

Los Angeles Regional Water Quality Control Board

March 17, 2015

Mr. Enrique C. Zaldivar, Director  
City of Los Angeles, Bureau of Sanitation  
1149 South Broadway, 9<sup>th</sup> Floor  
Los Angeles, CA 90015

**ADOPTED RESOLUTION APPROVING SPECIAL STUDIES – HYPERION TREATMENT PLANT (NPDES NO. CA0109991, CI-1492) AND TERMINAL ISLAND WATER RECLAMATION PLANT (NPDES NO. CA0053859, CI-2171)**

Dear Mr. Zaldivar:

The Regional Water Quality Control Board, Los Angeles Region (Regional Water Board) transmitted a letter containing the tentative Resolution Approving Proposed Special Studies for the City of Los Angeles' Hyperion Treatment Plant and the Terminal Island Water Reclamation Plant, on January 12, 2015.

In accordance with administrative procedures, the Regional Water Board at a public hearing held on March 12, 2015, reviewed the tentative requirements, and considered all the factors in the case, and adopted Resolution No. R15-002.

The complete adopted Order will be sent only to the Permittee. However, these documents are available on the Regional Water Board's website for review. The Regional Water Board's web address is [www.waterboards.ca.gov/losangeles/](http://www.waterboards.ca.gov/losangeles/).

If you have any questions, please contact me at (213) 620-2083 or Steven Webb at (213) 576-6793.

Sincerely,



 Cris Morris, P.E., Chief  
Municipal Permitting Unit (NPDES)

Enclosures

Adopted Resolution for Proposed Special Studies  
Special Study Proposals

Mr. Enrique Zaldivar  
City of Los Angeles, Bureau of Sanitation

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cc: Environmental Protection Agency, Region IX  
U.S. Army Corps of Engineers  
NOAA, National Maritime Fisheries Service  
U.S. Fish and Wildlife Service, Division of Ecological Services  
State Water Resources Control Board, NPDES Permitting Unit  
Frances McChesney, State Water Resources Control Board, Office of Chief Counsel  
State Water Resources Control Board, Division of Drinking Water  
California Department of Parks and Recreation  
California Coastal Commission  
California Coastal Conservancy  
California Department of Water Resources  
Santa Monica Bay Restoration Commission  
Los Angeles County, Department of Public Health  
Los Angeles County, Department of Public Works  
Los Angeles County Sanitation Districts  
City of Los Angeles, Department of Public Works  
Environment Now  
Heal the Bay  
Natural Resources Defense Council  
Santa Monica Baykeeper  
Resource Conservation District of Santa Monica Mountains  
Surfrider Foundation  
Southern California Coastal Water Research Project

Resolution No. R015-002  
Approving the City of Los Angeles' Proposed Special Studies for the  
Hyperion Treatment Plant & Terminal Island Water Reclamation Plant

State of California  
California Regional Water Quality Control Board, Los Angeles Region

RESOLUTION NO. R15-002  
Approving the City of Los Angeles' Proposed Special Studies for the Hyperion Treatment  
Plant and the Terminal Island Water Reclamation Plant

WHEREAS, the California Regional Water Quality Control Board, Los Angeles Region  
(hereinafter Regional Water Board), finds that:

1. The Regional Water Board adopted National Pollutant Discharge Elimination System (NPDES) permits for the City of Los Angeles' Hyperion Treatment Plant on November 4, 2010, and for the Terminal Island Water Reclamation Plant on May 6, 2010.
2. Both NPDES permits contain a requirement for the City of Los Angeles to consult annually with the Regional Water Board and the United States Environmental Protection Agency (USEPA) to determine the need for special studies. Detailed scopes of work for proposals must be presented to obtain Regional Water Board and USEPA approval and to inform the public. Special studies are intended to focus on refined questions regarding specific effects or development of monitoring techniques. Questions regarding effluent or receiving water quality, discharge impacts, ocean processes in the area of the discharge, or development of techniques for monitoring, arising out of the results of core or regional monitoring, may be pursued through these special studies.
3. On January 06, 2015, representatives from the City of Los Angeles met with Regional Water Board staff to discuss two proposed special studies for 2015: 1) *The Potential Impact of 17 $\beta$ -estradiol on Larval Topsmelt Development*, and 2) *Total Nitrogen Method Development for Wastewater, Receiving Water, Biosolids, and Sediments*.
4. Regional Water Board staff believe that these proposed special studies fulfill the requirements of the NPDES permits, will further the Regional Water Board's knowledge of the health of Los Angeles Harbor and Santa Monica Bay and of emerging issues associated with the discharges from both Plants, and recommend that they be approved by the Regional Water Board.

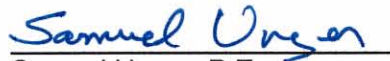
Resolution No. R015-002

Approving the City of Los Angeles' Proposed Special Studies for the  
Hyperion Treatment Plant & Terminal Island Water Reclamation Plant

THEREFORE, BE IT RESOLVED THAT:

1. The Regional Water Board believes that the two Special Studies proposed for 2015, 1) *The Potential Impact of 17 $\beta$ -estradiol on Larval Topsmelt Development*, and 2) *Total Nitrogen Method Development for Wastewater, Receiving Water, Biosolids, and Sediments*, merit approval.
2. The Regional Water Board hereby approves the City of Los Angeles' proposals for these special studies.

I, Samuel Unger, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of a Resolution adopted by the California Regional Water Quality Control Board, Los Angeles Region, on March 12, 2015.



Samuel Unger, P.E.  
Executive Officer

**City of Los Angeles  
Los Angeles Sanitation  
Hyperion Treatment Plant and Terminal Island Water Reclamation Plant**

**Special Study Proposal  
(March 13, 2015 to November 30, 2015)  
The Potential Impact of 17 $\beta$ -estradiol on Larval Topsmelt Development**

**Goal:**

The goal of this Special Study is to evaluate the potential sublethal effects of concentrations of 17 $\beta$ -estradiol, a steroidal hormone commonly found in POTW effluent, on the Topsmelt *Atherinops affinis*.

**Objectives:**

Estrogen has feminizing effects documented in other fish species, e.g. in male fish, the development of ovarian tissue within testes and the production of vitellogenin (VTG), an egg yolk-producing protein, found in the blood and tissue (Kishida 1992). The primary objective of the study is to determine the lowest concentration at which 17 $\beta$ -estradiol does not produce feminizing effects (NOEC), the lowest concentration at which an effect is detectable (LOEC) and the concentration that elicits an effect in 50% (EC50) of larval Topsmelt. The secondary objective is to develop a catalog of the effects elicited by exposure to 17 $\beta$ -estradiol.

**Benefits:**

Determine if there are any deleterious effects of sublethal exposure of 17 $\beta$ -estradiol to Topsmelt, an ecologically important species.

**Background:**

Recent developments in chemical analyses have allowed for the detection of pharmaceutical, personal care, and industrial products typically existing at very low levels in the environment. Collectively, these products are known as contaminants of emerging concern (CECs). Very little is known about the effects of CECs in aquatic organisms. A class of CECs that have demonstrated impacts on gonadal development are estrogen and estrogen-like compounds, known as female sex steroids. Estrogenic compounds such as 17 $\beta$ -estradiol and other steroids are commonly found in oral contraceptives. Since the human body does not completely metabolize the hormones, they are excreted in urine. Once they enter the waterways, typically through sewage treatment plant effluent, these hormones have had feminizing effects documented in some fish (Kishida 1992; Nash 2004).

The Hyperion Treatment Plant, whose effluent comprises about 79% domestic and 21% industrial and commercial, discharges an average of 285 MGD of secondary-treated

wastewater into Santa Monica Bay through its 5-Mile Outfall. As of 2013, HTP effluent has a reported 17 $\beta$ -estradiol concentration of .32 ng/L and 17 $\beta$ -estradiol was not detected in TIWRP effluent (City of Los Angeles, Environmental Monitoring Division, 2013).

Topsmelt are an ecologically significant species that are prey for other species such as terns, larger fish, and sea lions and are also currently used as the standard test organism for acute HTP toxicity tests. In the past, they were used as the standard test organism for acute TIWRP toxicity tests. Topsmelt were also used as the test organisms for chronic toxicity tests for HTP and TIWRP.

**Approach:**

Gonadal development typically occurs when *Menidia* spp. are between 8-21 mm in standard length (Baumann 2012). Gonadal development in larval Topsmelt is assumed to occur at the same time since *Menidia* spp. and Topsmelt are closely related. The beginning of the sensitive period of gonad development begins when Topsmelt are 7 days posthatching (dph). 7 dph fish will be exposed to pure seawater, carrier matrix control, and .5  $\mu$ g/L, 2  $\mu$ g/L, 4  $\mu$ g/L, and 8  $\mu$ g/L concentrations of 17 $\beta$ -estradiol with daily feeding, water renewal, and removal of dead organisms. The test will continue for 21 days, or until the Topsmelt are 25 mm in length. Every day, a sample of the tank water will be pipetted into a 96-well Enzo Life Science® 17 $\beta$ -estradiol ELISA plate. The plate will be incubated and then be read by an ELISA reader to reveal the concentrations of 17 $\beta$ -estradiol. At the close of the test, animals will be sacrificed. The entire gonads will be removed, stained in hematoxylin and eosin, and analyzed under a compound microscope for any evidence of oocytes within male testes. The liver will be removed from males and females and its VTG concentration will be measured by mass spectrometry. The concentration of VTG will be normalized to the female-to-male ratio of the replicate. NOEC, LOEC, and EC50 will be calculated from results of 17 $\beta$ -estradiol exposure conditions using the results from histology and VTG concentration as endpoints.

**Project Duration:**

Toxicity testing will begin in March 13, 2015 and will last approximately 8 months.

**Deliverables:**

A final report of the findings will be submitted to the LA RWQCB by January 2016.

**Participants:**

EMD Water Biologist Denise Li and EMD Biology Intern Lindsay Almaleh.

**Collaborators:**

Of the City of Los Angeles' Environmental Monitoring Division, Dr. Mas Dojiri and Stanford Asato will oversee the Special Study, Water Biologists Rodeline Estiva, Matthew Jacobe, Rea Crinklaw, and Angelika Moskova will assist, and Steve Bay, Dr. Keith Maruya, Dr. Doris Vidal-Dorsch, and Dr. Alvina Mehinto, of the Southern California Coastal Water Research Project, will provide scientific support.

**Literature Cited:**

Baumann, H., J.A. Rosales Casián, D.O. Conover. (2012). Contrasting latitudinal variations in vertebral number and sex determination in Pacific versus Atlantic silverside fishes. *Copeia*, 2012(2), 341-350.

City of Los Angeles, Environmental Monitoring Division. (2013). 2013 Annual Reporting of Constituents of Emerging Concern. Report submitted to EPA and RWQCB (Los Angeles). Department of Public Works, Bureau of Sanitation, Hyperion Treatment Plant, Playa del Rey, California, 16 pp.

Kishida, M., T.R. Anderson, J.L. Specker. (1992). Induction by  $\beta$ -estradiol of vitellogenin in striped bass (*Morone saxatilis*): Characterization and quantification in plasma and mucus. *General and Comparative Endocrinology*, 88(1), 29-39.

Nash, J.P., D.E. Kime, L.T.M. Van der Ven, P.W. Wester, F. Brion, G. Maack, P. Stahlschmidt-Alfner, C.R. Tyler. (2004). Long-term exposure to environmental concentrations of the pharmaceutical ethynylestradiol causes reproductive failure in fish. *Environmental Health Perspectives*, 112(12), 1725-1733.

Vidal-Dorsch, D.E., S.M. Bay, K. Maruya, S.A. Snyder, R.A. Trenholm, B.J. Vanderford. (2012). Contaminants of emerging concern in municipal wastewater effluents and marine receiving water. *Environmental Toxicology and Chemistry*, 31(12), 2674-2682.

**City of Los Angeles  
Los Angeles Sanitation  
Hyperion Treatment Plant and Terminal Island Water Reclamation Plant**

**Special Study Proposal  
(July 1, 2015 to June 30, 2016)  
Total Nitrogen Method Development for Wastewater, Receiving Water, Biosolids,  
and Sediments**

**Introduction:**

We propose to develop a test method for total nitrogen analysis in wastewater, receiving water, biosolids, ocean sediments and other receiving water sediments because there are projects such as the Southern California Bight Regional Monitoring Program and wastewater treatment plant (WWTP) total nitrogen mass balance studies, which may require total nitrogen data in the near future. We currently have an instrument, Shimadzu Total Organic Carbon (TOC) analyzer equipped with a total nitrogen module and a solid sample module that can be used to conduct total nitrogen analysis. There were initial challenges to achieving this because the existing software for this instrument on the PC cannot be used for this analysis for the solid matrix and new software has not yet been developed by the vendor. However, the total nitrogen method may be developed by making some modifications to the instrument based upon our initial research.

**Objectives:**

The objectives of this special study are two-fold: 1) to determine whether it is possible to use the existing instrument and the accessories to measure total nitrogen in various water matrices and in various solid matrices, and 2) develop a method to produce reliable data.

Total nitrogen data in water matrices are currently determined by calculation – by adding up ammonia-N, nitrate-N, nitrite-N, and organic N data. Also, total nitrogen data in solid matrices present a challenge as the calculation approach is not possible due to the lack of methods for the determination of nitrate-N and nitrite-N in solid samples. A couple of methods that can directly measure total nitrogen in liquid samples are available (Walker; JanBen, 2003); this special study will investigate developing a total nitrogen analysis method for both liquid and solid matrices.

**Benefits:**

The positive outcome of the study will be to have a test method to analyze for total nitrogen in different matrices so that the test can be performed within EMD instead of outsourced such as for total nitrogen mass balance study at WWTP and SCCWRP's future Bight regional monitoring projects. The sediment samples for the total nitrogen analysis for the Bight '13 project were sent to the City of San Diego because EMD could not analyze them.



**Approach:**

1. During the **first quarter**, EMD's Wet Chemistry Unit will contact other laboratories that use this instrument to see how they are able to perform the total nitrogen analysis in different matrices. We will also gather information by a thorough online literature search.
2. During the **second quarter**, we will begin the actual method development based on the information obtained in the first quarter. We will work on the instrument and contact the vendor and the other laboratories when issues arise.
3. During the **third quarter**, if we are able to successfully get the instrument to measure total nitrogen, we will work on a method to get reliable data and may compare data with other laboratories that have tested similar types of samples, in order to determine if the data are reliable.
4. During the **fourth quarter**, we will tabulate the data collected from the third quarter and include it in the final report to be submitted to the Regional Board.

**Project Duration:**

This special study will begin on July of 2015 and is expected to be completed in about one year (July 2015 to June 2016). There is a possibility that this study may be extended beyond one year due to the development of total nitrogen in different matrices.

**Deliverables:**

Three quarterly progress reports and a final report of the findings will be submitted to the LA RWQCB.

**Collaborators:**

The Wet Chemistry Unit of EMD's Conventional Chemistry Section will be spearheading the project with sample collection to be conducted by the Ocean Assessments Unit of the Biology Section.

**Literature Cited:**

Walker, K., Stojowski L., Clifford, R. (Undated) Total Nitrogen Analysis: A New Perspective on TOC. <http://www2.shimadzu.com/apps/appnotes/totalnit.pdf>.

JanBen, Enno. (2003) Determination of Total Phosphorus, Total Nitrogen and Nitrogen Fractions. [https://www.ecn.nl/docs/society/horizontal/hor16\\_nutrient.pdf](https://www.ecn.nl/docs/society/horizontal/hor16_nutrient.pdf).