City of
SACRAMENTO
Department of Utilities

October 20, 2015
(150438:rke)

Ms. Janis Cooke
Water Quality Control Engineer
California Regional Water Quality Control Board
Central Valley Region
11020 Sun Center Drive, Suite 200
Rancho Cordova, CA 95670-6114

Electronic Submission: centralvalleysacramento@waterboards.ca.gov

SUBJECT: CITY OF SACRAMENTO COMBINED SEWER SYSTEM DELTA TMDL PHASE I METHYLMERCURY CONTROL STUDY PROGRESS REPORT

Dear Ms. Cooke:

Attached is an electronic copy of the City of Sacramento (City) Combined Sewer System Delta TMDL Phase I Methylmercury Control Study Progress Report and certification statement. This report has been prepared in accordance with the Phase I Methylmercury Control Study Work Plan, approved by the Central Valley Regional Water Quality Control Board in October 2013, and documents the progress to date on the study.

Please contact Kyle Ericson at 916-808-5390 or me at 916-808-1455 if you have any questions.

Sincerely,

Sherill Huun, P.E.
Supervising Engineer

Enclosure

Copy: Kari Holmes, Regional Water Board (via email)
Bill Busath, City of Sacramento (via email)
Dan Sherry, City of Sacramento (via email)
Kyle Ericson, City of Sacramento (via email)

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City of SACRAMENTO
Department of Utilities

CITY OF SACRAMENTO

COMBINED SEWER SYSTEM DELTA TMDL PHASE 1 METHYLMERCURY CONTROL STUDY PROGRESS REPORT

NPDES PERMIT NO. CA0079111; ORDER NO. R5-2015-0045

CERTIFICATION

In accordance with Title 40, Section 122.22, Paragraphs (a)(3), (b)(1) and (d) of the Code of Federal Regulations

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

_____ Date: 10/16/15

William O. Busath, Director
Department of Utilities
City of Sacramento

City of Sacramento Department of Utilities
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Sacramento, CA 95822

TECHNICAL MEMORANDUM

DATE: October 19, 2015

TO: Sherill Huun, P.E., City of Sacramento
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SUBJECT: **CITY OF SACRAMENTO COMBINED SEWER SYSTEM DELTA TMDL PHASE I METHYLMERCURY CONTROL STUDY PROGRESS REPORT**

This progress report summarizes the activities completed to date to for the City of Sacramento (City) combined sewer system (CSS) Methylmercury Control Study (Control Study). The City is conducting the Control Study to comply with Phase I requirements of the Delta Methylmercury Total Maximum Daily Load (TMDL), and in accordance with Provision VI.C.2.a of its National Pollutant Discharge Elimination System (NPDES) Permit (Order R5-2015-0045).

The City of Sacramento (City) operates a combined sewer system (CSS) that conveys domestic and commercial wastewater and storm water runoff from downtown Sacramento, East Sacramento, and Land Park areas. The system includes four main complexes to manage the combined sewer flows: 1) Sump 1/1A, 2) Sump 2 and 2A, 3) Pioneer Reservoir Treatment Plant (Pioneer), and 4) Combined Wastewater Treatment Plant (CWTP). Up to 60 million gallons per day (MGD) of combined flow is pumped via the Regional Force Main to the Sacramento Regional County Sanitation District's (SRCSD) Sacramento Regional Wastewater Treatment Plant (SRWTP) for secondary treatment prior to discharge to the Sacramento River. During the higher flow events, storage capacity is used up and the treatment plants discharge primary disinfected effluent from Pioneer and/or CWTP. During extreme high flow conditions, discharges of untreated combined wastewater may occur at Sump 2 and 2A and at Sumps 1/1A. The CSS outfall locations are shown in **Figure 1.**

To comply with the Delta Methylmercury TMDL Control Study requirements[1], the City is participating in the Central Valley Clean Water Association (CVCWA) Methylmercury Special Project Group (SPG) as well as performing additional control studies of operational conditions specific to the CSS.

CVCWA COORDINATION

The City is participating in the Methylmercury Control Study Special Project[2] with the CVCWA SPG. The CVCWA Methylmercury Control Study is evaluating planned wastewater treatment changes, possible future changes, and an evaluation of influent conditions to identify feasible and meaningful methylmercury reductions to the Delta. The CVCWA Methylmercury Control Study encompasses all of the municipal wastewater treatment plants with a waste load allocation (WLA) under the existing Delta Methylmercury TMDL Program. The CVCWA Methylmercury SPG is submitting a separate Progress Report to the Central Valley Regional Water Quality Control Board (Regional Board) in October 2015, which includes evaluation of current and future CSS methylmercury loads.

CONTROL STUDY OVERVIEW

The City, in addition to its participation in the CVCWA SPG, developed a Control Study for its own facilities. The City submitted its Control Study Work Plan (Work Plan) on October 17, 2013 and it was approved by the Regional Board Executive Officer on November 7, 2013. The Control Study is designed to evaluate control measures to evaluate compliance with the TMDL WLA, as compliance with the final 2030 WLA may require further reductions of methylmercury in CSS discharges to the Sacramento River. The Control Study focuses on evaluating control measures to reduce methylmercury loading from the CSS by reducing methylation potential from the treatment and conveyance processes, and reducing the discharge volumes to the Sacramento River using a combination of Low Impact Development (LID) strategies and continuing Capital Improvement Plan (CIP) projects. The Control Study results will be used to assess the feasibility of these control measures to achieve TMDL compliance.

The Control Study has two Study Objectives, and four Control Objectives. The control measures are assessed by testing their associated hypotheses. The Control Study approach is summarized in **Table 1**. The four Control Objectives are briefly discussed below.

CSS discharges occur on average between four and five times per year at unpredictable times based on antecedent rainfall amounts, rainfall rates, total rainfall, and drainage catchment response. Discharge periods are limited to three to five hours on average. Despite these more limited opportunities to complete the control study data collection, the City is near completion with the field data collection.

[1] Central Valley Regional Water Quality Control Board. *Methylmercury Control Study Guidance For the Delta Methylmercury Control Program Implementation Phase I.* May 15, 2012

[2] Central Valley Clean Water Association Methylmercury Special Project Group. Methylmercury Control Study Work Plan. April 2013.

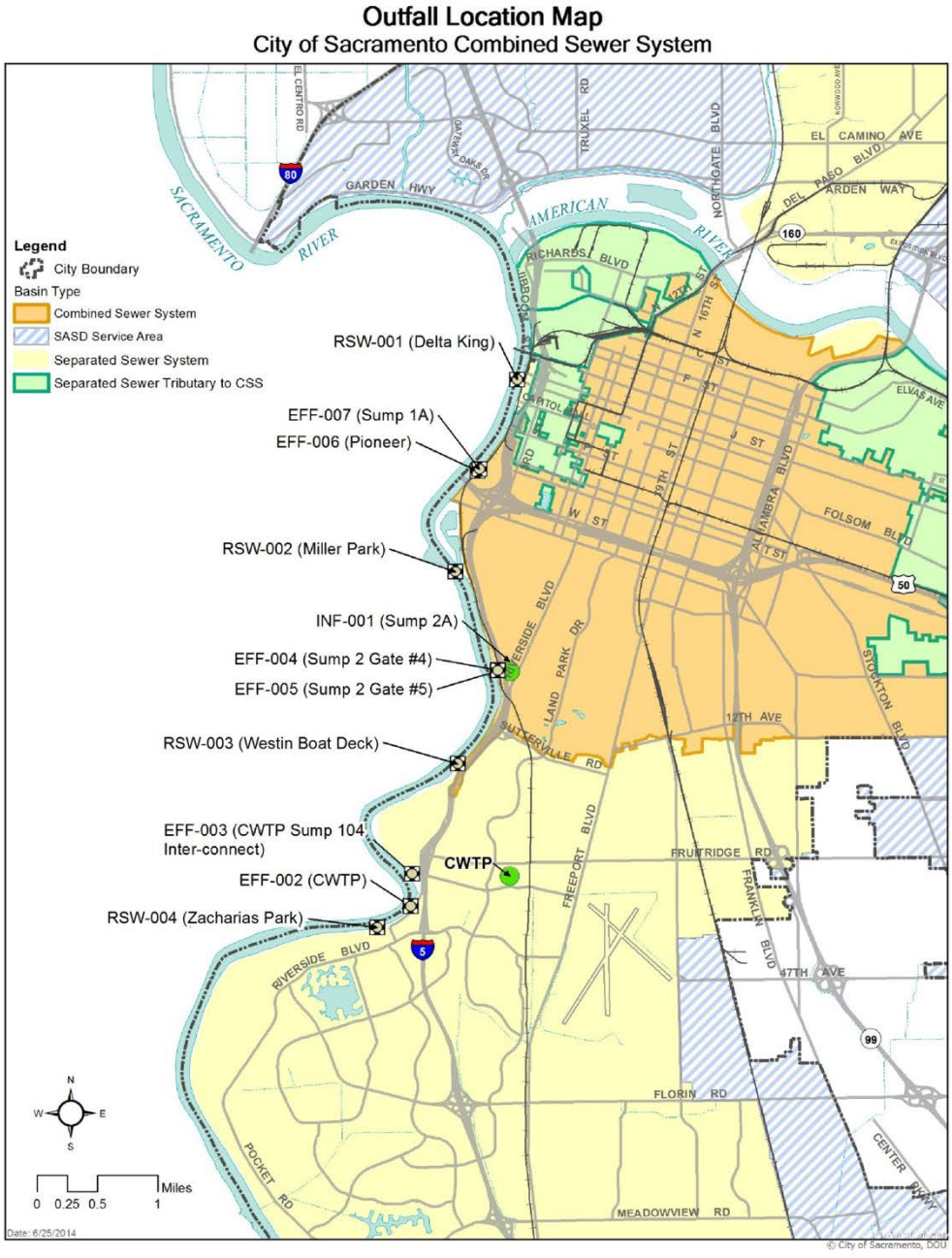

Figure 1. Location of CSS Outfalls

Table 1. Summary of Control Study Objectives, Control Objectives, and Control Measures

Control Objective		Control Measure	Null Hypothesis	Evaluation Method
SO-1: Evaluation of Plant and Conveyance Processes for Potential Methylation				
CO-1: Prevent Methylmercury Production for Existing Treatment Process	→	*CM-1: Evaluate Plant Processes (storage and solids handling process) and Potential for Methylation*	(a) MeHg concentrations between the influent and effluent do not change significantly in the treatment facilities. (b) Solids retention time i.e., the age of solids present) at Pioneer Reservoir and CWTP will not impact MeHg loading in the CSS overflow discharge.	→ Comparison of methylmercury concentrations between influent and effluent. Evaluation of grab sample variability over events to assess whether composite samples are needed. → Bench-scale test to evaluate MeHg production from aged solids
CO-2: Prevent Methylation in Collection System	→	*CM-2: Identify and Evaluate Methylation "Hot Spots" in the Collection System*	There are no significant differences between collection system and treatment facility solids MeHg concentrations	→ Identify and sample potential hot spots in the collection system for comparison with treatment facility MeHg concentrations
SO-2: Stormwater Runoff Reduction for Reducing Overflow Volume and Events for Total and Methylmercury Load Reduction				
CO-3: Stormwater Runoff Reduction	→	*CM-3: Stormwater Runoff Reduction with Low Impact Development (LID) Control Measures*	Implementing LID control measures at a feasible scale to reduce the stormwater inflows will not reduce the frequency and volume of discharges from the CSS.	→ CSS modeling to identify if depression storage associated with the LID projects in the CSS will have an appreciable difference in the volume or frequency of discharges.
CO-4: Wet Weather Flow Mitigation	→	*CM-4: Wet Weather Flow Mitigation with Capital Improvement Plan Projects*	Implementing CIP projects according to the LTCP will not have an appreciable effect on reducing the total load of methylmercury in CSS discharges for a typical climatic year.	→ Incorporate and evaluate scheduled and new CIP projects in the CSS model to identify if they are effective in reducing the volume and frequency of CSS discharges.

Note: SO = Study Objective; CO = Control Objective; CM = Control Measure.

Control Objective CO-1: Optimize Treatment Process and Solids Removal to Prevent Methylation

The retention time of water within the treatment facilities is generally short (several hours), leaving a short period where methylation could occur from the influent point to being discharged

as treated effluent to the Sacramento River. When storm conditions do not allow complete pump down of water to the SRWTP between events, some fraction of the retained volume may have longer detention times in the facility. The current operational procedure for solids removal is based on available storage volume, conveyance capacity of the SRCSD's Regional Force Main, river water elevation, and operator availability. When rainfall events are close together, solids may not be removed and secondary discharge volumes come in contact with the "aged" solids. Control Objective CO-1 evaluates whether the CSS is producing methylmercury within its treatment process. The Pioneer Reservoir and CWTP solids handling processes are evaluated to determine if increasing solids retention time increases effluent methylmercury concentrations, through an evaluation of current solids handling practices in relation to the influent/effluent data and with a bench-scale test. Control Measure CM-1 evaluates the efficacy and feasibility of modifying solids handling practices to prevent methylation.

Control Objective CO-2: Prevent Methylation in Collection System

There is a potential for stagnating water and solids to become anaerobic within the collection system, thereby increasing methylation potential. The City is evaluating potential methylation "hot spots" in its collection system through the use of its Field Services database to identify and sample potential hot spots where low grade areas or known lengths of the system require frequent clean out. Based on an analysis of methylmercury solids concentrations, field operation may adjust field maintenance schedule to accommodate more frequent solid removal at problematic areas to reduce potential methylation.

Control Objective CO-3: Stormwater Runoff Reduction

The City developed a high resolution hydrologic model for the CSS. The model supports an evaluation of the flooding "wet areas" identified in the Long Term Control Plan (LTCP) for prioritizing Capital Improvement Plan projects, and can be used to evaluate changes in discharge volumes between model runs. The City will evaluate whether or not LID control measures and CIP projects within the CSS service area will have an appreciable effect on the frequency and volume of discharges.

The modeling effort will be conducted for a pilot wet area within the CSS. If appreciable volume reduction could be achieved with feasible LID measures, scale-up modeling of the entire CSS could be conducted.

Control Objective CO-4: Wet Weather Flow Mitigation

The City is evaluating the use of scheduled and potentially new CIP projects to assist in reducing the flood potential for the 5-year and 10-year storm. The same computer model also used in CO-4 has the ability to evaluate CIP projects (e.g. rehabilitation projects, off-site storage, pump station retrofits) and its potential impact on discharge volume and frequency.

The implementation of the CIP modeling will assist the City in identifying if scheduled and new CIP projects will reduce the volume and frequency of CSS discharges. By reducing the volume and frequencies of CSS discharges, the City will directly reduce its methylmercury load. The modeling effort will incorporate projects in the entire CSS area.

CONTROL STUDY PROGRESS

The status of Control Study activities is summarized in the following sections. The Methylmercury Control Study Guidance[3] specifies that the progress report "includes Study progress and results to-day [sic] and amended Workplans for any additional studies" needed to address methylmercury reductions.

SO-1: Evaluation of Plant and Conveyance Processes for Potential Methylation

Influent/Effluent Data Evaluation

The City collected samples at the influent and effluent points during discharge events from Pioneer Reservoir and CWTP to evaluate changes in methylmercury concentrations across the treatment processes. The details of the discharge events and sample collection are shown in **Table 2**. Sampling was conducted during selected discharge events in order to assess temporal variability between aliquot samples over the duration of the event, and/or as a flow-weighted composite to compare against one grab sample.

[3] Central Valley Regional Water Quality Control Board. *Methylmercury Control Study Guidance for the Delta Methylmercury Control Program Implementation Phase I*. May 15, 2012. http://www.waterboards.ca.gov/rwqcb5/water_issues/tmdl/central_valley_projects/delta_hg/stakeholder_workgroup_mtgs/hg_controlstudy_15may2012.pdf

Table 2. Details of Discharge Events and Sample Collection during 2013-2015

Event	Date	Discharge Location	Discharge Duration	Volume of Discharge (MG)	# Samples Collected	Sample Type	Duration of Sample Collection	
							Influent	Effluent
13/14 Event 1	2/8-2/9/2014	Pioneer EFF-006	3:15	28.4	5	Composite[a] and Grab	1:15	1:15
13/14 Event 2	2/9/2014	CWTP EFF-002	4:15	23	5	Composite[a] and Grab	1:15	1:15
14/15 Event 1	12/3/2014	CWTP EFF-002	2:00	8	1	Microsample[c]	----	0
		Pioneer EFF-006	4:20[b]	46[b]	5	Microsample[c]	----	3:10
14/15 Event 2	12/11-12/12/2014	Pioneer EFF-006	14:15	193	6	Microsample[d]	12:45	8:55
14/15 Event 3	12/16/2014	Pioneer EFF-006	4:00	25.7	1	Microsample[d]	----	0
14/15 Event 4	2/6/2015	Pioneer EFF-006	3:20	32	2	Microsample[d]	0	0
14/15 Event 5	2/8/2015	Pioneer EFF-006	4:30	58.4	1	Microsample[d]	0	0

[a]The composite consisted of four grab samples, which were flow-weight composited by the laboratory.

[b]Pioneer discharged during two periods on 12/3: 46 MG between 5:55 and 10:20, and 62 MG between 15:15 and 21:30. Control Study samples were taken during the first discharge period.

[c]Two aliquots per micro-sample, spaced over 5 minutes

[d]Four aliquots per micro-sample, spaced over 5 minutes

During both 2013/2014 events, a flow-weighted composite sample was compared to a single grab sample. A field duplicate grab sample was collected to assess sample-to-sample variability. As shown in **Table 3**, there was high variability observed between duplicate grab samples. The relative percent differences (RPDs) ranged from 15% to 110% for methylmercury. The high variability between duplicate samples made a comparison between the composite sample and a single grab sample difficult. As a result, the sample collection strategy was modified for the second year of the Control Study.

The City collected "microsamples" rather than grab samples during 2014/2015 events. Microsamples consisted of multiple aliquots taken of a longer duration (five minutes) that were analyzed as one sample. Microsampling has been shown to have low sample bias and high accuracy in a comparison of stormwater sample collection methods.[4] The microsamples were analyzed as individual samples by the laboratory to assess methylmercury variability over the duration of an event, and a field duplicate microsample was analyzed to assess whether microsampling reduced the sample-to-sample variability. As shown in **Table 3**, the variability between duplicate microsamples was lower compared to the grab samples. The microsample RPDs ranged from 3.1% to 23% for methylmercury.

[4] SCCWRP, 2009 Annual Report. Evaluating stormwater sampling approaches using a dynamic watershed model. http://ftp.sccwrp.org/pub/download/DOCUMENTS/AnnualReports/2009AnnualReport/AR09_195_210.pdf

One event during 2014/2015 was targeted for more intensive sample collection to assess variability over the duration of the event. The December 11, 2014 storm was targeted because over an inch of rainfall was predicted. For that event, six microsamples were collected from the influent, spanning a 12 hour period prior to and during discharge. Five effluent microsamples were collected over a ten hour span during the 16 hour discharge. Methylmercury concentrations during that event are shown in **Figure 2**. The concentrations were highest at the beginning of the event, and decreased over the duration of the discharge, suggesting that methylmercury concentrations may vary temporally within a single event. Use of a single sample could, therefore, introduce quantitative bias in calculation of discharged loads or changes in concentration between influent and effluent.

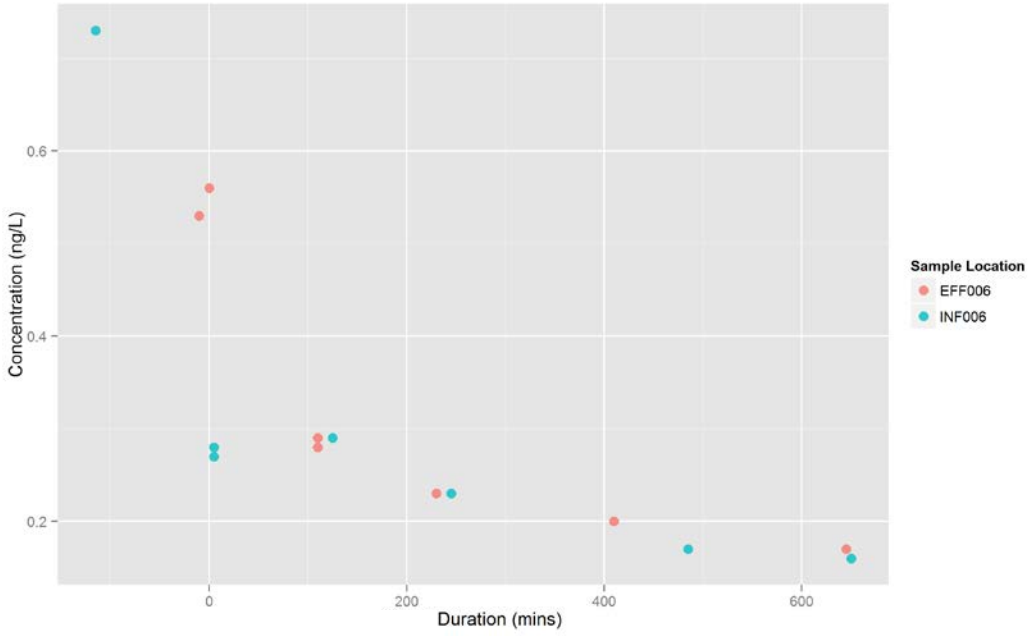

Figure 2. Methylmercury concentrations over the discharge duration of 2014/15 Discharge Event 2 (12/11/14-12/12-14)

Table 3. 2013-2015 Control Study Data

Event	Date	Site/Sample	Time Sampled	Mercury (ug/L)	Methylmercury (ng/L)	Sulfate (as SO4) (mg/L)	TOC (mg/L)
13/14 Event 1	2/8/2014	INF-006	21:50	0.14	0.47	4.2	12
		INF-006 FD	21:50	0.065	0.35	4.4	----------
		RPD		37%	15%	2%	----------
		INF-006 Composite[1]	23:10	----------	0.26	----------	----------
		EFF-006	22:00	0.085	0.67	18	16
		EFF-006 FD	22:00	0.04	0.26	18	----------
		RPD		36%	44%	0%	----------
		EFF-006 Composite[1]	23:15	----------	0.29	----------	----------
13/14 Event 2	2/9/2014	INF-002	10:40	0.059	0.18	4.5	9.9
		INF-002 FD	10:40	0.045	0.3	25	----------
		RPD		27%	50%	139%	----------
		INF-002 Composite	12:15	----------	0.11	----------	----------
		EFF-002	10:45	0.037	0.55	26	11
		EFF-002 FD	10:45	0.055	0.16	4.6	----------
		RPD		39%	110%	140%	----------
		EFF-002 Composite	12:10	----------	0.27	----------	----------
14/15 Event 1	12/3/14	EFF-002	6:35	0.048	0.41	----------	----------
		EFF-002 FB	6:45	ND	ND	ND	
		EFF-006 Grab	07:30	0.082	----------	21	9.8
		EFF-006 Microsample 1	07:30	----------	0.41	----------	----------
		EFF-006 Microsample 2	08:30	----------	0.32	----------	----------
		EFF-006 Grab	08:30	----------	0.33	----------	----------
		RPD			3.1%		
		EFF-006 Microsample 3	09:45	----------	0.29	----------	----------
		EFF-006 FB	08:30	ND	ND	ND	----------
14/15 Event 2	12/11/14	INF-006	14:15	0.044	----------	5.9	9.3
		INF-006 FD	14:15	0.043	----------	5.9	----------
		RPD		2.3%		0%	
		INF-006 Microsample 1	12:05	----------	0.73	----------	----------
		INF-006 Microsample 2	14:05	----------	0.28	----------	----------
		INF-006 Microsample 2 FD	14:05	----------	0.27	----------	----------
		RPD			3.6%		
		INF-006 Microsample 3	16:05	----------	0.29	----------	----------
		INF-006 Microsample 4	18:05	----------	0.23	----------	----------

Event	Date	Site/Sample	Time Sampled	Mercury (ug/L)	Methylmercury (ng/L)	Sulfate (as SO4) (mg/L)	TOC (mg/L)
14/15 Event 2		INF-006 Microsample 5	21:05	----------	0.17	----------	----------
	12/12/14	INF-006 Microsample 6	0:50	----------	0.16	----------	----------
	12/11/14	EFF-006	13:55	0.06	----------	13	16
		EFF-006 FD	13:55	0.06	----------	13	
		RPD		0%		0%	
		EFF-006 Microsample 1	13:50	----------	0.53	----------	----------
		EFF-006 Microsample 2	15:50	----------	0.28	----------	----------
		EFF-006 Microsample 2 FD	15:50	----------	0.29	----------	----------
		EFF-006 Microsample 3	17:50	----------	0.23	----------	----------
		RPD			23%		
		EFF-006 Microsample 4	20:50	----------	0.20	----------	----------
	12/12/14	EFF-006 Microsample 5	0:45	----------	0.17	----------	----------
14/15 Event 3	12/16/15	EFF-006	23:50	0.046	0.29	----------	----------
14/15 Event 4	2/6/15	INF-006	21:05		0.28	----------	----------
		EFF-006	21:20	0.045	0.59	----------	----------
		EFF-006 FD	21:20	0.071	0.51	----------	----------
		RPD		45%	15%		
14/15 Event 5	2/8/15	INF-006	14:10	----------	0.29	----------	----------
		EFF-006	14:20	0.056	0.35	----------	----------

Notes:

FB = Field Blank

FD = Field Duplicate

RPD = Relative Percent Difference

ND = Result below the detection limit

Bench Test

For the bench-scale test, the City is collecting solid samples at CWTP over three events before July 2016. Influent water is collected during a storm event that substantially fills the CWTP storage basin, and solids samples are collected following the event. To simulate a typical event, the laboratory applies influent water to the solids, and samples the water at three intervals over the course of 50 hours, as described in **Table 4**. The objective is to determine if prolonged solids storage times in the treatment plant could cause methylation.

Table 4. Solids Handling Evaluation Bench Test Sample List

Sample No.	Bench Test Collection Frequency	Analysis Matrix
0	At test set-up, prior to application of effluent water	Wetted solids
1	Two hours after test set-up and application of effluent water	Decant effluent
2	26 hours after test set-up and application of effluent water	Decant effluent
3	50 hours after test set-up and application of effluent water	Decant effluent

The City has completed two events. Sampling for the first event was conducted on May 8, 2013. The second event was completed on April 8, 2015. For both events, solids were collected across all three storage basins at CWTP and composited in the laboratory. The first event was conducted during Work Plan development. Following the first event, the wetted solids analyses were added as a Work Plan component for future bench test.

Bench test results for the first event are shown in **Figure 3**, and results from the second event are shown in **Figure 4**. Total mercury levels varied between the two events, with concentrations an order of magnitude lower in the first event than during the second.

Concentrations of dissolved organic carbon and sulfate remained relatively constant over the test duration of both bench tests. These ancillary parameters were measured because sulfate can stimulate methylmercury production by sulfate-reducing bacteria under anaerobic conditions. Dissolved organic carbon can potentially impact the bioavailability of total mercury for methylation. Dissolved oxygen levels decreased during the second bench test, but conditions remained aerobic (> 1 mg/L). Dissolved oxygen was not measured during the first bench test.

Total mercury concentrations were relatively stable during the first bench test. In the second test, the total mercury concentration was initially an order of magnitude higher, but decreased by the second day of the test. Methylmercury concentrations increased over the duration of the first test, but showed a small decrease between the first and second days of the second test.

A third bench test will be conducted during the 2015/2016 storm season. The results from all three bench tests will be evaluated together to assess whether prolonged solids storage times increase methylation.

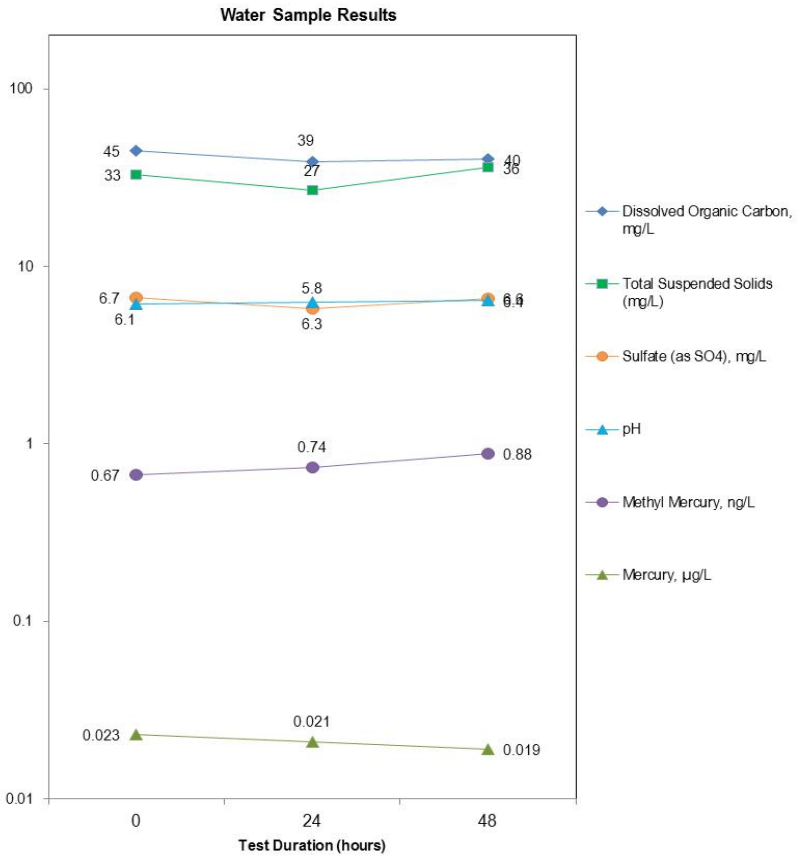

Figure 3. Bench Test Results, May 2013

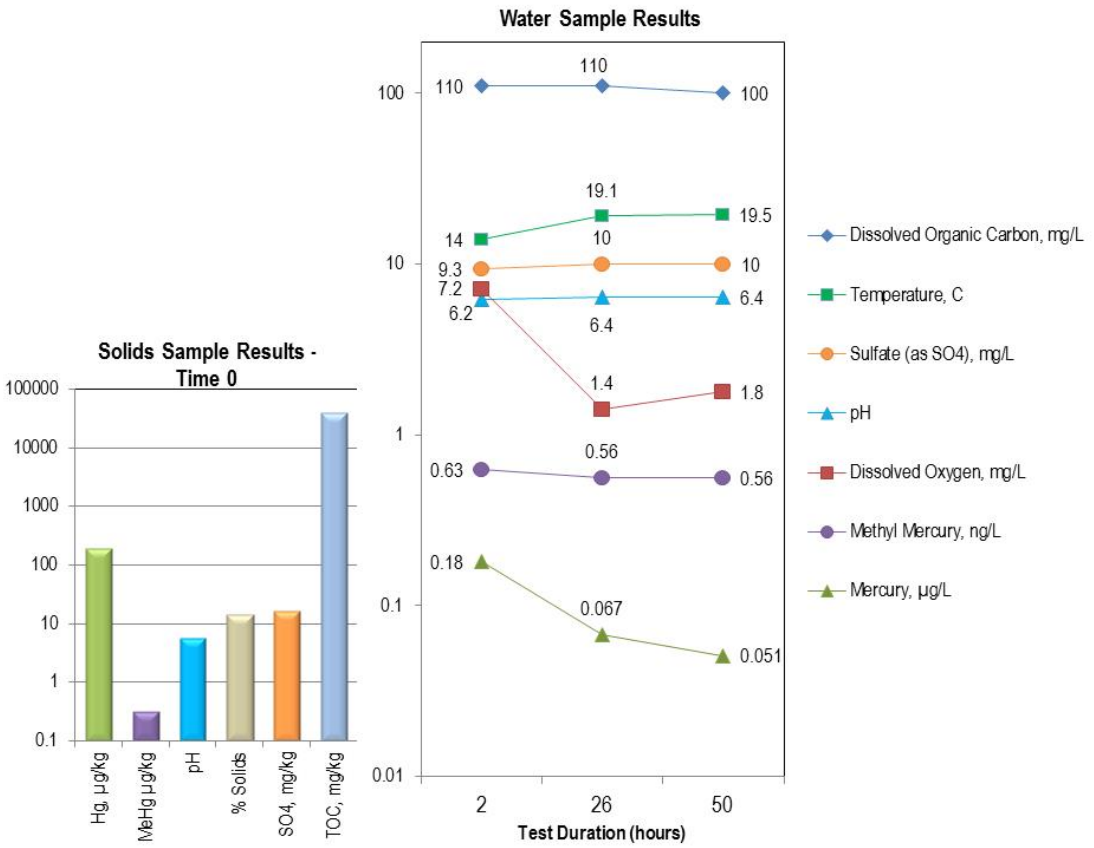

Figure 4. Bench Test Results, April 2015

Collection System Evaluation

The City is evaluating potential methylation hot spots in its collection system through the use of its Field Services database to identify and sample potential hot spots where low grade areas or known lengths of the system require frequent clean out. The City is working to identify potential locations to conduct sampling where sediments accumulate. Evaluation of potential sampling sites include the size of tributary area and the land use types that contribute flow to each location. Collection system sampling will occur before September 2016.

Stormwater Runoff Reduction for Reducing Overflow Volume and Events for Total and Methylmercury Load Reduction (SO-2)

The second study objective is to determine whether decreasing wet weather flows to the CSS using a combination of Low Impact Development (LID) strategies and Capital Improvement Plan (CIP) projects identified in the Long Term Control Plan (LTCP) will result in reductions of overflow discharge volume, therefore reducing methylmercury loads to the Sacramento River. Study Objective SO-2 will be accomplished using modeling of the CSS to identify if LID (through Control Objective CO-3) or CIP projects (through Control Objective CO-4) will have any appreciable effect on reducing overflow volumes or events. In August 2014, the City completed an updated CSS Improvement Plan (CSSIP). The CSSIP includes the incorporation of LID and other green infrastructure improvements to reduce street flooding. The initial modeling

of these techniques shows positive results, and the CSSIP proposes pilot studies to assess how to best integrate green infrastructure in the City's CSS system.

The Permit requires an update to the LTCP by June 1, 2018. The City submitted the LTCP Update Work Plan and Schedule with the 2013 Report of Waste Discharge. Modeling of LID and scheduled and new CIP projects will be conducted during the LTCP Update.

NEXT STEPS

The City will continue to implement the Work Plan to collect the remaining data necessary to evaluate the Control Study hypotheses. The following actions will be completed in the near-term to continue evaluating the Control Study objectives:

CO-1: Optimize Treatment Process and Solids Removal to Prevent Methylation

- The City will continue to evaluate the variability of methylmercury concentrations over the duration of discharge events. The City will target at least two additional events for collecting four to five microsamples of influent and effluent over the duration of an event. Major storm events (where greater than 0.75 inches are predicted) will be targeted.
- When sufficient data have been collected, the City will evaluate the sampling strategy for future events to determine whether composite samples are necessary to characterize influent and/or effluent methylmercury concentrations.
- The influent and effluent samples from an event will be used to compare paired influent-effluent samples using the Wilcoxon rank-sum test to evaluate the hypothesis (a) for CO-1, that MeHg concentrations between the influent and effluent do not change significantly in the treatment facilities.
- To the extent possible, the City will evaluate current solids handling practices in relation to the influent/effluent data.
- The bench test will be conducted once more during the 2015-2016 monitoring season. One storm event will be targeted during the early storm season, prior to December 15, 2015, but may be completed later in the season depending on rainfall conditions.
- The City will evaluate whether modifications to solids handling procedures can achieve compliance with the WLA.

CO-2: Prevent Methylation in Collection System

- The City will collect solids samples from potential hot spots within the collection system for analysis of total and methylmercury concentrations, for comparison to concentrations from solids samples that were previously collected at the treatment facilities. Based on the results of this evaluation, the City will evaluate whether procedural and operation changes may be implemented in an effort to prevent methylation within the collection system.

CO-3: Stormwater Runoff Reduction

- The City will apply its CSS model to evaluate several different LID control measures. The City will evaluate the null hypothesis for CO-3, that implementing LID control measures at a feasible scale to reduce the stormwater inflows will not reduce the frequency and volume of discharges from the CSS.

- Based on these results, the City may plan to include these LID control measures in the LTCP for Capital Improvement projects within the CSS service area.

CO-4: Wet Weather Flow Mitigation

- Scheduled and new CIP projects according to City's LTCP will be incorporated and evaluated in the CSS model to identify if they are effective in reducing the volume and frequency of CSS discharges. The City will evaluate the null hypothesis for CO-4, that implementing CIP projects according to the LTCP will not have an appreciable effect on reducing the total load of methylmercury in CSS discharges for a typical climatic year.

Additional Actions

- Participate in Delta Regional Monitoring Program methylmercury activities and track development of the statewide mercury control program and fish tissue objectives.
- Coordinate with CVCWA to evaluate implementation and compliance programs, including open water modeling and mercury offsets/trading programs.
- Prepare an evaluation of the overall feasibility of complying with the WLA.

SCHEDULE

The schedule for completing the Control Study is included below.

Activity	Completion Date
Conduct additional solids bench test	June 1, 2016
Conduct solids sampling within the collection system	September 1, 2016
Continue conducting influent/effluent microsampling	September 1, 2017
Prepare progress report for SO-1, summarizing the evaluation of bench test results, collection system solids results, and influent/effluent results	October 1, 2017
Complete modeling of LID and CIP projects for incorporation into LTCP	June 1, 2018
Submit updated LTCP to the Regional Board	June 1, 2018
Evaluate modeling results to test hypotheses for CM-3 and CM-4	August 1, 2018
Track implementation of the Delta Regional Monitoring Program ambient mercury monitoring and development of the statewide mercury control program and fish tissue objectives	October 20, 2018
Coordinate with CVCWA to evaluate implementation and compliance programs, including open water modeling, mercury offsets/trading programs.	October 20, 2018
Final Phase 1 Feasibility Report	October 20, 2018