg Se/g dw), then that fish tissue concentration becomes the site-specific fish tissue numeric target for that area.



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<sup>4</sup> Aquatic-dependent shorebirds

**Source Analysis**

Inputs of selenium to surface waters in the Newport Bay watershed come from both point and non-point sources. Point sources include urban runoff, groundwater dewatering, groundwater dewatering and cleanup, and nursery operations. Non-point sources include agriculture discharges, atmospheric deposition, open space, and rising groundwater<sup>11</sup>.

Selenium sources were evaluated based upon an estimate of the total load and water column concentrations. The analysis was not broken out by flow condition (dry vs. wet weather), but was evaluated seasonally (summer season (April 1 – September 30) and winter season (October 1 – March 31)). Consideration of the critical conditions (e.g., breeding seasons, dry weather vs. wet weather) and seasonal variations is reflected in the TMDLs and the wasteload allocations (WLA) and load allocations (LAs).

The source analysis evaluated total selenium loads to provide the potential magnitude of each source. Concentrations were also analyzed in order to provide a sense of the particular biological risk from a source (since concentrations tend to be a more biologically significant indicator of ecological risk from selenium than load). As data allowed, source categories were evaluated for the entire Newport Bay watershed as well as each of the three subwatersheds (San Diego Creek, Santa Ana-Delhi Channel, and Big Canyon Wash). However, due to data limitations, not all sources could be evaluated at the subwatershed scale.

Based on the Source Analysis, the following key conclusions can be made:

- Groundwater is the predominant source of selenium in the Newport Bay watershed. It enters surface waters either through point source discharges (e.g., dewatering operations) or more commonly through non-point source (NPS) rising groundwater. Of these sources, NPS rising groundwater is the major source of selenium inputs into surface waters in the watershed.
- Urban runoff is not a significant source of selenium. From a load perspective, urban runoff generates a relatively high load. However, this load is driven by volume, not concentration. Urban runoff concentrations are well below the CTR freshwater chronic criterion, with an annual median concentration of 0.90 µg/L, and a maximum concentration of 3.1 µg/L.
- Discharges from the City of Irvine’s dewatering operations contain moderate concentrations of selenium (annual median concentration of 29 µg/L), but generate a relatively minor annual load of 14 lbs/year, which has been drastically reduced in recent years.<sup>12</sup>
- General dewatering discharges are highly variable from year to year. Caltrans and

<sup>11</sup> Throughout this TMDL document, the term ‘rising groundwater’ is used to describe groundwater intercepted by channels (i.e., lateral groundwater inflows, shallow groundwater, or shallow exfiltrating groundwater), as well as an actively rising water table with artesian conditions. In most areas of the Newport Bay watershed, “rising groundwater” refers to the condition where groundwater is intercepted by channels; however, the artesian conditions typically associated with the term “rising groundwater” exist in the Newport Bay watershed in localized areas.

<sup>12</sup> The BMP Strategic Plans detail projects which are in development to address these discharges, and these loads are anticipated to be removed from the system. See Implementation Plan for additional details regarding the BMP Strategic Plans.

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Irvine Ranch Water District have consistent dewatering activities, with the Caltrans dewatering accounting for an estimated annual load averaging 51 lbs in the winter season and 52 lbs in the summer season. Caltrans currently sewers the groundwater, but it would otherwise represent both a significant source from a concentration, as well as load perspective, if discharged to surface waters. However, Caltrans is unlikely to discharge to receiving waters in the future except under exceptional circumstances.

- Other than Caltrans loads, which are sewered, the groundwater dewatering and cleanup selenium loads were not consistent from year to year during the period of record because many are short-term discharges and their loads can be highly variable.
- Atmospheric deposition, agricultural runoff, open space runoff, and nursery discharges are all considered relatively insignificant sources of selenium.

**Linkage Analysis**

The biodynamic model developed by the United States Geological Survey (USGS) staff (hereinafter referred to as the biodynamic model) was adapted for use in the Newport Bay watershed and used to calculate water column concentrations for fish and bird eggs in Newport Bay. The biodynamic model links waterborne concentrations of selenium to the selenium concentrations in particulates. From there, the model then follows selenium concentrations up through the food web, taking into account specific transfer factors between different trophic level organisms. This biodynamic model can be used to predict the probable selenium concentration in water that would correspond with a specific tissue concentration, such as a guideline or numeric target, or it can take a water column selenium concentration and use it to predict the probable selenium concentration in a target organism, such as fish or birds. To apply the biodynamic model to the Newport Bay watershed, USGS staff used available site-specific data on seasonal concentrations of selenium in water, waterborne particulates, algae, surficial bed sediment, aquatic invertebrates, fish, and bird eggs as input values into the model.

The Presser-Luoma model upon which the Newport Bay watershed biodynamic model is based is a mechanistic model that considers geochemical influences and biological differences empirically. For selenium, it provides a means to model site-specific food web structures by quantifying selenium transformation from the dissolved phase to the particulate phase (as determined by the partitioning coefficient,  $K_d$ ) and to biota (via diet and tissue trophic transfer factors, TTFs).

The biodynamic model was used to predict probable selenium water column concentrations from the tissue-based numeric targets for the different food webs and hydrologic compartments in the watershed using the following steps:

1. Calculate the  $K_d$  using Equation 1:

$$K_d = \frac{Se_{particulate} \text{ (ppm dry weight)}}{Se_{water} \text{ (ppb)}} \times 1,000$$

2. Calculate the TTF for particulates to invertebrates using Equation 2:

$$TTF_{invertebrate} = \frac{C_{invertebrate}}{C_{particulate}}$$



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3. Calculate the TTF for invertebrates to fish<sup>13</sup> (Equation 2):

$$TTF_{fish} = \frac{C_{fish}}{C_{invertebrate}}$$

4. Calculate the TTF for fish to bird eggs<sup>14</sup> (Equation 2):

$$TTF_{bird} = \frac{C_{bird}}{C_{fish}}$$

**Then:**

5a. Translate the target fish tissue concentration to a water column concentration (µg dissolved Se/L):

Piscivorous fish food web

$$C_{water} (\mu\text{g Se/L}) = \frac{C_{fish\ target}/TTF_{fish}}{TTF_{fish} \times TTF_{invertebrate} \times K_d} \times 1000$$

Invertivorous fish food web

$$C_{water} (\mu\text{g Se/L}) = \frac{C_{fish\ target}/TTF_{fish}}{TTF_{invertebrate} \times K_d} \times 1000$$

**Or:**

5b. Translate the target bird egg tissue concentration to a water column concentration (µg dissolved Se/L):

Piscivorous bird food web

$$C_{water} (\mu\text{g Se/L}) = \frac{C_{bird\ target}/TTF_{bird}}{TTF_{fish} \times TTF_{invertebrate} \times K_d} \times 1000$$

Invertivorous bird food web

$$C_{water} (\mu\text{g Se/L}) = \frac{C_{bird\ target}/TTF_{bird}}{TTF_{invertebrate} \times K_d} \times 1000$$

The following table provides the input parameters used in the biodynamic model:

**Input Parameters for the Biodynamic Model**

Numeric Targets	
Bird egg	8 µg Se/g dw
Fish (whole body as a dietary target for protection of birds) <sup>1</sup>	5 µg Se/g dw
Fish (whole body, as a low effect concentration for the protection of fish)	8.1 µg Se/g dw

<sup>13</sup> For piscivorous fish, a second step is needed for calculating the TTF from prey fish to predator fish:

$$TTF_{fish} = \frac{C_{predatory\ fish}}{C_{prey\ fish}}$$

<sup>14</sup> For non-piscivorous birds, calculate the TTF from invertebrates:

$$TTF_{bird} = \frac{C_{bird}}{C_{invertebrate}}$$

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K <sub>dS</sub> (Fish Tissue Targets)	
Peters Canyon Wash (mean)	98
Peters Canyon Wash (85 <sup>th</sup> percentile)	161
Lower San Diego Creek <sup>3</sup> (75 <sup>th</sup> percentile)	163
Lower San Diego Creek <sup>3</sup> (85 <sup>th</sup> percentile)	272
IRWD Constructed Treatment Wetlands (75 <sup>th</sup> percentile)	273
IRWD Constructed Treatment Wetlands (85 <sup>th</sup> percentile)	320
San Joaquin Marsh Reserve (UCI wetlands) (mean)	1440
San Joaquin Marsh Reserve (UCI wetlands) (75 <sup>th</sup> percentile)	1341
Combined Lower SDC and IRWD Constructed Treatment Wetlands (75 <sup>th</sup> percentile)	218
Combined Lower San Diego Creek and IRWD Constructed Treatment Wetlands (85 <sup>th</sup> percentile)	296
Santa Ana-Delhi Channel (85 <sup>th</sup> percentile)	165
Big Canyon Wash (lower stream and pond areas) (mean)	3308
Big Canyon Wash (lower stream and pond areas) (median)	2992
K <sub>dS</sub> (Bird Egg Target)	
Peters Canyon Wash <sup>4</sup>	NA
Lower San Diego Creek (75 <sup>th</sup> percentile)	65
Lower San Diego Creek (85 <sup>th</sup> percentile)	108
Lower San Diego Creek (median)	95
IRWD Constructed Treatment Wetlands (mean)	213
IRWD Constructed Treatment Wetlands (median)	171
San Joaquin Marsh Reserve (UCI wetlands) (median)	688
Combined Lower SDC and IRWD Constructed Treatment Wetlands (75 <sup>th</sup> percentile)	139
Combined Lower San Diego Creek and IRWD Constructed Treatment Wetlands (85 <sup>th</sup> percentile)	139.5
Santa Ana-Delhi Channel <sup>4</sup>	NA
Big Canyon Wash (lower stream and pond areas) (mean)	3308
Big Canyon Wash (lower stream and pond areas) (median)	2992
TTFs (equation 2)	
Fish or invertebrate to bird eggs (TTF <sub>bird</sub> )	1.8
Prey fish to predator fish (TTF <sub>piscivorous fish</sub> )	1.1
Invertebrate or particulate to fish (TTF <sub>invertivorous fish</sub> or TTF <sub>detritivorous fish</sub> )	1.1
Particulate to freshwater (generic) invertebrate (TTF <sub>invertebrate</sub> )	2.8
Lower San Diego Creek field-derived particulate to freshwater invertebrate (TTF <sub>invertebrate</sub> )	3.7

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- <sup>1</sup> Both as a protective concentration for fish reproduction and as a dietary value for aquatic-dependent birds.
- <sup>2</sup> Suspended particulate data were only available for Big Canyon Wash K<sub>ds</sub> were calculated based on sediment concentrations for the remaining sites.
- <sup>3</sup> Smaller particle sizes typically have higher Se concentrations than coarser particles. Selenium concentrations in the silt/clay fractions collected from SDC Basin 2 sediments in 2004 were compared with whole sediment Se concentrations in sediments collected from SDC Basin 2 sediments in 2003. The mean concentrations in the silt/clay fractions were (on average) 2.52 times higher in the 2004 silt/clay fractions than in the 2003 whole sediments (Appendix O). Therefore, for this location, this ratio was applied to all selenium concentrations in whole sediments from Lower SDC to estimate the particulate selenium concentration that is accessible to organisms. None of the other assessment areas had data that could be used to determine selenium concentrations in the silt/clay fraction of the sediments.
- <sup>4</sup> The model was not run for the bird egg tissue target in this location. In Peters Canyon Wash, there was difficulty validating the model for bird eggs. In Santa Ana-Delhi Channel, no bird egg data were available.

The model used the species of fish or birds for which the most data were available, which included:

- Sediment or invertebrates→fish (for lower trophic level fish such as mosquito fish)
- Invertebrates→fish (for intermediate trophic level fish such as bluegill or similar fish that ingest invertebrates)
- Invertebrates→birds (for shorebirds such as black-neck stilts).

The following table shows the predicted probable dissolved selenium water column concentrations generated by the biodynamic model for the different hydrologic units and TMDL numeric tissue targets:

**Ambient Selenium Water Column Concentrations (µg/L) Compared to the Range in Probable Selenium Water Column Concentrations (µg/L) Predicted by the Biodynamic Model (predicted water column concentrations are rounded to the nearest whole number)**

	San Diego Creek Subwatershed <sup>1</sup>					Santa Ana-Delhi Channel	Big Canyon Wash Sub-watershed
	Lower San Diego Creek	Peters Canyon Wash	IRWD Constructed Treatment Wetlands	Combined Lower SDC & IRWD Wetlands	San Joaquin Marsh Reserve (UCI Wetlands)		
	<b>Ambient Water Column Concentrations ± 95% confidence interval</b>						
	13.8±0.4	30±1.3	14.4±1.5	14.2	2.3 ±0.7	10.7±0.5	15±1.9
<b>Tissue Target</b>	<b>Predicted Probable Selenium Water Column Concentrations</b>						
8.1 µg Se/g dw <sup>2</sup>	6 – 10	16 – 27	8 - 10	8 - 10	2	16	2 – 3
8 µg Se/g dw <sup>3</sup>	11 – 19		7 - 9	10	2		1
5 µg Se/g dw <sup>4</sup>							1 - 2

- <sup>1</sup> For purposes of these proposed selenium TMDLs, allocations are established at the subwatershed or channel scale. The San Diego Creek subwatershed was modeled at a more refined scale to guide management actions.
- <sup>2</sup> Numeric Target for protection of fish. Highest confidence in terms of best fit validation.
- <sup>3</sup> Numeric Target for the protection of birds. Poorest fit to model because of variable bird species, diets, foraging ranges, and

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uncertainty in trophic transfer factor from invertebrates to birds to their eggs. Water values are least certain for this target. Probable selenium water column concentrations were not predicted for Santa Ana-Delhi Channel based on the absence of bird data from this area. Probable selenium concentrations were not predicted for Peters Canyon Wash because there is less certainty in establishing a justifiable water column concentration based upon modeling for bird eggs because of the difficulty in validating the model for bird eggs.

4. Numeric Target for fish – as a dietary item for the protection of aquatic-dependent birds, particularly shorebirds. Where birds meet the bird egg tissue target, the fish tissue-based dietary target is not applicable. Therefore, based upon current data, only the areas where the bird egg tissue target is not being met include probable water concentrations to meet the fish tissue target of 5 µg Se/g dw.

The  $K_d$  values used for the different hydrologic compartments in the Newport Bay watershed result in a range in possible water column concentrations for each hydrologic unit. Because of this variability, the predicted probable dissolved selenium water column concentrations may change as additional data are collected during implementation of these selenium TMDLs.

### **TMDLs and Allocations**

For these selenium TMDLs, the loading capacities for the freshwater waterbodies in the watershed are established based on 1) the CTR, and 2) the water column concentrations predicted from the tissue-based numeric targets, as described in the Linkage Analysis. If and when revised selenium objectives (e.g., SSOs) are established, and the current CTR criterion is depromulgated for the Newport Bay watershed, the CTR water column-based loading capacities will no longer be in effect for these selenium TMDLs.

As there is inherent uncertainty with any model, including the biodynamic model, the actual water column concentrations at which the tissue-based targets are attained may differ from the predicted concentrations derived in the Linkage Analysis. Therefore, once the tissue-based numeric targets are attained, the tissue-based loading capacity/TMDL is equivalent to the water column concentrations that achieve those tissue-based concentrations.

Protection of beneficial uses requires consideration of both the periods of highest selenium exposure (dry weather flows) and the periods of greatest potential harm to the beneficial uses (breeding season and periods of embryonic and/or juvenile development). Dry weather conditions with flows occur year-round, and therefore, present potential periods of high selenium exposure all year. The period of potential greatest harm due to selenium exposure occurs seasonally (spring and early summer). As a result, consideration of seasonal variations could result in the development of different allocations for different periods of the year or the application of the allocations only during the breeding season. However, to ensure protection of beneficial uses both during the sensitive period and from the higher selenium concentrations that occur during dry weather, a year-round application of the TMDLs and allocations during dry weather conditions is the most protective approach.

Further, to evaluate the influence of seasonality and to provide the most protective assessment of beneficial uses, an averaging period for the WLAs and LAs is appropriate. Averaging periods for the allocations are based on the potential impacts from selenium exposure and variability in observed receiving water data. Since the protection of beneficial uses is linked to chronic not acute selenium conditions, a semi-annual averaging period utilizing an arithmetic mean is appropriate for these TMDLs and allocations. The semi-annual averaging periods are defined as April 1 through September 30 and October 1 through March 31 each year.<sup>15</sup>

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<sup>15</sup> Note that this averaging period specifically applies to the concentration-based WLAs and LAs. As specifically noted in these selenium TMDLs, where the tissue-based numeric targets are attained, the WLAs/LAs shall be deemed to be attained. In evaluating the tissue-based numeric targets, an annual

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For purposes of these selenium TMDLs, wet and dry weather are defined as follows:

- Wet weather: Any day with 0.1 inches of rain or more, as measured at the Tustin-Irvine Ranch<sup>16</sup> Rain Gauge Station, and the following three days (72 hours).
- Dry weather: Any non-wet weather day.

These selenium TMDLs establish WLAs and LAs based upon the following:

- **Tissue-Based Water Column WLAs and LAs.** Ranges of water column concentrations necessary to achieve the tissue-based numeric targets were predicted for the freshwater areas of the watershed using the biodynamic model. These tissue-based water column concentrations, as opposed to the CTR-based water column concentration, provide a direct link to protection of beneficial uses (as they are derived from the tissue-based targets) and are, therefore, established as WLAs and LAs for these selenium TMDLs. These tissue-based allocations consider the following:
  - **Phase I<sup>17</sup> of the Selenium TMDLs: Selection of Protective Water Column Concentrations.** A range of loading capacities was derived from the biodynamic model for the three subwatershed areas. The range of results reflects the heterogeneity of the watershed, as well as the complexity in the pathways of selenium accumulation in the local foodweb. All of the results are deemed equally valid for predictive purposes (i.e., there is not a single “most appropriate” number that results from running the biodynamic model that definitively corresponds with the protection of beneficial uses). Further, there are several endpoints that are modeled (bird eggs for the protection of birds, fish tissue as a dietary component for protection of birds, fish tissue for the protection of fish). Therefore, the establishment of WLAs and LAs necessitates selection of a particular water column concentration from these ranges for each of the subwatershed areas as a starting point, with adjustments made if and as necessary based on monitoring and/or refined modeling. This initial selection is based upon concentrations that are expected to result in protection of beneficial uses, but is not intended to be considered the only concentration that is appropriate (e.g., tissue-based targets may be attained at higher or lower concentrations).

For each subwatershed, the upper end of the applicable predicted range of probable selenium concentrations has been selected for the establishment of allocations during Phase I of these selenium TMDLs. As noted above, while the model results in a range of possible concentrations, all modeled concentrations are considered equally predictive of what is needed to protect beneficial uses since the range results from various pathways of potential accumulation in various foodwebs. This approach supports the adaptive management component of these selenium

averaging period is more appropriate since bird eggs are only available during a very limited time of the year, and fish tissue and other biota should also be collected during the same timeframe that the birds are breeding since they constitute a likely source of selenium input. Because selenium concentrations in fish and bird egg tissue are expected to be much more variable than those in water, a geometric mean statistical approach should be employed for evaluating tissue data.

<sup>16</sup> Tustin-Irvine Ranch #61. Latitude = 33.719984, Longitude = -117.723111, Elevation = 507 feet.

<sup>17</sup> As described in the Implementation Plan, these selenium TMDLs are being established and implemented as phased TMDLs, consistent with USEPA guidance and based upon a three-part structure: Phase I, TMDL Reconsideration, and Phase II.

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TMDLs that requires iterative BMP implementation, focused on reductions in selenium concentrations until the tissue-based targets (and CTR water column-based targets, to the extent they remain in effect) are achieved. Further, as these selenium TMDLs will be incorporated into regulatory mechanisms, including NPDES permits, decreasing rather than increasing the WLAs over time, if necessary and appropriate, will comply with the general prohibition on anti-backsliding. However, as previously noted, the water column concentrations predicted from the tissue-based numeric targets are expected to result in protection of beneficial uses, but are not intended to be considered the only concentrations that are appropriate. As a result, consistent with the general prohibition on anti-backsliding, the WLAs may be adjusted up over time if new information is available that was not available at the time of adoption of these selenium TMDLs justifies a higher WLA.

- **Phase II of these Selenium TMDLs: Selection of Protective Water Column Concentrations.** During TMDL reconsideration, water column concentrations will be re-evaluated to determine if adjustments to the allocations are necessary to attain the tissue-based numeric targets (and CTR water column-based targets, to the extent they remain in effect) during Phase II of these selenium TMDLs. This evaluation will likely entail running the biodynamic model with new data that have been collected through Phase I. The re-evaluation will include an assessment of additional tissue data collected pursuant to the required monitoring program for these selenium TMDLs to assess progress toward achieving the targets and to reassess the most sensitive endpoint for the selection of appropriate allocations.

Further, during the implementation of Phase II, a more robust process to periodically reassess the allocations will be implemented by the Regional Board. During this process, allocations will be adjusted, as needed, over time to result in attainment of the tissue-based targets.

This approach, as well as the rationale for the approach, is the same as that described above for Phase I of these selenium TMDLs.

- **CTR Water Column-Based WLAs and LAs.** Until tissue-based objectives are approved, the CTR chronic criterion for selenium in freshwater must serve as the final numeric target for selenium for the freshwater areas in the Newport Bay watershed. As a result, water column-based allocations based on the CTR are also included in these selenium TMDLs. However, the CTR water column-based allocations will no longer be in effect if and when the CTR freshwater criterion has been replaced by revised objectives (e.g., SSOs).
- **Conditional Mass-Based WLAs.** Recognizing the lack of reasonable and feasible BMPs in the watershed, and that allowing certain discharges to be offset rather than prohibited may provide a greater net environmental benefit, conditional mass-based WLAs are included as an alternative to the concentration-based WLAs. As a requirement of the offset and trading program, discharges allowed pursuant to the offset and trading program cannot result in downstream impacts. Therefore, these conditional mass-based WLAs will result in attainment of the loading capacity and thereby attainment of the selenium TMDLs.
- **Attainment of Tissue-Based Numeric Targets.** While the tissue-based water column WLAs and LAs are expected to result in attainment of the tissue-based numeric targets, bioaccumulation in the various foodwebs in the



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watershed may be different than what was modeled with the biodynamic model as part of the Linkage Analysis. Therefore, where tissue-based numeric targets are attained, the corresponding WLAs/LAs will also be deemed to be attained, regardless of the actual measured water column concentration. This approach emphasizes that the water column concentrations are only surrogate measures, while the tissue-based targets provide for the direct assessment and protection of beneficial uses.

- **Direct Incorporation of the Biodynamic Model into the Tissue-Based WLAs and LAs.** The biodynamic model is directly incorporated into the tissue-based WLAs and LAs. As many assumptions and factors were utilized in developing the initial allocations, future data may warrant revising these assumptions and factors, thereby modifying the allocations. By incorporating the model directly into the allocations, it becomes part of the assumptions and requirements of the allocations and can be modified by the Regional Board<sup>18</sup> without necessitating a Basin Plan Amendment. Any such modification to the allocations will be subject to a public review process. However, if future data indicate that a revised modeling approach is warranted (e.g., a bioaccumulation factor (BAF) approach in lieu of the biodynamic model), such a revision would necessitate a Basin Plan Amendment.
- **Assignment of WLAs and LAs at the Subwatershed Scale.** As the selenium TMDLs are based upon a determination of impairment for three subwatersheds (San Diego Creek, Santa Ana-Delhi Channel, and Big Canyon Wash), corresponding WLAs and LAs are also established for each subwatershed. While the San Diego Creek subwatershed contains various areas, the water column concentration selected for the WLAs is based upon the Lower San Diego Creek analysis in the Linkage Analysis. Attainment of the allocations in Lower San Diego Creek is expected to result in reductions in both the San Joaquin Marsh Reserve (UCI Wetlands) and the IRWD Constructed Treatment Wetlands such that the tissue targets will be achieved; therefore, no separate allocations for these areas are established at this time.
- **Compliance Options.** To aid in ensuring permitting consistency with the intent of these selenium TMDLs, the WLAs include compliance options as part of the assumptions and requirements of the WLAs.

**Wasteload Allocations**

WLAs are assigned to the following point source dischargers: Municipal separate storm sewer system (MS4) Permittees and all other NPDES permitted discharges that discharge groundwater to surface water as part of dewatering, treatment, or similar operations in the watershed (the latter referred to herein as “Other NPDES Permittees”).

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<sup>18</sup> Per the Regional Board’s delegation of authority, the Executive Officer may approve such modifications, subject to a public review and comment process. Upon request, such modifications may be considered directly by the Regional Board.

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<b>Final WLAs as a Semi-Annual Arithmetic Mean<sup>1</sup> (for Implementation Purposes)</b>					
WLAs	Tissue-based Water Column WLAs <sup>2,3,4,5,6,7,8</sup> (Based upon Biodynamic Model) (µg Se/L)			CTR-based Water Column WLAs <sup>2,8,14,16</sup> (µg Se/L)	Conditional Mass-based WLAs <sup>15,16</sup> (lbs)
	San Diego Creek Subwatershed <sup>9,12,13,16</sup>	Santa Ana-Delhi Channel <sup>10,12,13,16</sup>	Big Canyon Wash Subwatershed <sup>11,12,13,16</sup>		
MS4 Permittees					Optional. Applies when discharger meets the following conditions:  Participates in approved Offset and Trading Program  Offsets entirety of discharge concentration x flow) including any specified offset ratio
Other NPDES Permittees	10	11	1	5	

(1) Semi-annual arithmetic mean: April 1 through September 30 and October 1 through March 31.

(2) Allocations apply year-round during non-wet weather (i.e. dry) conditions. Wet weather conditions are any day with 0.1 inches of rain or more, as measured at the Tustin-Irvine Ranch Rain Gauge Station, and the following three days (72 hours).

(3) The tissue-based WLAs are based on probable water column concentrations derived from the biodynamic model, as detailed in the Linkage Analysis of these selenium TMDLs. The biodynamic model is directly incorporated herein to these WLAs and is represented by the following equations:  
 (1) Fish tissue target of 8.1 or 5 µg Se/g dw (piscivorous fish):  $C_{water} (\mu\text{g Se/L}) = \frac{((C_{fish\ target}/ TTF_{piscivorous\ fish})/ TTF_{invertivorous\ fish})/TTF_{invertebrate}/K_d}{1000}$ ;  
 (2) Fish tissue target of 8.1 or 5 µg Se/g dw (invertivorous fish):  $C_{water} (\mu\text{g Se/L}) = \frac{(C_{fish\ target}/ TTF_{invertivorous\ fish})/TTF_{invertebrate}/K_d}{1000}$ ;  
 (3) Fish tissue target of 8.1 or 5 µg Se/g dw (detritivorous fish):  $C_{water} (\mu\text{g Se/L}) = \frac{(C_{fish\ target}/ TTF_{detritivorous\ fish})/K_d}{1000}$ ;  
 (4) Bird egg target of 8.0 µg Se/g dw (piscivorous bird):  $C_{water} (\mu\text{g Se/L}) = \frac{((C_{bird\ target}/TTF_{bird})/ TTF_{invertivorous\ fish})/TTF_{invertebrate}/K_d}{1000}$ ;  
 (5) Bird egg target of 8.0 µg Se/g dw (invertivorous bird):  $C_{water} (\mu\text{g Se/L}) = \frac{((C_{bird\ target}/TTF_{bird})/TTF_{invertebrate})/K_d}{1000}$

(4)  $TTF_{bird}$  = trophic transfer factor from fish or invertebrates to bird egg,  $TTF_{piscivorous\ fish}$  = trophic transfer factor from small fish to predatory fish,  $TTF_{invertivorous\ fish}$  = trophic transfer factor from invertebrates to fish,  $TTF_{detritivorous\ fish}$  = trophic transfer factor from particulates to fish,  $TTF_{invertebrate}$  = trophic transfer factor from particulates to invertebrates,  $K_d$  = partitioning coefficient from dissolved selenium in water to particulates.

(5) Initial values for all TTFs and  $K_d$ s are specified in the Linkage Analysis of these selenium TMDLs. TTF values may vary by specific water body. In water bodies where predatory fish are not present, the  $TTF_{predatory\ fish}$  value should equal 1 to represent that one less step is occurring in the food chain.

(6) During the development of the selenium TMDLs, a range of probable water column concentrations was derived from the tissue-based numeric targets, based on the values assumed for the variables in the equation. The initial WLA values selected are based upon consideration of the most sensitive endpoint in the watershed and existing tissue data. During Phase I of these selenium TMDLs, that endpoint has been identified as fish tissue for the protection of fish (numeric target of 8.1 µg Se/g dw) for the SDC and SADC subwatersheds and as bird egg tissue for the protection of birds (8.0 µg Se/g dw) in BCW.

(7) During the TMDL Reconsideration and during Phase II of these selenium TMDLs, the biodynamic model inputs and resulting probable water column concentrations will be reevaluated and updated as necessary and per the schedule included in **Table 6.1. Se.2**. Subject to review and written comment via a public participation process, if updates are determined to be appropriate, such revised values will then replace the initial values in the biodynamic model equations, resulting in revised allocations. Such revisions can be made via approval by the Executive Officer, per delegated authority by the Regional Board, unless during the public review process a request is made to bring the modification before the Regional Board for consideration.

(8) The final allocations are to be achieved as soon as possible, but no later than 30 years from the effective date of the reconsidered TMDLs, as discussed in the Implementation Plan.

(9) Assessed in the receiving water at San Diego Creek at Campus Drive for Regulated Parties (as defined in the Implementation Plan other than MS4 Permittees) that opt to implement a BMP Strategic Plan consistent with the Implementation Plan.

(10) Assessed in the receiving water at Santa Ana-Delhi Channel at Irvine Avenue for Regulated Parties (as defined in the Implementation Plan other than MS4 Permittees) that opt to implement a BMP Strategic Plan consistent with the

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Implementation Plan.

- (11) Assessed in the receiving water at Big Canyon Wash at Back Bay Drive for Regulated Parties (as defined in the Implementation Plan other than MS4 Permittees) that opt to implement a BMP Strategic Plan consistent with the Implementation Plan.
- (12) Assessed at 'end of pipe' for Individual Action Plan point sources that elect not to pursue an offset. Compliance with allocations will be determined pursuant to the compliance options outlined under the heading "Compliance with WLAs". Such compliance options are directly incorporated herein as part of the assumptions and requirements of these WLAs.
- (13) Assessment location for the MS4 permittees (urban runoff) is the Costa Mesa Channel. This location was selected as a surrogate urban runoff site because the subwatershed is approximately 1 square mile in area, it has predominantly urban land uses, and it is outside of the areas impacted by rising groundwater.
- (14) The CTR-based water column WLAs will no longer apply to these selenium TMDLs if and when revised objectives (e.g., SSOs) have been approved and are in effect and the current CTR chronic criterion for selenium in freshwater is de-promulgated.
- (15) The Offset and Trading Program and any applicable offset ratios, described in the Implementation Plan, is incorporated herein to these conditional mass-based WLAs.
- (16) Compliance with allocations will be determined pursuant to the compliance options outlined under the heading "Compliance with WLAs". Such compliance options are directly incorporated herein as part of the assumptions and requirements of these WLAs.

**Compliance with WLAs**

The following compliance options are included to clearly indicate how compliance with the WLAs, incorporated as effluent limitations into the applicable NPDES Permit, will be determined. These compliance options are part of the assumptions and requirements of the WLAs and will be explicitly incorporated in the applicable NPDES Permit to the extent permitted by law.

**MS4 Permittees**

Compliance with final WLAs (incorporated as effluent limits) may be demonstrated through any one of the following means:

1. For MS4 Permittees who opt to implement a BMP Strategic Plan consistent with requirements specified in the Implementation Plan:
  - A. Implementation of an approved BMP Strategic Plan (consistent with the approved Plan and schedule) for all areas where the MS4 Permittee is identified as a Regulated Party<sup>19</sup> OR
  - B. Attainment of tissue-based numeric targets over the specified averaging period, as measured in the Assessment Area<sup>20 21</sup> OR
  - C. Attainment of dry weather WLAs over the specified averaging period in the receiving water, as measured at the Assessment Point<sup>22</sup> OR
  - D. Attainment of conditional mass-based WLAs, consistent with all requirements of the conditional mass-based WLAs<sup>23</sup> OR

<sup>19</sup> As defined in the Implementation Plan.

<sup>20</sup> *Ibid.*

<sup>21</sup> Compliance with final WLAs may not be demonstrated through attainment of tissue-based numeric targets over the specified averaging period, as measured in the Assessment Area, until revised tissue-based objectives (e.g., SSOs) are adopted.

<sup>22</sup> As defined in the Implementation Plan.

<sup>23</sup> Attainment requires that the discharger meets the following conditions: (1) Participates in approved Offset and Trading Program and (2) Offsets entirety of discharge (concentration x flow) at the applicable ratio.

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- E. Attainment of dry weather WLAs over the specified averaging period at the point of discharge OR
  - F. Attainment of a water column concentration at the point of discharge which is calculated to attain the water quality objective OR
  - G. No discharge.
2. Where the BMP Strategic Plan is not implemented consistent with the approved plan and schedule, MS4 Permittees must demonstrate compliance through one option in 1.B through 1.G.

Other NPDES Permittees

Option 1:

Compliance with final WLAs may be demonstrated through any one of the means identified in Part 1 below:

- 1. For a Regulated Party who opts to implement a BMP Strategic Plan:
  - A. Implementation of an approved BMP Strategic Plan (consistent with the approved Plan and schedule) for all areas where the Permittee is identified as a Regulated Party<sup>24</sup> OR
  - B. Attainment of tissue-based numeric targets over the specified averaging period, as measured in the Assessment Area<sup>25</sup> defined for the applicable Monitoring Plan<sup>26</sup> OR
  - C. Attainment of dry weather WLAs over the specified averaging period in the receiving water, as measured at the Assessment Point<sup>27</sup> defined for the applicable Monitoring Plan OR
  - D. Attainment of conditional mass-based WLAs, consistent with all requirements of the conditional mass-based WLAs<sup>28</sup> OR
  - E. Attainment of dry weather WLAs over the specified averaging period at the point of discharge OR
  - F. Attainment of a water column concentration at the point of discharge which is calculated to attain the water quality objective OR
  - G. No discharge.
- 2. Where the BMP Strategic Plan is not implemented consistent with the approved plan and schedule, a Regulated Party must demonstrate compliance through one option in 1.B

<sup>24</sup> As defined in the Implementation Plan.

<sup>25</sup> *Ibid.*

<sup>26</sup> Compliance with final WLAs may not be demonstrated through attainment of tissue-based numeric targets over the specified averaging period, as measured in the Assessment Area, until revised objectives (e.g., SSOs) are adopted.

<sup>27</sup> As defined in the Implementation Plan.

<sup>28</sup> Attainment requires that the discharger meets the following conditions: (1) Participates in approved Offset and Trading Program and (2) Offsets entirety of discharge (concentration x flow) at the applicable ratio.

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through 1.G.

**Option 2:**

For a Regulated Party who opts to implement an Individual Action Plan (IAP), compliance with final WLAs may be demonstrated through any one of the means identified below:

- A. Participation in an approved Offset and Trading Program OR
- B. Attainment of WLAs over the specified averaging period at the point of discharge OR
- C. No discharge.

**Load Allocations**

LAs are assigned to the following non-point sources of selenium within the Newport Bay watershed: agricultural discharges, open space, and rising groundwater. Atmospheric deposition has not been assigned a separate load allocation since most of the atmospheric deposition is accounted for in allocations for runoff from the various land uses and direct atmospheric deposition on to waterbodies accounts for less than one percent of the total non-point source load.

**Final LAs as a Semi-Annual Arithmetic Mean<sup>1</sup> (For Implementation Purposes)**

LAs	Tissue-based Water Column LAs <sup>2,3,4,5,6,7,8</sup> (Based upon Biodynamic Model) (µg Se/L)			CTR-based Water Column LAs <sup>2,8,12</sup> (µg Se/L)
	San Diego Creek Subwatershed <sup>9</sup>	Santa Ana-Delhi Channel <sup>10</sup>	Big Canyon Wash Subwatershed <sup>11</sup>	
Agricultural Discharges	10	11	1	5
Open Space				
Rising Groundwater				

- (1) For semi-annual arithmetic mean: April 1 through September 30 and October 1 through March 31.
- (2) Allocations apply year-round during non-wet weather (i.e. dry) conditions. Wet weather conditions are any day with 0.1 inches of rain or more, as measured at the Tustin-Irvine Ranch Rain Gauge Station, and the following three days (72 hours).
- (3) The tissue-based final LAs are based on probable water column concentrations derived from the biodynamic model, as detailed in the Linkage Analysis of these selenium TMDLs. The biodynamic model is directly incorporated herein to these LAs and is represented by the following equations:
  - (1) Fish tissue target of 8.1 or 5 µg Se/g dw (piscivorous fish):  $C_{water} (\mu\text{g Se/L}) = [(((C_{fish\ target} / TTF_{piscivorous\ fish}) / TTF_{invertivorous\ fish}) / TTF_{invertebrate}) / K_d] * 1000$ ;
  - (2) Fish tissue target of 8.1 or 5 µg Se/g dw (invertivorous fish):  $C_{water} (\mu\text{g Se/L}) = [((C_{fish\ target} / TTF_{invertivorous\ fish}) / TTF_{invertebrate}) / K_d] * 1000$ ;
  - (3) Fish tissue target of 8.1 or 5 µg Se/g dw (detritivorous fish):  $C_{water} (\mu\text{g Se/L}) = [(C_{fish\ target} / TTF_{detritivorous\ fish}) / K_d] * 1000$ ;
  - (4) Bird egg target of 8.0 µg Se/g dw (piscivorous bird):  $C_{water} (\mu\text{g Se/L}) = [(((C_{bird\ target} / TTF_{bird}) / TTF_{invertivorous\ fish}) / TTF_{invertebrate}) / K_d] * 1000$ ;
  - (5) Bird egg target of 8.0 µg Se/g dw (invertivorous bird):  $C_{water} (\mu\text{g Se/L}) = [(((C_{bird\ target} / TTF_{bird}) / TTF_{invertebrate}) / K_d] * 1000$
- (4)  $TTF_{bird}$  = trophic transfer factor from fish or invertebrates to bird egg,  $TTF_{piscivorous\ fish}$  = trophic transfer factor from small fish to predatory fish,  $TTF_{invertivorous\ fish}$  = trophic transfer factor from invertebrates to fish,  $TTF_{detritivorous\ fish}$  = trophic transfer factor from particulates to fish,  $TTF_{invertebrate}$  = trophic transfer factor from particulates to invertebrates,  $K_d$  = partitioning coefficient from dissolved selenium in water to particulates.
- (5) Initial values for all TTFs and  $K_d$ s are specified in the Linkage Analysis of these selenium TMDLs. TTF values may vary by specific water body. In water bodies where predatory fish are not present, the  $TTF_{predatory\ fish}$  value should equal 1 to represent that one less step is occurring in the food chain.
- (6) During the development of the proposed selenium TMDLs, a range of probable water column concentrations was derived from the tissue-based numeric targets, based on the values assumed for the variables in the equation. The initial LA values selected are based upon consideration of the most sensitive endpoint in the watershed and existing tissue data. During Phase I of these proposed selenium TMDLs, that endpoint has been identified as fish tissue for the protection of fish (numeric target of 8.1 µg Se/g dw) for the San Diego Creek and Santa Ana-Delhi Channel subwatersheds, and bird egg tissue for the protection of birds (numeric target of 8.0 µg Se/g dw) for the Big Canyon Wash subwatershed.
- (7) During the TMDL Reconsideration and during Phase II of these selenium TMDLs, the biodynamic model inputs and resulting

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probable water column concentrations will be reevaluated and updated as necessary and per the schedule included in **Table 6.1. Se.2**. Subject to review and written comment via a public participation process, if updates are determined to be appropriate, such revised values will then replace the initial values in the biodynamic model equations, resulting in revised allocations. Such revisions can be made via approval by the Executive Officer, per delegated authority by the Regional Board, unless during the public review process a request is made to bring the modification before the Regional Board for consideration.

- (8) The final allocations are to be achieved as soon as possible, but no later than 30 years from the effective date of the reconsidered TMDLs, as discussed in the Implementation Plan.
- (9) Assessed in the receiving water at San Diego Creek at Campus.
- (10) Assessed in the receiving water at Santa Ana-Delhi Channel at Irvine Ave.
- (11) Assessed in the receiving water at Big Canyon Wash at Back Bay Drive.
- (12) The CTR-based water column LAs will no longer apply to these selenium TMDLs if and when revised objectives (e.g., SSOs) have been approved and are in effect and the current CTR chronic criterion for selenium in freshwater is de-promulgated.

### **Margin of Safety**

A margin of safety (MOS) for a TMDL addresses uncertainties associated with the analyses that may result in targets not being achieved. The MOS may be explicit, implicit, or both. For these selenium TMDLs, an implicit MOS is used.

There remains scientific and regulatory agency disagreement concerning the adequacy of the CTR criteria for the protection of aquatic life and aquatic-dependent wildlife, principally because selenium is bioaccumulated primarily via diet, not water. For the selenium TMDLs, the tissue-based numeric targets were recommended by USEPA<sup>29</sup> and USFWS staff<sup>30</sup> to ensure protection of the bird and fish species that inhabit or forage in the Newport Bay watershed. The selenium tissue concentrations recommended by USFWS are considered to be either no effect concentration for birds or no to very low effect concentrations for fish and for fish as a dietary concentration for birds, and as such are conservative objectives that provide an implicit MOS for the selenium TMDLs. The selenium tissue concentration for the protection of fish (as a whole body tissue concentration of 8.1 µg Se/g dw) that has been proposed by USEPA as one element of their draft aquatic life criterion for selenium in freshwater (2014) is a low effect (EC10) concentration that is considered protective of 90% of the freshwater fish population present in the freshwater areas in the Newport Bay watershed. By selecting numeric targets that are tissue-based and designed to be protective of aquatic life and aquatic-dependent wildlife, these selenium TMDLs are expected to be more protective of the beneficial uses in the watershed than TMDLs based solely on the current CTR criteria, which may be over- or under-protective of those uses.

### **Implementation Plan**

TMDL implementation will be carried out in the three areas by the following Regulated Parties<sup>31</sup>:

<sup>29</sup> Recommendation from the *External Peer Review Draft Aquatic Life Ambient Water Quality Criterion for Selenium – Freshwater 2014* (USEPA, 2014) for fish tissue target for the protection of fish.

<sup>30</sup> Recommendation for fish tissue target as a dietary item for birds and the bird egg tissue target (J. Skorupa, USFWS, electronic communication, October 20, 2008).

<sup>31</sup> Regulated Parties include MS4 Permittees, Other NPDES Permittees, and the owner/operators of the IRWD Constructed Treatment Wetlands, the San Joaquin Marsh Reserve (UCI Wetlands), and the Big Canyon Nature Preserve. Certain Regulated Parties may be subject to multiple, separate NPDES permits and; therefore, may have implementation responsibilities under more than one category (e.g.,



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**San Diego Creek Subwatershed**

- MS4 Permittees:
  - County of Orange
  - Orange County Flood Control District
  - City of Irvine
  - City of Laguna Hills
  - City of Laguna Woods
  - City of Lake Forest
  - City of Newport Beach
  - City of Orange
  - City of Tustin
  - City of Santa Ana
- Other NPDES Permittees
  - General Groundwater Cleanup Permittees
  - Individual Groundwater Cleanup Permittees
  - General Groundwater Dewatering Permittees
  - Individual Groundwater Dewatering Permittees
- IRWD (owner/operator of the IRWD Constructed Treatment Wetlands)<sup>32</sup>
- UCI (owner/operator of the San Joaquin Marsh Reserve (UCI Wetlands))<sup>33</sup>

**Santa Ana-Delhi Channel**

- MS4 Permittees:
  - County of Orange
  - Orange County Flood Control District
  - City of Costa Mesa

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City of Irvine is an MS4 Permittee and also is regulated separately by an individual dewatering NPDES permit).

<sup>32</sup> IRWD is not assigned a WLA or LA at this time as owner/operator of the IRWD Constructed Treatment Wetlands (it is, however, separately a Groundwater Dewatering Permittee). IRWD is required to participate in the implementation of these proposed TMDLs by coordinating with the Regulated Parties in the development of the BMP Strategic Plan and Regional Monitoring Program for San Diego Creek. As part of the adaptive management process, the BMP Strategic Plan will assess the need to manage and reduce selenium bioaccumulation in the IRWD Constructed Treatment Wetlands, if reductions in San Diego Creek are not in and of themselves sufficient for the TMDL numeric targets to be met in the wetlands. The need to implement additional measures will be assessed during the TMDL reconsideration process and/or as a part of Phase II.

<sup>33</sup> UCI is not assigned a WLA or LA at this time. However, as the owner/operator of the San Joaquin Marsh Reserve (UCI Wetlands), UCI is required to participate in the implementation of these proposed TMDLs by coordinating with the Regulated Parties in the development of the BMP Strategic Plan and Regional Monitoring Program for San Diego Creek. As part of the adaptive management process, the BMP Strategic Plan will assess the need to manage and reduce selenium bioaccumulation in the San Joaquin Marsh Reserve (UCI Wetlands), if reductions in San Diego Creek or the IRWD Constructed Treatment Wetlands are not in and of themselves sufficient for the TMDL numeric targets to be met in the reserve. The need to implement additional measures will be assessed during the TMDL reconsideration process and/or as a part of Phase II.

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- City of Santa Ana
- City of Newport Beach
- Other NPDES Permittees
  - General Groundwater Cleanup Permittees
  - Individual Groundwater Cleanup Permittees
  - General Groundwater Dewatering Permittees
  - Individual Groundwater Dewatering Permittees

Big Canyon Wash Subwatershed

- MS4 Permittees:
  - City of Newport Beach
- Other NPDES Permittees
  - General Groundwater Cleanup Permittees
  - Individual Groundwater Cleanup Permittees
  - General Groundwater Dewatering Permittees
  - Individual Groundwater Dewatering Permittees
- California Department of Fish and Wildlife (DFW) (owner/operator of a mitigation area located at the downstream end of the Big Canyon Nature Park). DFW’s mitigation area, which includes a pond and riparian habitat, lies within the boundaries of the Upper Newport Bay Ecological Reserve.<sup>34</sup>

These selenium TMDLs are being established and implemented as phased TMDLs, consistent with USEPA guidance and based upon a three-part structure:

- Phase I – Completion as soon as possible, but no later than 6 years from the effective date of the selenium TMDLs<sup>35</sup>.
- TMDL Reconsideration – Completion as soon as possible, but no later than 2 years after Phase I. Reconsideration of the selenium TMDLs will be no later than 8 years from the effective date of the selenium TMDLs.
- Phase II – Completion as soon as possible, but no later than 30 years from the effective date of the reconsidered selenium TMDLs<sup>36</sup>. If reconsidered selenium TMDLs are not in effect 8 years after the effective date of the original selenium TMDLs, Phase II actions will commence at this time. In this circumstance, changes in

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<sup>34</sup> DFW is not assigned a WLA or LA at this time. However, as the owner/operator of the restoration areas within BCNP, DFW is required to participate in the implementation of these proposed TMDLs by coordinating with the Regulated Parties in the development of the BMP Strategic Plan and Regional Monitoring Program for Big Canyon Wash. The BMP Strategic Plan for Big Canyon Wash must include a task to develop a contingency strategy to manage and reduce selenium bioaccumulation in the wetlands in the BCNP, if reductions in selenium upstream of the wetlands are not in and of themselves sufficient for the TMDL numeric targets to be met in the wetlands. The need to develop the contingency strategy will be assessed during the TMDL reconsideration process and/or as a part of Phase II.

<sup>35</sup> Each individual action will be scheduled as a specific number of years/months from the effective date of the proposed selenium TMDL/reconsidered selenium TMDL (as applicable).

<sup>36</sup> *Ibid.*

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the reconsidered selenium TMDLs will be incorporated into Phase II at the time they become effective.

In addition, each phase of TMDL implementation will be guided by adaptive management. This adaptive management approach is a required element of the BMP Strategic Plans described below.

**Phase I: LA Implementation**

For the implementation of the LAs, these selenium TMDLs will rely upon the State of California *Nonpoint Source Program Strategy and Implementation Plan* (SWRCB, 2000) and the *Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program* (SWRCB, 2004c). It is anticipated that the implementation measures for the WLAs will not only address the controllable sources of selenium (e.g., groundwater dewatering and clean-up discharges), but will also result in a substantial reduction in the NPS load as well. Therefore, the need for an NPS strategy and the development of the strategy will be part of the TMDL Reconsideration and will therefore be implemented during Phase II.

**Phase I: WLA Implementation**

The Phase I implementation actions required of MS4 Permittees includes the development and implementation of the following plans/programs for each subwatershed where the MS4 Permittee is identified as a Regulated Party:

- BMP Strategic Plan
- Offset/Trading Program (participation in the program by individual Regulated Parties is optional)
- Monitoring Program
- Reporting

The Phase I implementation actions required of Other NPDES Permittees includes the development and implementation of the following plans/programs for each subwatershed where the Permittee is identified in these TMDLs as a Regulated Party:

- BMP Strategic Plan OR Individual Action Plan as described below
- Participation in the Offset and Trading Program (participation in the program by individual Regulated Parties is optional)
- Participation in Regional Monitoring Program OR development of monitoring program within Individual Action Plan
- Reporting

Other NPDES Permittees who elect not to participate in a BMP Strategic Plan(s) must develop and implement an Individual Action Plan that identifies an acceptable means to attain the WLAs. MS4 Permittees must participate in the BMP Strategic Plans while Other NPDES Permittees have the option of participating in a BMP Strategic Plan or implementing an Individual Action Plan. This alternative approach is provided for Other NPDES Permittees recognizing that groundwater dewatering discharges may be short-term in nature and a tailored, individual approach may be more appropriate. Requirements for Individual Action Plans are detailed below.

**BMP Strategic Plan Requirements**

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BMP Strategic Plans must be developed for each area (San Diego Creek, Santa Ana-Delhi Channel, and Big Canyon Wash). The plans can be developed individually for each area or combined to address multiple areas (resulting in a minimum of one (1) and a maximum of three (3) plans). Each BMP Strategic Plan must be submitted to the Executive Officer for approval by the date specified in **Table 6.1. Se.2**, and must be implemented upon approval. Each BMP Strategic Plan must be circulated for public review and comment for a period of no less than 30 days, and the Regional Board shall hold a public hearing prior to considering approval of each plan. If no significant public comments are received, then the Executive Officer may approve the plan. As identified in the TMDLs and Allocations section, and as further described below, implementation of an approved BMP Strategic Plan, consistent with the actions and schedules identified in the Plan, shall provide the basis for effluent limits expressed as BMPs or BMP-based compliance options in the relevant NPDES permit.

To be considered for approval by the Executive Officer, each BMP Strategic Plan must include the following:

- **Baseline and Source Control Activities** – Identification of source control activities that prevent or minimize new or existing discharges of selenium (such as volume reduction BMPs). For example, volume reduction BMP fact sheets were developed by the NSMP in 2005<sup>37</sup> and five potential volume reduction BMPs were identified: (1) discharge to land; (2) discharge to sewer; (3) evaporation ponds; (4) off-site transportation; and (5) reinjection. These volume reduction BMPs do not limit the type of source control BMPs that can be identified in the BMP Strategic Plan(s), but rather serve as examples.
- **Selenium Reduction Projects** – Identification of projects that result in reductions of selenium, including the characteristics, timeframe, and estimated selenium removal for each project.
- **BMP Effectiveness Monitoring** – Identification of the monitoring needed to assess the effectiveness of the BMPs implemented through the BMP Strategic Plan. To ensure an integrated and cohesive approach to monitoring, this monitoring will be incorporated as part of the Regional Monitoring Program (described below).
- **BMP/Technology Evaluation** – Identification of the process and schedule for periodic assessment of selenium BMPs/treatment technologies. This review may include evaluation of journal articles, online references, technical reports, and communication with researchers and vendors to evaluate the most up-to-date information on selenium treatment. The following information must be identified for each potential BMP/treatment technology evaluated:
  - Selenium removal capability and efficiency, and to the extent feasible, removal capability for other pollutants (e.g., nitrogen);
  - Physical requirements and capabilities of the technology, such as operating flows, land and energy requirements, pre-treatment requirements, modular capabilities, portability of the treatment, lifespan of the treatment media, start-up and shut-down considerations, and operation and maintenance requirements;

<sup>37</sup> Document is available to download on the NSMP website at the following web address:  
[http://www.ocnsmp.com/pdf/Volume%20Reducing%20BMPs\\_REVISION%2011Aug05.pdf](http://www.ocnsmp.com/pdf/Volume%20Reducing%20BMPs_REVISION%2011Aug05.pdf)

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- Potential discharge concerns, including any issues with selenium speciation, selenium concentration, nuisance factors, process waste streams, solid waste disposal, associated permitting requirements and costs; and,
- Capital and operations and maintenance costs.
- **Adaptive Management** – Identification of the process and schedule for how new information (e.g., effectiveness of source control activities and selenium reduction projects, identification of new BMPs/treatment technologies, monitoring data, effectiveness of BMPs/treatment technologies upstream of wetlands to achieve reductions within wetlands) will be evaluated and how the plan may be modified based upon such information. Given the timeframe for Phase I (a maximum of 6 years from the TMDL effective date), it is anticipated that only minor modifications to the Plans will occur in Phase I and that a full re-evaluation of the Plans will occur during the TMDL Reconsideration process. A more robust adaptive management process will be required during Phase II implementation (see below).
- **Goals** – Clear, specific, quantifiable and measurable goals for the reduction of selenium must be identified. The goal(s) could take the form of a mass-based reduction, reduction in total selenium concentration, reduction in selenite concentrations, etc. The BMP Strategic Plan must clearly identify how achieving the goals will result in progress toward attaining the WLAs as soon as possible (recognizing that in Phase I of these selenium TMDLs, attainment of the WLAs is not the required or intended objective; final WLAs must be attained as soon as possible but no later than by the end of Phase II). The cumulative actions identified in the plans must be designed to meet the identified goals<sup>38</sup>.
- **Schedule** – For each element included in the BMP Strategic Plan, the anticipated dates must be identified for the implementation of each action.

Many Regulated Parties have already invested significant effort in the development of BMP Strategic Plans, prior to the adoption of these selenium TMDLs, as part of compliance with their existing NPDES permits. A BMP Strategic Plan (RBF, 2013) for the Santa Ana-Delhi Channel and San Diego Creek subwatershed was developed and received approval from the Executive Officer in December 2013. This BMP Strategic Plan was submitted to meet the requirements of Time Schedule Order (TSO) R8-2009-0069 and Order R8-2009-0070 (i.e., the

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<sup>38</sup> As part of the development of these TMDLs, the identification of step-wise, interim selenium reduction goals during each recommended phase was carefully considered. The selenium reductions that are estimated to be achieved as the result of the implementation of proposed Phase I projects have been identified (some of these projects are already being implemented - see discussion of TSO BMP Strategic Plan, below). These estimated reductions are reflected in the TSO BMP Strategic Plan that will form the basis for the Phase I BMP Strategic Plans for the San Diego Creek subwatershed and the Santa Ana-Delhi Channel. However, since the specific nature and location of, and need for, projects to be implemented in Phase II are unknown at this time, and since these factors must be known to provide defensible estimates of the selenium reductions that could be achieved, it is not practical to specify additional interim selenium reductions in these TMDLs. Any such interim goals would be purely arbitrary. The establishment of interim goals will be considered as part of the TMDL Reconsideration consideration process, based on the results of Phase I, including monitoring to assess the efficacy of implemented BMPs and the effects of those BMPs on the receiving waters and biota. As part of the TMDL Reconsideration process, a revised implementation plan will be developed, with specific determination of where and what types of projects are necessary and feasible to achieve remaining selenium reductions.

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Irvine TSO). The TSO BMP Strategic Plan identifies discrete actions and includes an implementation schedule for those actions. The actions identified will help address the controllable sources of selenium (e.g., groundwater dewatering discharges), and are also expected to result in reductions in the NPS load as well. It is therefore anticipated that the BMP Strategic Plan submitted for approval as part of the requirements for Phase I of these selenium TMDLs<sup>39</sup> will be consistent with the TSO BMP Strategic Plan.

*Individual Action Plan Requirements*

Other NPDES Permittees may elect to identify and implement an alternative, acceptable means to comply with the final WLAs through the development and implementation of an Individual Action Plan. As part of the Notice of Intent (NOI), the Individual Action Plan must be submitted to the Executive Officer for approval by the date specified in **Table 6.1 Se.2**, and implemented upon approval. Each Individual Action Plan must be circulated for public review and comment for a period of no less than 30 days, and the Regional Board shall hold a public hearing prior to considering approval of each plan. If no significant public comments are received, then the Executive Officer may approve the plan. Discharges cannot commence until the Individual Action Plan is approved.

To be considered for approval by the Executive Officer, each Individual Action Plan must include the following:

- **Volume Reduction BMPs** – Identification of volume reduction BMPs that prevent or minimize discharges of selenium prior to discharge. Volume reduction BMP fact sheets were developed by the NSMP in 2005 and five potential volume reduction BMPs were identified: (1) discharge to land, (2) discharge to sewer, (3) evaporation ponds, (4) off-site transportation, and (5) reinjection. These Volume Reduction BMPs do not limit the type of volume reduction BMPs that can be identified in an Individual Action Plan, but rather serve as an example;
- **Method of Attaining the final WLAs** – Identification of how the Individual Action Plan will result in attainment of the final WLAs. Methods of attainment may include:
  - Participation in an approved Offset and Trading Program, such that the discharge is offset consistent with all requirements of the Offset and Trading Program and restrictions pertaining to downstream impacts; OR
  - Implementation of BMPs to attain the final WLAs at the point of discharge<sup>40</sup>; OR
  - No discharge (e.g., sewer the discharge).

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<sup>39</sup> The BMP Strategic Plan approved in December 2013 is in response to TSOs for groundwater dewatering permits and therefore does not cover all Regulated Parties subject to this TMDL. Therefore, the BMP Strategic Plan must be resubmitted for approval to address the requirements for all Regulated Parties and the requirements detailed in these TMDLs. Such modifications may entail including and specifying additional parties to the plan (e.g., MS4 Permittees), specifically identifying interim goals, and ensuring the schedule is consistent with **Table 6.1 Se.2**. These modifications are anticipated to be minor. It is not the intention to require an overhaul of the TSO BMP Strategic Plans as the timeframe for Phase I of these TMDLs is based upon the actions already identified and approved as part of the TSO BMP Strategic Plans.

<sup>40</sup> Attainment of the final WLAs at the point of discharge must be demonstrated in the NOI and compliance would need to be immediate. It may be feasible that the Permittee may want to utilize the Offset and Trading Program until BMPs are implemented to meet the final WLAs at the point of discharge.



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- **Schedule** – Identification of the timeframe of the discharge and the discrete dates for implementation of each action identified as part of the Individual Action Plan.
  - **Monitoring Program** – Identification of how the Individual Action Plan will demonstrate attainment of the final WLAs, per the method identified above, through monitoring. Where an Individual Action Plan opts to attain the final WLAs through an approved Offset and Trading Program, at a minimum, monitoring must be consistent with the monitoring requirements specified in the Monitoring section below. Where an Individual Action Plan opts to attain the final WLAs at the point of discharge, at a minimum (until it has been shown that the discharge meets the final WLAs), the monitoring must include water column monitoring for total selenium and flow (end of pipe). The monitoring program requirement can be satisfied individually (e.g., a separate and individual monitoring plan) or can be incorporated into the Regional Monitoring Program specified in the Monitoring section below. Where an Individual Action Plan opts to attain the final WLAs by sewerage the discharge, monitoring must include flow measurements (flow that is being sewerage)<sup>41</sup> and document that no discharge to surface waters is occurring.
- **Reporting** – Identification of the frequency of reports provided to the Regional Board. The frequency should take into account the underlying permit requirements. Contents of the reports are specified in the section on Reporting.

Offset and Trading Program

Since, at the present time, there is no readily available, conventional selenium treatment technology that can be implemented in a reasonably practicable manner given the watershed-scale of the selenium problem, its diffuse origin (largely rising groundwater), and the limited land available for facility placement, it is not reasonable to prohibit such discharges where doing so would seriously jeopardize public safety, impede important groundwater remediation projects, or adversely affect the beneficial uses of receiving waters. In some places, point source discharges from groundwater dewatering facilities help support aquatic habitat that might otherwise be lost if the discharge were prohibited. To prevent these adverse effects, while continuing to protect water quality, it is appropriate and in the best interests of overall water quality to authorize the use of offsets and trading as an alternate method for demonstrating compliance<sup>42</sup>.

An Offset and Trading Program will allow Regulated Parties to demonstrate compliance with the applicable effluent limitation by reducing selenium loads from NPSs (primarily rising groundwater) in lieu of treating or ceasing their own point-source discharge(s). Implementation of this Offset and Trading Program allows available resources to be leveraged to address both point and non-point sources (the most significant and difficult to control) of selenium. The Offset and Trading Program will be managed so as to ensure that the net effect on water

<sup>41</sup> The sewerage agency will require certain monitoring to be conducted of water that enters the sewer system. This monitoring data may be utilized to fulfill, fully or in part, monitoring requirements for an Individual Action Plan.

<sup>42</sup> Investigation and evaluation of potential selenium treatment technologies is a part of the adaptive management approach for implementation of these TMDLs. New, cost-effective, and practicable treatment technologies may be identified in the future. Consistent with this, a Regulated Party's eligibility to participate in the Offset and Trading Program is contingent, in part, on the demonstration that there is no reasonably feasible or practicable conventional treatment technology available that can achieve compliance with the applicable WQO for selenium at the point of discharge.

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quality and beneficial uses of continued point source discharges mitigated by offsets is better than would be expected if the regulated discharge were prohibited altogether.

If Regulated Parties opt to develop an Offset and Trading Program, it must be submitted to the Executive Officer for approval by the date specified in **Table 6.1. Se.2**, and must be implemented upon approval. The Offset and Trading Program must include a plan and a schedule. The Offset and Trading Program plan and schedule shall be circulated for public review and comment for a period of no less than 30 days, and the Regional Board shall hold a public hearing prior to considering approval of the plan. If no significant public comments are received, then the Executive Officer may approve the plan. This program will cover the entire Newport Bay watershed, though individual trades are limited by subwatershed as described below.

To be considered for approval by the Executive Officer, the Offset and Trading Program must include or conform with all elements/definitions described below:

*Offset and Trading Program Elements*

- **Program Administration:** The Offset and Trading Program must develop the process for, and identify the party responsible for, managing the program (including the Offset Accounting System described below).
- **Trading Baseline:** A minimum level of effort or level of implementation that must be achieved before a project is eligible to generate credits. For purpose of calculating offset credits, the baseline level is equivalent to the mass-based WLA<sup>43</sup>.
- **Credit Generation:** Selenium "credits" (offset credits) are created under either of the two following conditions:
  - A diversion or treatment project reduces selenium loads (expressed as mass) below the baseline level.
  - A Regulated Party reduces the average concentration of selenium in its point source discharge to below 5 µg/L, or below the applicable water column concentration if the CTR water quality objective is revised in the future. The mass-based credit is calculated by multiplying the discharge flow volume times the difference in concentration (i.e., the effluent concentration minus 5 µg/L or the applicable water column concentration).
- **Offset Ratios:** Groundwater cleanup projects<sup>44</sup> must offset their discharge by a 1:1 ratio (e.g., acquire one pound [or fraction thereof] of offset credits for each pound [or fraction thereof] of selenium discharged [i.e., a 1:1 ratio]). All other permitted point-source discharges must offset their discharge by a 2:1 ratio (e.g., acquire two pounds of offset credits for each pound of selenium discharged). The 2:1 ratio serves as a "retirement ratio" that is applied to the estimated credits to set aside a portion of credits for net environmental benefit (e.g., ensuring that all projects with a 2:1 offset ratio that generate credits result in a reduction of NPSs).

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<sup>43</sup> The mass-based WLAs are applicable on an individual Permittee basis. For example, if Permittee A discharges 5 lbs of selenium but implements a diversion project that removes 25 lbs of selenium, then 20 lbs of selenium credits are generated.

<sup>44</sup> Groundwater cleanup projects are those projects regulated under the groundwater remediation permits.

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- **Prior Approval:** Any project for which offset credits are proposed to be generated by reducing existing selenium inputs to surface waters from one or more NPSs, must first be approved by the Executive Officer.<sup>45</sup> As an example, this approval could be modeled on the Los Angeles Regional Water Quality Control Board's and/or State Water Resources Control Board's approach for approval of full capture devices for trash, whereby the Regional Board would create an approved list of BMPs to avoid approving each individual project. As the specifics must be detailed in the Offset and Trading Program, this approach is purely provided as an example for consideration.
- **Offset Accounting:** The Offset and Trading program must develop and establish a selenium accounting system, consistent with the monitoring requirements identified below, which accurately characterizes any load reductions claimed as offset credits and discharges being offset by those credits. The Offset and Accounting System must identify how each project integrates with other selenium reduction efforts in the region including the relevant BMP Strategic Plan.
- **Types of Trades:** Offsets and trades can occur between point source – point source and point source – non-point source.
- **Timing:** Offset credits must be generated before they can be used to offset permitted-point source discharges. Offset credits automatically expire 12 months after they are created regardless of whether they have been used as an offset or not.
- **Trading Area:** Offset credits may only be used as offsets in the same subwatershed (i.e., San Diego Creek, Santa Ana-Delhi Channel, or Big Canyon Wash) in which they were created.
- **Monitoring:** Regulated Parties that rely on offsets and trading to demonstrate compliance will also be required to participate in a monitoring program, as described in the section on Monitoring. This program shall be designed to demonstrate the effectiveness of the offset and trading program in improving water quality. The program shall include, but may not be limited to, water quality monitoring and biological assessments downstream of the point-source discharge. This monitoring obligation may be satisfied by each discharger individually or by cooperating with other dischargers where doing so would be more cost-effective and efficient. The latter option is intended to increase the opportunities for smaller dischargers to participate in the program.

### Eligibility Requirements for the Offset and Trading Program

Regulated Parties will be eligible to participate in the Offset and Trading Program, designed to achieve compliance with the applicable NPDES permit limitation by relying on credits generated from an offset and trading project approved by the Executive Officer, to offset selenium loads in their point-source discharge, provided they demonstrate the following, as determined by the Executive Officer:

- (a) That there is no reasonably feasible or practicable conventional treatment technology available that can achieve compliance with the applicable WQO for selenium at the point of discharge.

<sup>45</sup> Approval is needed for the initial project, not for individual trades of the offset credits. The trades of the offset credits will be documented in the offset accounting system.

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- (b) That it is not feasible or practicable to eliminate<sup>46</sup> the discharge, that doing so would pose unreasonable risks to human health, public safety, or the natural environment, or that prohibiting the discharge would result in unreasonable economic hardship on the surrounding community, or result in greater selenium loading to the Newport Bay watershed than would occur in the absence of the offset project.
- (c) That the point source discharge that relies on offset credits to achieve compliance with the applicable WLA is not expected to unreasonably adversely affect beneficial uses of receiving waters downstream of the discharge outfall.

The Regional Board will require point-source dischargers to re-confirm their eligibility for continued participation in the offset and trading program and to reassess the range of conventional treatment technologies each time a permit is renewed. The Regional Board encourages coordination on treatment technologies in order to minimize redundant efforts and share the total cost as described in the BMP Strategic Plans.

*Demonstrating Compliance with the Waste Load Allocation*

- **Permit Authorization:** An offset credit may not be relied on to demonstrate effective compliance with an effluent limitation unless authorized by a permit (including, but not limited to, the existing Regional Board orders and permits regulating discharges in the Newport Bay Watershed) and unless it has met the credit generation and prior approval requirements.
- **Use of Credits:** Sufficient qualified offset credits must be acquired to offset the remaining selenium load (measured as mass), including any applicable offset ratios, in the point-source discharge.
- **Compliance Assessment:** Satisfactory implementation of the Offset and Trading Program, in accordance with the terms and conditions specified by the Executive Officer, will constitute full compliance with the applicable effluent limitation specified to implement the relevant WLA. The Regional Board retains discretion to revise the specific offset requirements to maintain consistency with the TMDLs<sup>47</sup>. The Regional Board also retains discretion to reauthorize or disallow continued reliance on pollutant offsets and trading projects to demonstrate compliance with the selenium effluent limitation implementing the WLA each time a discharge permit is renewed. Such a determination will include an assessment of the program's continued effectiveness in achieving greater water quality improvements than if the program were disallowed.
- **Non-Compliance and Enforcement:** For Regulated Parties that rely on the Offset and Trading Program to demonstrate compliance with an NPDES effluent limitation, failure to comply with the terms and conditions specified by the Executive Officer at the time the Program is approved will be a violation of the discharge permit. Notwithstanding any other enforcement option already available, the Regional Board may also elect to terminate eligibility to participate in the Offset and Trading Program, require a higher offset ratio from

<sup>46</sup> Individual Action Plan's must include Volume Reduction BMPs and, even if the discharge is reduced, it may be necessary and in the best interests of overall water quality for the remaining discharge to utilize the Offset and Trading Program as an alternate method for demonstrating compliance.

<sup>47</sup> The specific offset requirements must be consistent with the TMDL. Any future revisions to the offset ratios, achieved through a Basin Plan Amendment, would be reflected in permit requirements.

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the non-compliant discharger, or impose additional terms and conditions to ensure full compliance by the non-compliant discharger.

**Development of Site-Specific Objectives**

It is the intent of the Regional Board to develop SSOs for selenium for the Newport Bay watershed, with a targeted date of within one to two years <sup>48</sup>of the effective date of these TMDLs.

Regional Board staff will work with all relevant parties to ensure that the process is implemented as soon as possible. However, this process is time intensive and will take several years to complete even under the most expeditious of circumstances. Therefore, the time to complete this process, as well as the time needed for implementation and assessment of BMPs, forms, in part, the basis for the timeframe for Phase I of these selenium TMDLs.

**TMDL Reconsideration**

The TMDL Reconsideration is a core component of the overall structure and approach for these selenium TMDLs and will occur after the completion of Phase I and prior to the initiation of Phase II.

The TMDL Reconsideration allows these selenium TMDLs to be implemented while there are pending revisions at the state and local levels to the applicable selenium objectives. It is anticipated that the revised objectives will become effective during Phase I of these selenium TMDLs. After the revised objectives are established, the actions needed to attain those objectives can be identified. This process will occur as part of the TMDL Reconsideration and the requirements will be specified as part of the Phase II implementation of these selenium TMDLs.

In addition, the TMDL Reconsideration will also review the overall effectiveness and practicality of BMPs implemented during Phase I and the associated data from the Regional Monitoring Program in developing the appropriate strategies and requirements for Phase II. This approach is consistent with the acknowledged difficulty of controlling selenium discharges in the Newport Bay watershed and the need for further investigation and adaptive management of appropriate and effective control strategies.

Effective BMPs implemented as part of Phase I implementation will continue to be operated during the TMDL Reconsideration. Adaptive management of BMPs and consideration of and planning for new BMPs that are considered likely to be required to attain the revised TMDLs shall also proceed during the TMDL Reconsideration period in order to assure that water quality standards are attained as soon as possible.

The entirety of these selenium TMDLs and supporting documentation may be modified during the TMDL Reconsideration, but it is anticipated that at a minimum, the following elements will be revised:

- Problem Statement

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<sup>48</sup> The timeframe of one to two years refers to the time needed to develop the SSOs and have them considered for adoption by the Regional Board. The timeframe for the SSOs to become effective includes many other regulatory and procedural steps.

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- Numeric Targets
- Linkage Analysis
- TMDLs and Allocations
- Implementation Plan

Implementation of the selenium TMDLs is expected to be an ongoing and dynamic process and may lead to further modifications during Phase II. This includes detailed evaluation of and possible modification of the schedule needed to assure final attainment of the TMDLs. The Regional Board will reevaluate the selenium TMDLs consistent with the implementation schedule in **Table 6.1. Se.2.**

**Phase II: LAs Implementation**

Phase II will focus on actions designed to attain the final WLAs and LAs as expeditiously as possible. Phase II actions will be determined based on the results of Phase I implementation, the requisite monitoring program, and the Reconsidered TMDL and may include revisions to key TMDL elements like the final WLAs and LAs. A schedule for the actions that may be considered for implementation during Phase II has been developed. Given the revisions to the selenium WQOs that have taken place at the federal level, are currently underway at the state level, and the proposed SSOs that will be initiated at the local level, the actions and schedule are preliminary and will be reevaluated for appropriateness during TMDL Reconsideration and any future TMDL reopener. This approach is consistent with the concept of a Phased TMDL as defined in USEPA guidance. The implementation schedule for these TMDLs is limited to **Table 6.1. Se.2.**

During Phase II, these selenium TMDLs will rely upon the State of California *Nonpoint Source Program Strategy and Implementation Plan* (SWRCB, 2000) and the *Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program* (SWRCB, 2004c). As it is anticipated that the implementation measures described in Phase I: WLA Implementation will also address a portion of the NPS rising groundwater, the need for a NPS strategy and the development of the strategy will be part of the TMDL Reconsideration. The strategy that is developed will be implemented during Phase II.

**Phase II: WLAs Implementation**

Specific requirements for Phase II will be identified through the TMDL Reconsideration process. However, it is anticipated that the implementation approach and elements identified for Phase I will be the basis for Phase II. These elements include the following:

MS4 Permittees:

- BMP Strategic Plan
- Offset and Trading Program (participation in the program by individual Regulated Parties is optional)
- Monitoring Program
- Reporting

Other NPDES Permittees:

- BMP Strategic Plan OR Individual Action Plan
- Offset and Trading Program (participation in the program by individual Regulated Parties is optional)

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- Monitoring Program
- Reporting

A key distinction for Phase II implementation is the timeframe, compared to the timeframe identified for Phase I. As the objective for Phase II will be to achieve the final WLAs and LAs and assure that water quality standards are achieved, a significantly longer timeframe is expected to be needed.

Controlling selenium discharges to surface waters poses multiple challenges in part because the most significant source is rising groundwater that is diffuse in origin. Lining of surface water channels to prevent infiltration of rising groundwater could compromise the structural integrity of the channels and their flood control functions. Diversion of this rising groundwater in all surface waters, even if technically feasible, would dewater the surface waters and thereby impair wildlife-related and other beneficial uses. The Offset and Trading Program that is expected to be initiated in Phase I of these selenium TMDLs provides one mechanism to address this source. Other mechanisms may be needed, and adequate but reasonable time will be needed to identify, design, and implement them. These selenium TMDLs specify a schedule of *as soon as possible but no later than 30 years* for Phase II. The propriety of this schedule will be carefully considered, and modified if appropriate, during the TMDL Reconsideration.

During Phase II implementation, a more robust adaptive management process will be incorporated, given the now established 30-year implementation timeframe, including the following:

- **Modifications to the BMP Strategic Plans** – Whereas only minor modifications are anticipated during Phase I implementation, major revisions to the plans may be warranted during Phase II, based upon the information developed through the adaptive management process. Such revisions may entail identifying additional or alternative BMPs necessary to achieve the final WLAs/LAs. Regulated Parties will be required to revise and update the BMP Strategic Plans every five years (as needed), unless an alternative schedule is identified, as directed by the Regional Board’s Executive Officer.
  - **Evaluation of the Final WLAs** – A key component of these proposed selenium TMDLs is identifying water column concentrations that may be necessary to achieve the tissue-based numeric targets. Therefore, it will be necessary to periodically re-evaluate the water column concentrations derived from the biodynamic model (or alternative model, if adopted for Phase II based on special studies) to ensure that tissue-based targets will be attained. Regulated Parties implementing BMP Strategic Plans will be required to update the applicable model utilized in the Linkage Analysis with new data and submit a report with recommendations to the Regional Board’s Executive Officer for review and approval<sup>49</sup>. The frequency of such evaluations shall be consistent with the schedule identified in **Table 6.1. Se.2**.

**Incorporation of the TMDLs into NPDES Permits**

<sup>49</sup> Any changes in the proposed water column-based allocations will occur via a public participation process, and if requested, may require consideration and approval by the Regional Board.

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TMDLs are not self-implementing and must therefore be incorporated into the appropriate regulatory mechanisms to be enforceable. Section 303(d) of the CWA requires WLAs to be implemented through the NPDES permit program. After a TMDL has been developed, water quality-based discharge limits in NPDES permits authorized under CWA section 402 must be consistent with the assumptions and requirements of the WLAs.<sup>50</sup>

The purpose of this section is to provide clear direction to permit writers regarding how these selenium TMDLs are to be incorporated into the relevant NPDES permit.

#### **MS4 Permits**

Effluent limitations are generally expressed in numerical form. However, USEPA guidance provides discretion for how TMDLs should be incorporated into permits for NPDES-regulated municipal and small construction stormwater discharges, including expressing effluent limitations as BMPs or other similar requirements rather than as numeric effluent limitations as long as the effluent limitations are clear, specific and measureable. As part of the assumptions and requirements of the WLAs, these selenium TMDLs specifically provide for BMP-based compliance, as one of several options, for MS4 Permittees.

As the WLAs are incorporated into the MS4 permit via appropriate effluent limitations, all assumptions and requirements of the WLAs, including all footnotes and all compliance options specified in the TMDLs and Allocations section, will be incorporated into the permit.

#### **Other NPDES Permits**

There are several Regional Board orders and/or NPDES permits that may be revised to incorporate the selenium TMDLs' WLAs. The expectation for incorporation of these selenium TMDLs is similar to that stated above for MS4 permits.

As the WLAs are incorporated into other NPDES permits via effluent limitations, the entirety of the WLAs, including all footnotes and all compliance options specified in the TMDLs and Allocations section, shall be incorporated into the permit.

However, there are some additional relevant issues to address for these Other NPDES permits.

- **Effluent limits:** Effluent limits, consistent with the applicable WLAs, will be incorporated into the permit. The approach to the WLAs explicitly acknowledges that the WLAs may be adjusted over time based upon new information. Consequential revisions to permits can be made via approval by the Executive Officer, per delegated authority by the Regional Board, unless during the public review process, a request is made to bring the modification before the Regional Board for consideration. When and if WLAs are adjusted, the most up to date WLAs shall be incorporated into the relevant permits as revised effluent limits.
  - **Compliance via the Offset and Trading Program:** These selenium TMDLs specifically provide for Other NPDES Permittees to comply with effluent limits implementing the WLAs via an Offset and Trading Program. The requirements of the program are specified above, but key aspects related to permit conditions are included here for clarity:
  - Regulated Parties may not rely on offset credits to demonstrate compliance with the applicable effluent limitation based on the WLA unless explicitly

<sup>50</sup> <http://water.epa.gov/lawsregs/lawguidance/cwa/tmdl/overviewoftmdl.cfm>



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authorized by the permit and unless it has met the credit generation and prior approval requirements.

- Satisfactory implementation of the Offset and Trading Program, in accordance with the terms and conditions specified by the Executive Officer, will constitute full compliance with the applicable effluent limitation specified to implement the relevant WLA. The Regional Board retains discretion to revise the specific offset requirements to maintain consistency with the TMDLs. The Regional Board also retains discretion to reauthorize or disallow continued reliance on pollutant offset and trading projects to demonstrate compliance with the selenium WLA each time a discharge permit is renewed in order to ensure the TMDL implementation program is making reasonable progress. Such a determination will include an assessment of the Program’s continued effectiveness in achieving greater water quality improvements than if the Program were disallowed.

## **Monitoring**

### **Individual Action Plan Monitoring**

For Regulated Parties implementing an Individual Action Plan, a monitoring program must be submitted as part of the Individual Action Plan, detailed above in the Implementation section.

### **Regional Monitoring Program**

For Regulated Parties implementing a BMP Strategic Plan, a Regional Monitoring Program must be developed and submitted as part of the applicable BMP Strategic Plan. The Regional Monitoring Program must be submitted to the Executive Officer for approval<sup>51</sup>, consistent with the schedule identified in Table 6.1. Se.2 and implemented upon that approval. A Regional Monitoring Program must be developed for each subwatershed area (San Diego Creek, Santa Ana-Delhi Channel, and Big Canyon Wash). The monitoring programs can be developed individually for each subwatershed or combined to address multiple subwatersheds (resulting in a minimum of one (1) and a maximum of three (3) monitoring programs) consistent with the applicable BMP Strategic Plan(s).

To be considered for approval by the Executive Officer, each Regional Monitoring Program must include the following elements:

- TMDL Evaluation Monitoring
- BMP Effectiveness Monitoring
- Offset and Trading Program Monitoring<sup>52</sup>
- Source Assessment Monitoring
- Other Considerations
- Special Studies

<sup>51</sup> It is expected that prior to Executive Officer approval, input and recommendations from the U.S. Fish and Wildlife Service and the California Department of Fish and Wildlife will be solicited concerning the proposed monitoring, particularly biological monitoring conducted as part of Assessment Area monitoring (see below).

<sup>52</sup> Only required where the Regulated Parties opt to implement an Offset and Trading Program.

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○ **Quality Assurance and Quality Control Measures**

The above monitoring elements reflect the various aspects of these selenium TMDLs that are supported, informed and/or evaluated by monitoring in the watershed. In order to ensure integration of these elements and the various components of these selenium TMDLs within each watershed, the monitoring requirements are contained within one unified document, the Regional Monitoring Program.

Regulated Parties may, and are encouraged to, integrate the various monitoring requirements as appropriate and necessary (e.g., one monitoring location may provide data for multiple purposes). Additionally, Regulated Parties may, and are encouraged to, integrate or coordinate the monitoring requirements for this TMDL with other existing monitoring efforts (e.g., other TMDLs, the MS4 Permit, other regional monitoring programs, etc.).

The specific requirements for each element of the Regional Monitoring Program are detailed below.

***TMDL Evaluation Monitoring***

The purpose of the TMDL evaluation monitoring is to assess progress toward the attainment of the WLAs, LAs, and the tissue-based numeric targets<sup>53</sup>, consistent with California Water Code Section 13242.

The TMDL evaluation monitoring is divided into two categories:

- **Assessment Point Monitoring** – Assessment Point Monitoring will be used to assess, through water column monitoring, whether the WLAs and LAs are being attained. The assessment point within each of the subwatershed/channel areas is as follows:
  - San Diego Creek subwatershed: San Diego Creek at Campus Drive
  - Santa Ana-Delhi Channel: Santa Ana Delhi Channel upstream of Irvine Ave
  - Big Canyon Wash subwatershed: Big Canyon Wash at the outfall to Upper Newport Bay at Back Bay Drive.

The monitoring parameters for the Assessment Point Monitoring must consist of the following:

- Water column: selenium (total and dissolved)<sup>54</sup>
- Flow<sup>55</sup>

The frequency of sample collection must be sufficient to evaluate the WLAs and LAs (including the seasonal evaluation) and must be specified in the Regional Monitoring Program.

- **Assessment Area Monitoring** – Assessment area monitoring will be used to

<sup>53</sup> The monitoring program’s purpose is not to determine permit compliance. Permit compliance will be determined as described in the TMDLs and Allocations section and Implementation Plan section.

<sup>54</sup> Selenium species in addition to total and dissolved selenium (collected at same time as assessment area monitoring is being conducted) should be considered, but are not required for all monitoring events or locations.

<sup>55</sup> To be measured at a nearby gauge or estimated at the point of sample collection if a nearby gauge is not present (e.g., Big Canyon Wash).

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assess, through bird egg and fish tissue samples, attainment of the tissue-based numeric targets. Tissue samples must be collected throughout the subwatershed area. For instances where sufficient tissue samples cannot be collected from an assessment area, a surrogate parameter (e.g., macroinvertebrates such as crayfish; reptiles; amphibians) may be used. The surrogate parameter must be proposed in the Regional Monitoring Program and, therefore, is subject to approval by the Executive Officer. The purpose of the surrogate parameter is to allow for an alternative assessment, as appropriate, of the tissue-based numeric targets to avoid a default presumption of attainment or lack of attainment due to an insufficient number of tissue samples. Given that numeric targets have not been established for these surrogate parameters, they would be used for informative purposes (e.g., to observe trends over time) rather than to determine whether the TMDLs have been attained. Where sufficient tissue samples are not available, these selenium TMDLs do not default to the assessment of water column (per the Assessment Point Monitoring) to determine attainment of the TMDLs. Additionally, where sufficient tissue samples are not available, these selenium TMDLs do not default to a determination that the TMDLs have been attained.

The assessment areas are as follows:<sup>56</sup>

- San Diego Creek subwatershed
  - i. Peters Canyon Wash
  - ii. San Diego Creek
  - iii. Off-Channel Wetlands (IRWD Constructed Treatment Wetlands and San Joaquin Marsh Reserve (UCI Wetlands))
- Santa Ana-Delhi Channel
  - i. Santa Ana Gardens Channel
  - ii. Santa Ana Delhi Channel (upstream of proposed diversion)
- Big Canyon Wash subwatershed
  - i. Harbor View Nature Park
  - ii. Big Canyon Country Club Golf Course Pond 4 or 5
  - iii. Big Canyon Nature Park

At a minimum, the monitoring parameters for the Assessment Area Monitoring must consist of the following:

- **Bird Egg Tissue (individual eggs, contents only):** total selenium; targeted species include shorebirds such as avocets or stilts (invertivorous birds), grebes (omnivorous or insectivorous birds), coots (omnivorous or herbivorous birds) and terns (piscivorous birds); since not all species are expected to be available in any given year within each subwatershed area, the monitoring program must be flexible with regard to the species targeted.

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<sup>56</sup> Each subwatershed, in its entirety, is the assessment area. The sub areas within the subwatersheds are identified to ensure that sampling occurs specifically within at least one of these areas.

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- **Fish Tissue (composite, whole-body tissue analyses):** total selenium; targeted species include juvenile and adult fish of the *Centrarchidae* family (e.g., bluegill, largemouth bass) and smaller fish such as red shiners or mosquito fish; since not all species are expected to be available in any given year within each subwatershed area, the monitoring program must be flexible with regard to the species targeted.
- **Surrogate Parameters:** Field experience indicates that locations with limited habitat (e.g., Upper Peters Canyon Wash, Santa Ana-Delhi Channel, and Big Canyon Wash) may not reliably provide fish or bird eggs for collection. Therefore, the Regional Monitoring Program must identify appropriate surrogate parameters (e.g., larger macroinvertebrates, such as crayfish (tails only, exoskeleton removed), reptiles such as non-native turtles, or amphibians such as non-native frogs) for sampling. At a minimum, surrogate tissue samples will be analyzed for total selenium and percent solids.

The frequency of sample collection must be sufficient to evaluate the tissue-based numeric targets, provided sufficient samples can be collected during target sample collection times, and must be specified in the Regional Monitoring Program.<sup>57</sup> At a minimum, an attempt to collect samples must be conducted annually in each assessment area, unless and until the Executive Officer determines that sufficient tissue data has been obtained to adequately characterize conditions and a lower sample collection frequency is warranted. Bird egg collection should be conducted during the nesting season (generally March through August). Fish collection should be at the same time of year to capture the potential effects of fish as bird dietary items and for effects to fish reproduction (common timing for most of the target species).

### ***BMP Effectiveness Monitoring***

The purpose of the BMP effectiveness monitoring is to assess the effectiveness of the BMPs that have been implemented pursuant to the BMP Strategic Plan(s).

Changes in selenium concentrations in receiving waters, fish tissue, and bird eggs as a result of BMPs can be evaluated on either a project-specific or regional basis (e.g., the assessment area), depending upon the location and scale of the BMP. In addition, depending upon the type of BMP implemented, additional parameters or factors may be warranted (e.g., selenium speciation; bacteriological monitoring). Therefore, the monitoring that is appropriate to assess BMP effectiveness will be project-specific. However, to ensure integration of the goals and purposes of the BMP Strategic Plan and the Regional Monitoring Program, a project-specific monitoring plan must be developed for each project. The project-specific monitoring can be approved either through the BMP Strategic Plan approval process (including periodic updates) or through the Regional Monitoring Program approval process (including periodic updates). Each project-specific monitoring plan must be appended to the overall Regional Monitoring Program and address the following:

- Baseline conditions prior to the project;
- Monitoring locations and rationale for the monitoring locations. At a minimum,

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<sup>57</sup> It is expected that prior to Executive Officer approval, input and recommendations from the U.S. Fish and Wildlife Service and the California Department of Fish and Wildlife will be solicited concerning the proposed monitoring, particularly biological monitoring conducted as part of Assessment Area monitoring (see below).

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two (2) monitoring locations must be established: one immediately upstream of the BMP and one immediately downstream of the BMP. If warranted by the type of BMP implemented or its proximity to sensitive or important habitat, another monitoring location may be added further downstream of the BMP<sup>58</sup>. For diversion projects, monitoring upstream is not required (though monitoring of the diverted water is required, in order to quantify the selenium removed by the diversion<sup>59</sup>). For all types of BMPs, downstream monitoring may be coordinated with other monitoring locations where appropriate;

- Monitoring parameters, which at a minimum must include selenium in water (total and dissolved)<sup>60</sup>;
- Frequency with which each selenium reduction BMP will be monitored once the BMP is constructed and fully functioning. Monitoring must be sufficient to determine performance and selenium reduction effectiveness; and
- Duration of the BMP effectiveness monitoring.

***Offset and Trading Program Monitoring***

The purpose of the offset and trading program monitoring component is to provide the data that verify the generation of credits, and to conduct assessments on the effects of the offsets and/or trades on receiving water conditions to prevent localized impacts. This monitoring element only applies to Regulated Parties that opt to participate in the Offset and Trading Program.

For Regulated Parties who are generating credits via a BMP, at a minimum, monitoring must include the following<sup>61</sup>:

- Influent water to the BMP (prior to treatment)
- Water Column: selenium (total and dissolved)
- Flow
- Effluent water from the BMP (after treatment)
- Water Column: selenium (total and dissolved)<sup>62</sup>

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<sup>58</sup> The same monitoring location(s) can potentially be utilized for different aspects of the Regional Monitoring Program (e.g., a TMDL Evaluation location can also serve as a BMP effectiveness monitoring location), provided that the monitoring location will provide the necessary information. The intent of requiring all monitoring aspects in one Regional Monitoring Program is to integrate all of the requirements such that the program is efficient, effective, and practical.

<sup>59</sup> The sewerage agency will require certain monitoring to be conducted of water that enters the sewer system. This monitoring data may be utilized to fulfill, fully or in part, monitoring requirements for the diversion projects.

<sup>60</sup> As determined on a project specific basis, the monitoring parameters may also include, if warranted, selenium species: selenate, selenite, and organic selenium.

<sup>61</sup> Note that the BMP itself will be assessed under the requirements specified in the BMP effectiveness monitoring aspect of the Regional Monitoring Program. The requirements specified here are specifically designed to assess the generation of credits for the Offset and Trading Program.

<sup>62</sup> Additional monitoring parameters may be required depending on the type of BMP being used (e.g., selenium species, bacteria, nutrients, dissolved oxygen).

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- Flow

For Regulated Parties who are generating credits via a diversion project, at a minimum, monitoring must include the following:

- Influent water to the diversion
- Water Column: selenium (total and dissolved)
- Flow

For Regulated Parties who seek to use credits, at a minimum, monitoring must include the following:

- At the point of discharge:
  - Water Column: selenium (total and dissolved)
  - Flow
- Downstream of the point of discharge:
  - Water Column: selenium (total and dissolved). Water column monitoring conducted under the TMDL compliance monitoring element may be sufficient to satisfy this requirement.
  - Bird Egg Tissue: consistent with the requirements specified in the TMDL compliance monitoring element. Tissue monitoring conducted under the TMDL compliance monitoring element may be sufficient to satisfy this requirement.
  - Fish Tissue: consistent with the requirements specified in the TMDL compliance monitoring element. Tissue monitoring conducted under the TMDL compliance monitoring element may be sufficient to satisfy this requirement.

***Source Assessment Monitoring***

As BMPs needed to achieve these proposed selenium TMDLs are implemented, and as conditions in the subwatershed areas change over time, the collection of selenium source data in each of the subwatershed areas may be necessary to identify and assess significant remaining inputs that do not have BMPs. The need for and selection of additional sample collection locations will be based on the results of Assessment Point and Assessment Area monitoring. Each Regional Monitoring Program must provide for this monitoring element.

***Other Considerations***

In addition to the required elements of the Regional Monitoring Program (TMDL evaluation monitoring, BMP effectiveness monitoring, offset and trading program monitoring, and source assessment monitoring), other elements, such as those listed below, may be considered for inclusion in the Regional Monitoring Program. These elements are not required components of the Regional Monitoring Program, but may be considered as the program develops or added based on consultation with Regional Board staff, and may change over time:

- **Selenium Speciation** – The chemical speciation of selenium is a critical consideration in assessing the potential impacts of selenium because the bioavailability and toxicity of selenium are greatly affected by its chemical forms. Additionally, the various chemical forms of selenium bioaccumulate at different rates. Monitoring aimed at collecting data on the chemical speciation of selenium in the water column should be considered where appropriate.

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Where selenium speciation is included as part of the assessment area monitoring, the water column samples should be collected within each assessment area at the same location and same time as the fish collection occurs.

- **Additional Monitoring Sites** – Additional sites that provide meaningful data to support refinement of the TMDLs and/or BMP implementation may be considered. These sites would not be used for TMDL evaluation purposes (as detailed under “TMDL Evaluation Monitoring” above), but to support future decision-making.
- **Additional Monitoring Triggers** – As part of the overall adaptive management aspect of these selenium TMDLs, the Regional Monitoring Program may consider triggers where additional monitoring is warranted (e.g., tissue concentrations that are orders of magnitude higher than other samples).

***Special Studies***

Special studies are supplemental to the core, routine components of the Regional Monitoring Program. These studies are intended to answer discrete questions and are not intended to be part of the routine monitoring conducted through the Regional Monitoring Program. These studies can inform and fill data gaps that support refinement and/or modification to these proposed selenium TMDLs. Therefore, any special study conducted during Phase I must be completed consistent with the schedule in **Table 6.1. Se.2** in order to be considered during the TMDL Reconsideration.

As part of Phase I of these TMDLs, the following special studies may be implemented by the Regulated Parties or Regional Board:

- **Model Comparison:** This study would provide a comparison of the biodynamic model and a selenium BAF or BSAF model for the Newport Bay watershed. The purpose of the comparison would be to evaluate if the BAF/BSAF model performs equally well for the watershed and to consider revision of the modeling approach utilized for the linkage analysis portion of these selenium TMDLs.
- **Refinement of Site-Specific  $K_d$  values:** This study would focus on obtaining algae, fine organic surficial sediment, and suspended particulates from multiple locations in the watershed to aid in refining the partitioning coefficients used in the biodynamic model to predict the probable selenium water column concentrations needed to meet the numeric tissue targets.
- **Special Studies by Regulated Parties:** Additional special studies may be proposed during implementation of Phase I of the proposed selenium TMDLs as funding allows and as deemed necessary. To be considered during the TMDL Reconsideration process, the proposed special studies must meet the following requirements and be submitted to the Regional Board’s Executive Officer for review and approval:
  - **Purpose** – Identification of the data and/or information gap that will be filled by completion of the special study.
  - **Timeframe** – Identification of the timeframe for completing the special study. The special study must be completed within a time period that allows a sufficient amount of time for the results of the special study to be considered

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during the TMDL Reconsideration process.

- **Link to TMDL Reconsideration** – Identification of the manner in which the results of the special study can be used to revise the TMDLs during the Reconsideration process.
- **Special Studies Requested by the Regional Board:** The Regional Board may identify the need for additional special studies during the implementation of these selenium TMDLs. Where warranted, the Regional Board may issue a California Water Code Section 13267 Order. The Order would meet the requirements of Section 13267 as well as identify the purpose, timeframe, and link to TMDL reconsideration.

***Quality Assurance and Quality Control Measures***

The Regional Monitoring Program must identify the quality assurance and quality control measures (QA/QC) that will be implemented. At a minimum, the Regional Monitoring Program must be consistent with the requirements of California’s Surface Water Ambient Monitoring Program (SWAMP).

**Reporting**

Reporting is an integral component of these selenium TMDLs as it provides the foundation for assessing progress in attaining the TMDLs and the adaptive management process. Reporting requirements for Regulated Parties implementing a BMP Strategic Plan or an Individual Action Plan are detailed below.

***BMP Strategic Plan Reporting***

For Regulated Parties implementing BMP Strategic Plan(s), an annual report must be submitted to the Regional Board, consistent with the schedule identified in **Table 6.1 Se.2**.

BMP Strategic Plan Annual Reports must, at a minimum, address the following:

- **Baseline and Source Control Activities** – Detail the baseline and source control activities implemented during the reporting year.
- **Selenium Reduction Projects** – Detail the selenium reduction projects implemented during the reporting year, including the characteristics, timeframe, and resulting changes in selenium loading and concentration of each project, including as appropriate, any changes in selenium species, and any resultant changes in stream flows/hydrology.
- **Goals** – Evaluate progress in attainment of the goal(s) of the BMP Strategic Plan.
- **Schedule** – Verify that actions were implemented consistent with the approved BMP Strategic Plan schedule.
- **Monitoring Results** – Evaluate the results from the Regional Monitoring Program, including:
  - BMP effectiveness monitoring
  - Progress in attaining WLAs
  - Progress in attaining numeric targets



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- If applicable, results and recommendations from any special studies
- **BMP/Technology Evaluation** – When applicable per the schedule defined as part of an approved BMP Strategic Plan, provide any BMP/technology evaluations. Evaluations can be submitted as a separate, stand-alone report.
- **Adaptive Management** – Based upon the results of the reporting year, propose any minor modifications to the BMP Strategic Plan and/or Regional Monitoring Program, if necessary and appropriate.<sup>63</sup>
- **Data** – Submit data from the Regional Monitoring Program in Excel format to Regional Board staff on a semi-annual basis if exceedances of the numeric targets are observed, and annually if exceedances of the numeric targets are not observed. Data must also be uploaded to the California Environmental Data Exchange Network (CEDEN) on an annual basis. If and as a specific need arises, respond to specific data requests by Regional Board staff as soon as possible.

### Individual Action Plan Reporting

Individual Action Plans are provided as part of these selenium TMDLs recognizing that certain discharges may be short-term in nature and that long-term participation in a BMP Strategic Plan may, thus, be inappropriate. Therefore, the reporting schedule will be determined on a case-by-case basis for each Regulated Party opting to implement an Individual Action Plan. As noted above, the reporting schedule must be included as part of the Individual Action Plan, which is subject to approval by the Executive Officer.

The Individual Action Plan reports must include the following:

- **Volume Reduction BMPs** – Detail the volume reduction BMPs implemented during the reporting period;
- **Method of Attaining the Final WLAs** – Describe the method of attaining the final WLAs during the reporting period:
  - Participation in an approved Offset and Trading Program, such that the discharge is offset consistent with the requirements of the Offset and Trading Program, including the applicable offset ratios and restrictions pertaining to impacts to downstream beneficial uses; OR
  - Implementation of BMPs to attain the final WLAs at the point of discharge; OR
  - No discharge (e.g., sewer the discharge).
- **Schedule** – Verify that actions were implemented consistent with the approved Individual Action Plan schedule.
- **Monitoring Results** – Evaluate the results of the Individual Action Plan monitoring program to demonstrate that the selected method to attain the final WLAs was effective.
- **Data** – Submit data from the Individual Action Plan Monitoring Program in Excel format to the Regional Board's Executive Officer for review and approval in

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<sup>63</sup> Due to the compressed timeframe for Phase I, it is anticipated that only minor modifications to the BMP Strategic Plans will occur during Phase I. However, a more robust adaptive management process will be required during Phase II of these TMDLs.

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<p>accordance with the schedule identified in the permittees Individual Action Plan. Data must also be uploaded to the California Environmental Data Exchange Network (CEDEN).</p>
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**Table 6.1. Se.2 Newport Bay Watershed Selenium TMDLs Implementation and Compliance Schedule**

<b>PHASE I</b>		
<b>Date</b>	<b>Action</b>	<b>Implemented By</b>
3 months from TMDL effective date	Submit Phase I BMP Strategic Plan for approval by the Executive Officer; implement upon approval	MS4 Permittees; Other NPDES Permittees (existing discharges) opting to participate in a BMP Strategic Plan
3 months from TMDL effective date	Submit Regional Monitoring Program for approval by the Executive Officer; implement upon approval.	MS4 Permittees; existing Other NPDES Permittees opting to participate in a BMP Strategic Plan (in lieu of an Individual Action Plan)
3 months from TMDL effective date	Submit Offset and Trading Program for approval by the Executive Officer; implement upon approval.	MS4 Permittees; existing Other NPDES Permittees opting to participate in an Offset and Trading Program
Submit with Notice of Intent	Submit Individual Action Plan OR documentation of participation in an approved BMP Strategic Plan	Other NPDES Permittees (new discharges) <sup>1</sup>
1 year from approval of Phase I BMP Strategic Plan, then annually thereafter	Submit annual report to Regional Board	MS4 Permittees; Other NPDES Permittees opting to participate in a BMP Strategic Plan
As determined in the approved Individual Action Plan	Submit reports to Regional Board	Other NPDES Permittees opting to implement an Individual Action Plan in lieu of participation in a BMP Strategic Plan
To be considered during the TMDL Reconsideration - 5 years from TMDL effective date	Complete any special studies and submit final report on study to Regional Board	MS4 Permittees; Other NPDES Permittees opting to implement a Special Study
Within 5 years from TMDL effective date	Complete development of selenium SSO	Regional Board with support from MS4 Permittees and Other NPDES Permittees
6 years from TMDL effective date	Complete implementation of Phase I BMP Strategic Plans	MS4 Permittees; Other NPDES Permittees opting to participate in a BMP Strategic Plan (in lieu of an Individual Action Plan)
<b>TMDL RECONSIDERATION</b>		
As soon as possible after the completion of Phase I, but no later than 8 years from the TMDL effective date	Reconsider TMDL -the entirety, or selected sections, of the selenium TMDLs and supporting documentation may be modified during the TMDL	Regional Board

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	Reconsideration	
Throughout TMDL Reconsideration Period	Continue to implement Phase I BMP Strategic Plan	MS4 Permittees; Other NPDES Permittees (existing discharges) opting to participate in the BMP Strategic Plan
<b>PHASE II</b>		
<b>Date</b>	<b>Action</b>	<b>Implemented By</b>
6 months from Reconsidered TMDL effective date	Submit Phase II BMP Strategic Plan <sup>2</sup> for approval by the Executive Officer; implement upon approval	MS4 Permittees; Other NPDES Permittees (existing discharges) opting to participate in a BMP Strategic Plan
6 months from Reconsidered TMDL effective date	Submit Regional Monitoring Program for approval by the Executive Officer; implement upon approval	MS4 Permittees; existing Other NPDES Permittees opting to participate in a BMP Strategic Plan
Submit with Notice of Intent	Submit Individual Action Plan OR documentation of participation in an approved BMP Strategic Plan	Other NPDES Permittees (new discharges) <sup>1</sup> opting to implement an Individual Action plan in lieu of participation in the BMP Strategic Plan and Other NPDES Permittees opting to participate in a BMP Strategic Plan
1 year from approval of Phase II BMP Strategic Plan, then annually thereafter	Submit annual report to Regional Board	MS4 Permittees; Other NPDES Permittees opting to participate in a BMP Strategic Plan
As determined in the approved Individual Action Plan	Submit reports to Regional Board	Other NPDES Permittees (new discharges) opting to implement an Individual Action Plan in lieu of participation in the BMP Strategic Plan
9 years from Reconsidered TMDL Effective Date	Evaluate WLAs/LAs and submit report with recommendations to the Regional Board <sup>3</sup>	MS4 Permittees; Other NPDES Permittees opting to participate in the BMP Strategic Plan
10 years from Reconsidered TMDL effective date	TMDL Reopener	Regional Board
19 years from Reconsidered TMDL effective date	Evaluate WLAs/LAs and submit report with recommendations to the Regional Board <sup>3</sup>	MS4 Permittees; Other NPDES Permittees opting to participate in the BMP Strategic Plan
20 years from Reconsidered TMDL effective date	TMDL Reopener	Regional Board
As soon as possible but no later than 30 years from Reconsidered TMDL effective date	Complete implementation of Phase II BMP Strategic Plans	MS4 Permittees; Other NPDES Permittees opting to participate in the BMP Strategic Plan
As soon as possible but no later than 30 years from Reconsidered TMDL effective date	Attain Final WLAs <sup>4</sup>	MS4 Permittees and Other NPDES Permittees opting to participate in a BMP Strategic Plan AND Other NPDES Permittees (new discharges) opting to implement an Individual

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		Action Plan in lieu of participation in the BMP Strategic Plan
	Attain Final LAs <sup>4</sup>	Non-Point Source dischargers
<p><sup>1</sup> = The TMDL considers that there may be new dischargers after the TMDL becomes effective (e.g., a short-term groundwater discharger that was not discharging at the time the TMDL became effective).</p> <p><sup>2</sup> = The schedule in the approved Phase II BMP Strategic Plan will include periodic updates and revisions, anticipated to be every 5 years throughout Phase II of these proposed selenium TMDLs. The schedule is subject to approval by the Executive Officer.</p> <p><sup>3</sup> = As the models are directly incorporated into the assumptions and requirements of the WLAs and LAs, the Regional Board can re-evaluate the allocations at any time and, through a public review process, modify the allocations. The discrete tasks here reflect the minimum frequency for re-evaluation of the allocations. Any additional reviews beyond those specified in the implementation schedule would be at the discretion of the Regional Board or at the request of Regulated Parties.</p> <p><sup>4</sup> = While the tissue-based WLAs and LAs are expected to result in attainment of the tissue-based numeric targets, bioaccumulation in the various foodwebs in the watershed may be different than what was modeled with the biodynamic model as part of the Linkage Analysis. Therefore, where tissue-based numeric targets are attained, the corresponding WLAs/LAs will also be deemed to be attained, regardless of the actual measured water column concentration.</p>		