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July 2, 2012

Jeanine Townsend, Clerk to the Board
State Water Resources Control Board
1001 I Street, 24th Floor
Sacramento, CA 95814



Re: Proposed Amendment to the Recycled Water Policy to Incorporate Monitoring Requirements for Constituents of Emerging Concern

Dear Ms. Townsend:

Please accept the following comments on behalf of Heal the Ocean (HTO), a Santa Barbara-based citizens' action group whose focus is on ocean pollution, with wastewater infrastructure being a prime target for ocean pollution source control. HTO has been researching Constituents of Emerging Concern (CECs) for some years, and our discussion of those chemicals/constituents/contaminants – and wastewater treatment methods that reduce or eliminate them – is contained in our Report, California Ocean Wastewater Discharge Inventory and Report (<http://www.healthocean.org/research/wdi>) which our research staff spent some years researching.

Heal the Ocean has been following the State's efforts to develop a monitoring program for CECs by participating in hearings held by the Southern California Coastal Water Research Project's (SCCWRP) Science Advisory Panel. We've also offered input with suggestions on how to improve the recommendations of the expert Panel.

Enclosed are Heal the Ocean's comments on the State's recently released draft amendment to the Recycled Water Policy. We appreciate the State's efforts towards implementing the recommendations of the SCCWRP Panel and look forward to future progress on this topic.

General Comments

HTO is concerned that the State Water Board's "Requirements for Monitoring Constituents of Emerging Concern for Recycled Water" (referred to as the "proposed Monitoring Requirements" throughout our comments) ignores recommendations of the California Department of Public Health as well as its own Science Advisory Panel AND the State Water Board staff, in coming up with its draft Monitoring Requirements. Our particular concerns about this disparity are outlined below:

The State's CEC Performance Indicator List Must Correlate with California Department of Public Health (CDPH)'s Proposed Performance Indicator List

The rationale behind using a performance indicator CEC monitoring program as recommended by the Science Advisory Panel seems to be a fair enough course of action, in that if a particular contaminant shows up in recycled water it can be assumed that the treatment process is not working effectively, and other similar CECs are passing through.

However, in its June 25, 2010 Final Report the Science Advisory Panel lists (in Table 8.2) only the following specific indicators: 17B-estradiol, Triclosan, Caffeine, NDMA, gemfibrozil, DEET, iopromide, and Sucralose.

On the other hand, Section 60320.201(c)(1) of the California Department of Public Health draft regulations for Recycled Water (November 21, 2011) recommends indicator compounds from nine functional groups, as indicated (A through I) below:

Nine Indicator Groups from CDPH FAQ Page¹

(A) **Hydroxy Aromatic:** Acetaminophen, Benzyl salicylate, Bisphenol A, Estrone, Hexyl salicylate, Isobutylparaben, Methyl salicylate, Nonylphenol, Oxybenzone, Propylparaben, Salicylic acid, Triclosan, Clorfibric Acid

(B) **Amino/Acylamino Aromatic:** Sulfamethoxazole, Atorvastatin, Triclocarban

(C) **Nonaromatic with carbon double bonds:** Acetyl cedrene, Carbamazepine, Codeine, Hexylcinnamaldehyde, Methyl ionine, OTNE, Simvastatin hydroxyl, Terpeneol

(D) **Deprotonated Amine:** Atenolol, Caffeine, Diclofenac, EDTA, Erythromycin-H₂O, Fluoxetine, Metoprolol, Nicotine, Norfluoxetine, Ofloxacin, Paraxanthine, Pentoxifylline, Trimethoprim

(E) **Alkoxy Polyaromatic:** Naproxen, Propranolol

(F) **Alkoxy Aromatic:** Gemfibrozil, Hydrocodone

(G) **Alkyl Aromatic:** Benzophenone, Benzyl acetate, Bucinal, DEET, Dilantin, Dibutyl Phthalate, Diphenhydramine, Galazolide, Ibuprofen, Indolebutyric acid, Primidone, Tonalide

(H) **Saturated Aliphatic:** Iopromide, Isobornyl acetate, Meprobamate, Methyl dihydrojasmonate

(I) **Nitro Aromatic:** Musk ketone, musk xylene

The State Water Board's proposed Monitoring Requirements includes four of the nine groups above as performance indicators, these include: Caffeine from Group D, Gemfibrozil from Group F, DEET from Group G, and Iopromide from Group H. Triclosan is also included in the proposed Monitoring Requirements but it is only listed as a health

¹ California Department of Public Health. "FAQ for Draft Regulations for Groundwater Replenishment with Recycled Water," November 22, 2011. Accessed at: <http://www.cdph.ca.gov/certlic/drinkingwater/Pages/RechargeFAQ.aspx>

based CEC, not a performance indicator (see Table 6). Thus, the current monitoring list completely omits five of the indicator groups, Group A, Group B, Group C, Group E, and Group I, listed in CDPH's proposed framework.

In fact, the list for subsurface application of recycled water includes only two of the groups, namely: Caffeine from Group D, and DEET from Group G. It makes no sense that subsurface application projects, as in direct injection, calls for LESS requirements than surface application projects (!). In any case, both types of recycled water use should have to meet performance standards for all nine of the performance indicator groups listed above.

The State Water Board should adopt a performance indicator CEC monitoring program that is similar to the proposed CDPH framework for both surface and subsurface application projects.

Where are the antibiotics?

There is a growing and alarming body of literature on antibiotics in global water supplies, and there is some indication that antibiotics that have escaped wastewater treatment and recycled water treatment pose a threat to humans in the form of increasing antibiotic resistance. This raises concerns that antibiotic resistance can be spread through the use of recycled water. Any monitoring program for CECs must take antibiotics into account. While the CDPH list includes types of antibiotics in its Group B (**Amino/Acylamino Aromatic**) and D (**Deprotonated Amine**), the proposed Monitoring Requirements contains no such focus. The State Water Board should make examining antibiotics in recycled water a priority in the next review of its CEC monitoring program.

A future science advisory panel needs to examine and make recommendations on addressing antibiotics in recycled water.

Expanding the List of Health Based CECs

The usefulness of the proposed Monitoring Requirements will be significantly diminished unless the current list of health-based CECs is expanded. The State Water Board can meet public concerns regarding groundwater replenishment with recycled water if it takes this opportunity to set up a rigorous chemical list for monitoring. Fortunately, a rigorous approach does not have to be a radical one since the Science Advisory Panel, CDPH, and comments made during the development process by the State Water Board staff and Regional Water Boards have already provided a reasonable template for expanding the current list.

In response to the Science Advisory Panel's April 15, 2010 Draft Report, the State Water Board staff raised issue (in its May 13, 2010 letter) regarding the Panel's exclusion of chemicals on CDPH's Notification List for consideration as CECs. In its comment, staff stated, "...we understand that DPH is concerned that the [P]anel screened out CECs on the

basis that that [sic.] were already regulated, and we agree that these should have been evaluated for potential monitoring.”²

In addition, the Science Advisory Panel’s subsequent May 21, 2012 *Panel Report Out* sought to address these concerns by promising to examine those chemicals on the Notification List with adequate MEC/MTL data. Unfortunately, the Final Report did not include the vast majority of those chemicals on the CDPH Notification List for consideration as CECs. Tables 5.1, 5.2, and 5.3 in the Final Report show a minimal number of chemicals from the Notification List.

That the proposed Monitoring Requirements fails to include chemicals from the Notification List is a serious omission!

The CDPH Notification List is designed to provide guidance on chemicals that are thought to pose health threats in drinking water. The potential connection of these chemicals to health concerns establishes them as prime targets for monitoring in the proposed Monitoring Requirements. Even if there was limited MEC/MTL data for those chemicals on the Notification List, the Panel should have included them, and noted the lack of data, in the Final Report.

In fact, any lack of data adds to the case for their inclusion in the new CEC monitoring program. The State should establish baseline concentrations for these chemicals through the CEC monitoring program. The baseline data can then be applied to the Panel’s CEC prioritization framework to determine whether further monitoring is necessary. Unless adequate MEC data is collected, it will be impossible to tell whether these chemicals pose a serious risk in a groundwater replenishment program.

The State Water Board should include all chemicals on the CDPH Notification List for monitoring in the proposed CEC monitoring program. The exclusion of the vast majority of these chemicals from the Panel’s Final Report is an unacceptable omission. Any lack of data on these chemicals does not provide a legitimate excuse for their exclusion and, in fact, adds weight to the case for their addition to the State’s final monitoring program. The CDPH Notification List is designed to provide guidance on chemicals that are a health concern. Any chemical that is connected to suspected health concerns and has limited data associated with it is *exactly* the kind of chemical that should be included in the State Water Board’s CEC monitoring program.

In addition, CDPH’s December 14, 2010 “Drinking Water Notification Levels and Response Levels” contains a Table 2, “Response Levels”...“*at which CDPH recommends removal of a (drinking water) source from service.*” In that Table, each of the following chemicals are listed with the toxicological endpoint being *Cancer Risk: RDX, TBA, 1,2,3-TCP, TNT, NDPA, 1,,4-Dioxane, NDMA, and NDEA.*

As we stated above, the State Water Board should adopt into its proposed Monitoring Program the substances listed in the Table 1, and additionally, should adopt the Table 2

² State Water Resources Control Board. “Comments on Draft Final Report - Monitoring Strategies for Chemicals of Emerging Concern (CECs) in Recycled Water,” May 13, 2010, p. 2.

“Response Levels” from the CDPH notification list. Given the fact that these chemicals pose a “cancer risk,” and that CDPH identified them as important enough to apply individual response levels, the State Water Board should not apply the more arbitrary response level framework across all of these CECs. There is no sense in ignoring the valuable work done by CDPH to more accurately evaluate and respond to the health risk posed by the presence of such hazardous CECs.

The State Water Board needs to incorporate CDPH’s response levels for the Drinking Water Notification List into the Proposed Monitoring Requirements.

The State Water Board should accept the September 13, 2010 recommendations from CDPH regarding constituents to monitor in surface spreading operations. We are seriously concerned by the fact that these recommendations were left out of the State Water Board’s proposed Monitoring Requirements. There is no legitimate reason why the State should completely disregard the recommendations of CDPH. Even the State Water Board’s staff report has recommended “monitoring for these additional CECs in recycled water.”³

For surface spreading operations, the State Water Board should heed its staff recommendations to add those chemicals recommended by CDPH to monitor in recycled water.

The State Water Board should also follow the Science Advisory Panel’s recommendation to “conduct a more thorough review of CECs likely to occur in recycled water using MEC and PEC data from peer-reviewed literature and occurrence studies outside California.”⁴ The Panel recommended that those CECs identified through this review be put on a “secondary monitoring list.” According to the Panel, this monitoring list should also include those CECs identified in Table 5.3, pages 41-43 of the Final Report of the Science Advisory Panel (June 25, 2010). Monitoring of substances in this list could occur less frequently than the main list of CECs while still providing data to determine the potential threat that these CECs pose to public health.

We believe the State Water Board should follow the Science Advisory Panel’s recommendation to create a secondary monitoring list populated with the results of a more thorough review of available MEC and PEC data and with the CECs listed in Table 5.3.

More Aggressive Review Timeline Needed of the CECs List

Due to limited State resources, it is understandable that the Science Advisory Panel and the State Water Board established several stages of monitoring in which CECs of particular concern will receive greater prioritization over time. However, a multi-staged refinement

³ California Department of Public Health. “Recommendations on Chemicals of Emerging Concern Expert Panel Report,” September 13, 2010, p. 8. Accessed at: http://www.waterboards.ca.gov/water_issues/programs/water_recycling_policy/docs/cec111610/cdphletter.pdf

⁴ Southern California Coastal Water Research Project. “Monitoring Strategies for Chemicals of Emerging Concern (CECs) in Recycled Water,” June 25, 2010, p. 41.

of the monitoring list without a reasonable timeline for the addition of new CECs that are found to pose a public health risk is unsupportable.

In its June 2010 Final Report to the State Board, the Science Advisory Panel put forth a template in section 8.4.3 for establishing and conducting a review process of the list of CECs. First, it recommends that an independent panel review the CEC monitoring list along with a subsequent round of monitoring for those CECs. Second, it recommends an independent panel review the list of indicator CECs every three years through guidelines outlined on Page 72 of the Final Report.

The State Water Board needs to adopt a more aggressive timeline than the one proposed by the Science Advisory Panel. There should be a review of the list of indicator CECs every two years and the list of health based CECs every three years. Currently, the State Water Board allows for a five year update of the Science Advisory Panel's report but does not propose a specific process for updating the list of indicator CECs. While we assume that the review of the list of indicator CECs would fall under the five year update of the entire report, the significance of the indicator framework to the success of the monitoring program necessitates the review of that list on a timelier basis.

The State *should* review the list of indicator CECs every two years and the list of health based CECs every three years. At the very least, the State Water Board should include a separate and more aggressive review process for indicator CECs that is in line with the recommendations of the Science Advisory Panel.

The State Water Board also needs to increase the frequency of monitoring for all health based and performance indicator CECs. The proposed Monitoring Requirements is broken up into three phases, the initial assessment, baseline, and standard operating phase. In the initial assessment, monitoring occurs quarterly for health and indicator CECs and becomes less frequent in future phases. Instead of quarterly monitoring, monthly monitoring should occur in order to establish an accurate reading of CECs in recycled water. Future phases should conduct monitoring on a semi-annual basis at a minimum.

The State Water Board needs to adjust monitoring frequency for all CECs in order to ensure a more conservative approach to the monitoring program.

Response Level/Action Framework is Inadequate

Table 7 from the proposed Monitoring Requirements lays out a plan for differing response actions, like resampling of monitoring data, for increasing concentrations of measured concentrations of the health based CECs. Neither the Science Advisory Panel nor the State Water Board has offered sufficient justification for the specific thresholds and response actions framework as listed in Table 7 of Attachment A. As it currently stands, Table 7 (reproduced below) applies a single arbitrary framework over all the health based CECs that the State Water Board proposes to monitor. This lacks the nuance that a conservatively designed CEC monitoring program would hold. For instance, NDMA may require different response actions than Triclosan at a comparable threshold.

Furthermore, considering the fact that there are FEW health based CECs on the proposed monitoring list, it would not be difficult for the State Water Board to review the health risks associated with each CEC, and subsequently propose specific response actions for each. Even if the State Water Board were to accept all of our recommendations for expanding the proposed list of CECs, a more detailed review of each chemical would still represent a necessary step to ensuring that the monitoring program is operating effectively. Simply put, if the State does not get the response actions right, than the effectiveness of the program as it relates to the protection of public health is severely diminished.

Table 7: MC/MTL Thresholds and Response Actions⁵

MC/MTL Threshold	Response Action
If greater than 75 percent of the MC/MTL ratio results for a CEC are less than or equal to 0.1 during the baseline monitoring phase and/or subsequent monitoring -	A) Consider requesting removal the CEC from the monitoring program; confer with CDPH and the Regional Water Board.
If MC/MTL ratio is greater than 0.1 and less than or equal to 1 -	B) Continue to monitor.
If MC/MTL ratio is greater than 1 and less than or equal to 10 -	C) Check the data and conduct action B.
If MC/MLT ratio is greater than 10 and less than or equal to 100 -	D) Resample immediately, analyze to confirm CEC result, and conduct action C.
If MC/MLT ratio is greater than 100 and less than or equal to 1000 -	E) Conduct action D and implement a source identification program, and monitor at additional location(s) closer to the point of extraction for water supply and/or a point in the distribution system to confirm that attenuation of CECs is occurring subsequent to the downgradient monitoring location (Section 2) and to confirm the magnitude of assumed safety factors associated with removal efficiency. The recharge reuse agency also shall contact CDPH and the Regional Water Board and evaluate the need for additional actions, which may include, but are not limited to, additional monitoring, toxicological studies, engineering removal studies and/or modification of facility operation to reduce CEC concentrations.
If MC/MTL ratio is greater than 1000 -	F) Conduct action E and immediately confer with CDPH and the Regional Water Board to determine the required response action. Monitor to confirm effectiveness of corrective action(s) to reduce CEC levels below at least an MC/MTL ratio of 100.

While reviewing all of the response actions and associated thresholds in Table 7 is critical, the State Water Board needs to pay specific attention to the proposed response actions in Part E and F. These final response actions make an unjustified assumption that there is a problem at the source for chemical samples between 100 and 1000 MEC/MTL, while plant operation is the problem for chemical samples measuring over 1000 MEC/MTL. How can there be such a distinction between source and plant operation at the 1000 MEC/MTL level? This illustrates why a specific review of each CEC would offer better protection of public health than what is proposed in Table 7.

⁵ California State Water Resources Control Board. "DRAFT Attachment A: Requirements for Monitoring Constituents of Emerging Concern for Recycled Water," May 7, 2012, p. 17.

The State Water Board should adjust the threshold levels and response actions in Table 7 to reflect the specific risks associated with each health based CEC.

Furthermore, Attachment A does not indicate which monitoring location will be utilized when evaluating the appropriate response actions for a particular chemical. For instance, for a surface spreading groundwater recharge project, it is not clear whether monitoring will be done prior to soil aquifer treatment or afterward. This is a consequential omission since the MEC/MTL ratio can change significantly between different monitoring locations.

The proposed Monitoring Requirements need to clarify which monitoring locations will be used in evaluating the corresponding response actions for the suite of CECs.

Monitoring Program for Irrigation Needed

The State Water Board needs to set up a program for monitoring CECs in recycled water used for irrigation, especially in the case of NDMA. Based on its original calculations, the Science Advisory Panel found that NDMA did have a MEC/MTL ratio above 1 in irrigation, which classifies it as a CEC requiring monitoring. However, in the time between the Draft and Final Reports, the Panel revised the formula to calculate MTLs for irrigation by reducing the estimated water ingestion by humans from water in irrigation. As a result of this change, MEC/MTL ratios in irrigation fell by an order of magnitude and also caused NDMA's MEC/MTL ratio to fall below 1.

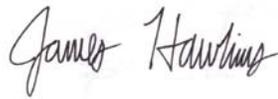
The proposed Monitoring Program should include a more robust program for monitoring CECs in recycled water used for irrigation – AND include NDMA on the irrigation monitoring list

In closing, Heal the Ocean would like to reiterate that a proactive policy from the State Water Board in monitoring for CECs in recycled water is absolutely necessary for the health of people and the environment. We would also like to thank the State Water Board for their consideration of our recommendations to improve the proposed Monitoring Program for CECs.

Sincerely,



Hillary Hauser, Executive Director



James O. Hawkins, Associate
Researcher