WATER DEPARTMENT
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Constituents of Emerging Concern, August 2016 Report

INTRODUCTION

The mission of the City of Santa Cruz Water Department is to ensure public health and safety by providing a clean, safe, and reliable supply of water. We are passionate about providing our community with high-quality drinking water and consistently meet all regulated state and federal standards. In addition to complying with all required standards, we have begun voluntarily testing for unregulated constituents known as "constituents of emerging concern", or "CECs." This report provides results from our initial round of testing for CECs.

CECs typically result from pharmaceuticals, personal care products and insect repellant that enter water sources through runoff or wastewater system discharges. Some are known or suspected to be potentially endocrine-disrupting. Endocrine disruptors are chemicals that may interfere with the body's endocrine (or hormone) system, and may produce adverse developmental, reproductive, neurological, and immune effects in both humans and in wildlife. As you will see in the attached report, the levels of CECs we found in our recent water testing are not alarming. Most are at levels equivalent to a drop of water in three Olympic-size swimming pools. That said, results from the tests help inform our planning for future water treatment.

We know that when the public turns on their tap they want to feel comfortable that their water is safe. They want to know that we're doing all we can to protect their water at its source. They want to know that the treatment their water has received protects them from anything potentially harmful. They want to know that the infrastructure their water is delivered through is maintained, reliable and secure. This report identifies CECs that we found in recent, voluntary testing of unregulated constituents.

Results of the Santa Cruz Water Department
Initial Testing for Constituents of Emerging Concern[1]

In the fall of 2015, the Santa Cruz Water Department initiated new testing for the system's source water and treated water to begin to create a better understanding of the water quality characteristics of our community's source waters. This new testing includes looking at what trace levels of Constituents of Emerging Concern (CECs) might be finding their way into our community's drinking water supplies. This voluntary testing regime was undertaken largely to help inform planning for upcoming major investments in drinking water treatment that are necessary to address aging infrastructure at the Graham Hill Water Treatment Plant.

Santa Cruz's Water Supply

The drinking water for the City of Santa Cruz comes primarily from local watersheds which include coastal streams north of the city and the San Lorenzo River. The Water Department diverts water from rivers or streams (flowing sources) and sends it to water treatment facilities for processing and delivery to customers, or stores water available during the rainy season in Loch Lomond Reservoir for treatment and delivery to customers during the dry season. Protecting public health and providing a safe and reliable supply of water to our customers is job #1 for the Santa Cruz Water Department. Drinking water produced and delivered by the Santa Cruz Water Department complies with all current state and federal drinking water regulations; a source of professional pride and personal satisfaction for the dozens of water utility employees who work every day to make this statement true.

Like other water utilities, the Santa Cruz Water Department uses a tried and true strategy called a multi-barrier approach to protecting water quality and ensuring that we produce a high quality product. The first barrier is source water protection, the second is effective water treatment – which also includes multiple barriers, and the third is careful management of the treated water delivery system that keeps water quality from degrading as it moves from the treatment plant to the customer's tap.

To provide context for the discussion about CECs covered later in this paper, a brief discussion of each of the multiple barriers follows:

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[1]Constituents of emerging concern (CECs) is a term used to include a broad range of unregulated chemical components found at trace levels in many of our water supplies, including surface water, drinking water, wastewater, and recycled water. Other terms include "emerging constituents," "endocrine disrupting chemicals," or "pharmaceuticals and personal care products." From National Water Research Institute: http://www.nwri-usa.org/CECs.htm

Barrier #1 – Source Water Protection

Source water assessments and active watershed management are the key elements of any effective source water protection program. On an ongoing basis the Department keeps tabs on what's going on in the watersheds from which it draws water, and every three years the Department conducts a thorough sanitary survey of the watersheds from which our community's drinking water is drawn. These efforts keep Department staff aware of changes in activities or circumstances occurring in the watershed that may be sources of contaminants: either from natural conditions such as erosion that increases sediment loading in the source water, or human-caused sources such as agricultural run-off that may introduce fertilizers, herbicides, or pesticides into the water supply sources.

Barrier #2 – Water Treatment

Utilities using surface water sources (rivers, streams, lakes) are required by state and federal regulations to provide significant levels of water treatment, typically through a facility like the Department's Graham Hill Water Treatment Plant. The water treatment process is designed to specifically address the character of the water source feeding the treatment plant, for example the levels and types of microbes typically present in surface water sources, and to produce drinking water that protects public health and looks, smells, and tastes good.

Barrier #3 – Distribution System Management

Over the last 20 years, water utility managers have become increasingly sensitized to the need to operate their water distribution systems in a manner that recognizes that, in effect, water is a perishable product that can't just be sent out into the distribution system and left to languish. Water sitting in distribution storage tanks or dead-end water mains will eventually become more susceptible to microbial growth. Microbial contaminants can produce water borne disease outbreaks, an obvious public health threat. In addition, water that is subject to long residence times in distribution storage tanks or parts of the distribution system that has demand may have higher levels of disinfection byproducts, which are formed by the interaction of a disinfectant such as chlorine and naturally occurring organic carbon found in many surface water sources. Like microbial contaminants in distribution systems, disinfection byproducts are the subject of state and federal drinking water regulations.

Good management of a distribution system limits these potential threats to public health, but isn't as easy to achieve as it might seem. Distribution storage tanks and standpipes that are located throughout the distribution system are designed to hold a lot of water – much more

than is needed to meet customer demand – because a lot of water is needed to support fire-fighting, should it become necessary. Balancing the need for fire flows with drinking water quality requires system operators to conscientiously cycle tanks, ensure that dead-end mains are flushed, and match treatment plant production to water system demands in a much more sophisticated manner than ever before.

Ability to Test for Trace Amounts of CECs-What New Technology Enables Us to Discover in Public Drinking Water Supplies

The age of advanced technology has given humans the ability to view the world (and the universe, too) in new ways that would have been unfathomable only a relatively few years ago. By reading the newspaper or following news content online, we know that we have the technology now to do everything from discovering earth-like planets in star systems in far-away galaxies to being able to detect one drop of a compound of interest (1 drop = 0.00005 liter) in 50 million liters, which is equivalent to the volume of 15 Olympic sized swimming pools[2] (if the compound of interest is found at the level of 1 drop in 50 million liters, its concentration is described as 1 part per trillion or 1 nanogram per liter).

The first two elements of the multi-barrier approach described earlier makes a good framework for summarizing the results of the CEC testing that the Department has completed to date because, if present, CECs will enter the drinking water supply from the source water and the treatment provided will either effectively address them or it won't due to treatment process limitations.

The Department conducted testing for 96 different constituents, as listed in Attachment2. Most of them (76) were never detected in the source water, and the remainder were occasionally detected at very low levels. The data table for the available results is included as Attachment 1 to this document. All results are presented in nanograms per liter (1 nanogram per liter = 1 particle in a trillion particles). A cell with no entry means that that constituent was not detected in that sample. Only detected CECs are listed in Attachment 1.

[2] For source see slide 7 of Dr. Shane Snyder's presentation on Safe and Sustainable Water Reuse at http://www.lottcleanwater.org/pdf/symposiumsnyder.pdf

Source Water Protection

Relatively few of the nation's thousands of drinking water utilities have the benefit of drawing water from fully protected sources. Most utilities do what Santa Cruz has done and strategically purchase lands around critical facilities such as reservoirs and upstream of river intakes, and establish robust treatment systems to inactivate or remove microbes and naturally occurring or man-made chemicals. Not having a pristine source, however, does suggest the need to carefully monitor source water quality and take what source water protection steps can be taken to ensure a consistent and high quality source of water is provided to the water treatment plant.

Routine sanitary surveys of Santa Cruz's North Coast supplies indicate relatively low levels of development and natural or human-caused activities that could introduce contaminants into those sources of supply. On the other hand, however, the San Lorenzo River watershed has a long history of development – both for residential use, various kinds of recreational uses such as equestrian facilities, and for resource extraction uses such as timber harvesting, and sand, gravel, limestone, and granite quarrying.

While not a pristine watershed, the Department's many years of sanitary survey data for the San Lorenzo's watershed as well as water quality from the San Lorenzo source show that for the traditional issues of concern (e.g., bacteria, parasites, nitrates and sediments) the condition of the watershed and the quality of the source water are good, and generally stable or improving. Since the 1980's the County has been implementing a program to monitor and upgrade the septic systems in the watershed.

The CEC Sampling Program and Results

Beginning in the fall of 2015 and on a quarterly basis thereafter, untreated water samples were collected at the Coast Pump Station for a composite of the Department's North Coast sources, San Lorenzo River at both the Tait Street and Felton Diversions, and at Loch Lomond. Treated water samples were collected from water leaving the Graham Hill Water Treatment Plan, and in one case, an untreated water sample was taken of blended source waters just before they entered the Graham Hill Water Treatment Plant. Two other "event" related samples were collected and analyzed as well. One captured what is known as the "first flush," which typically happens as the weather transitions from dry to wet sometime in the October to December time frame. The second event sample was collected in April to represent a high, stable flow in the San Lorenzo River.

All samples were prepared for shipping and sent for processing to Eurofins/Eaton Analytical lab for processing. Attachment 2 provides a list of all the CECs for which testing was completed and the method reporting limit (MRL) for each.

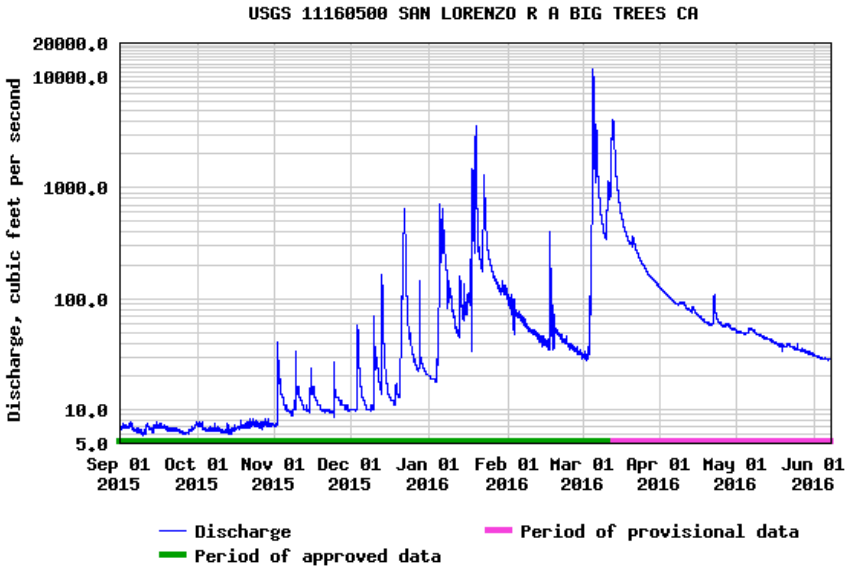
- ***Source Water CEC Results***

The source of CECs found in water supplies is invariably linked to human activity. For example, pharmaceuticals, personal care products, and insect repellant are all used by humans and end up in wastewater streams through human excretion or through being washed off during showering or recreational bathing in streams that are used as drinking water sources.
In Santa Cruz's case, the major sources of wastewater-related effluent which has the potential to reach the San Lorenzo River source is septic systems and the leach-fields associated with two small wastewater treatment plants in the Boulder Creek area. Prior to 1986, failing or improperly functioning septic systems in the mid and upper San Lorenzo basin were a significant source of nitrates reaching the river, and nitrates can be a significant threat to drinking water quality. In 1986, Santa Cruz County initiated a program to work with property owners to reduce the occurrence of failing septic systems as well as instituting new requirements for the construction and performance of new and existing septic systems.

The most common CECs detected in Santa Cruz untreated water source sampling are two types of artificial sweeteners, Sucralose (Splenda) and Acesulfame-K, (Sunett and Sweet One). These compounds were identified in most of the San Lorenzo River untreated water samples and are shown in **Blue type** in the sampling results provided in Attachment 1.

The most diverse set of CECs were found in the first flush samples from the San Lorenzo River collected on November 2, 2015. The first flush sample was drawn to reflect the influence of the first significant rain fall of the season on river flows and is intended to capture the impacts on water quality of both surface run-off and the rewetting of the streambed. Figure 1 is a hydrograph produced from data from the USGS Big Trees gauge that documents the transition of the river from a very low base flow during the late summer and early fall to a more typical rainy season flow pattern.

Figure 1 – USGS San Lorenzo Big Trees Gauge Results September 1, 2015 to June 7, 2016



Of the 20 CECs identified during the first year of sampling, 9 were only found in the first flush sample. The results table included as Attachment 1 shows these compounds and their sampling results in **Green type**. Included in this group are over-the-counter pain relievers, caffeine, two preservatives used in personal care products, one herbicide, one of the two medical imaging chemicals identified (the kind used in some x-ray testing), bisphenol A, and a prescription cholesterol drug.

The remaining compounds identified are shown in Attachment 1 in **Black type**, include DEET (a well-known insect repellant), a compound used in shampoos and soaps, two herbicides, an organic chemical used in the manufacture of dyes, some pharmaceuticals and vitamin B3, a second medical imaging chemical, pharmaceuticals to treat heart conditions and respiratory conditions such as asthma, and an antibiotic used to treat bacterial infections. These CECs were typically found more intermittently in the samples collected and also were found at lower levels than the artificial sweeteners.

Samples collected during drier months contained far fewer CECs than those collected during wetter periods. This result makes sense because the source of CECs entering the San Lorenzo supply is either surface water run-off or septic system effluent reaching the river through saturated underground water flow - both of which are less prevalent during the dry season than they are during wet periods.

Water Treatment

Drinking water quality is highly regulated by state and federal agencies and over time new regulations have been issued to address a broad range of water quality issues. Similarly, drinking water treatment technology has also evolved over time, but because a water treatment plant is typically a water utility's most expensive and least adaptable fixed asset, many utilities are using treatment processes and facilities designed to meet water quality conditions that were identified and well understood at the time the plant was designed and constructed.

The cost and complexity of water treatment facilities and processes often results in a kind of leap-frog effect, where new treatment processes or facilities are implemented in response to current knowledge, with somewhat murky assumptions about likely treatment needs for the next 20 years. Over those 20 years, new information about water quality issues emerges, and existing treatment facilities may or may not effectively address them. If existing treatment does not effectively address the issue, addressing the issue becomes an input to the next water treatment investment cycle. Drinking water treatment in Santa Cruz is among the key infrastructure issues to be addressed in the coming decade, which makes testing for CECs now particularly relevant.

- ***Treated Water CEC Results***

Treated water samples were collected as grab samples essentially at the same time as treatment plant influent water samples were collected. If the goal is to analyze the impact of water treatment on the CECs identified (if any) in the untreated water inflow to the Graham Hill Water Treatment plant, grab samples of treatment plant inflow and outflow collected at the same time won't effectively support that analysis because it doesn't take into account the approximately 8 hours of travel time between water reaching the plant and that same water emerging from treatment, ready to be delivered to customers.

As a refinement to the future sampling methodology for treated water, the treated water sample will be collected at a time that will allow for more refined analysis of the degree to which current treatment is effective in addressing CECs.

Even with this sampling limitation in mind, when compared to untreated water samples, treated water samples indicated that the current treatment process has at least some potential to eliminate or reduce the level of some CECs. In particular, the existing water treatment

process shows a reduction or, in some cases, an elimination of artificial sweeteners, DEET, and herbicides.

The results also indicate that some CECs may be less affected by current treatment. These include Atenolol (a pharmaceutical to treat heart conditions) and Iohexal (one of the two medical imaging contrasting agents found). Future testing using the revised sampling protocol will shed further light on the degree to which these or other CECs persist through the current treatment process.

With respect to the first flush sample results, only untreated water samples were evaluated for this condition. The Department typically avoids taking water from the San Lorenzo flowing sources (Felton Diversion and Tait Wells) during first flush events because of concerns about the quality of source water during the first flush and the ability of the current treatment processes to treat this water to required standards. The analytical results of this initial study, while focused only on CECs and not on the full suite of regulated constituents in drinking water, certainly support that there are reasons to be mindful about the quality of water during and immediately after first flush events.

Discussion of Results

What does the presence of CECs in our community's source water and, in some cases, in our treated drinking water mean? The potential health and environmental effects for some of the CECs identified are not known, but many of those identified so far are food products or medicines which typically receive extensive testing prior to being approved for human consumption.

As an example to provide context, caffeine is a well-known stimulant that has been used by humans and evaluated for positive and negative impacts on human health in a variety of studies over the last several hundred years. The one water sample collected which tested positive for caffeine showed a value of 270 nanograms per liter (1 liter equals approximately 34 ounces). The Center for Science in the Public Interest's Caffeine Chart (see: https://cspinet.org/caffeine-chart) would place caffeine consumption from 32 ounces of Starbucks Coffee at 660 milligrams. A milligram per liter is one part per million, while a nanogram per liter is one part per trillion. So 660 milligrams is about 2.4 million times as much caffeine as the amount that was identified in the one first flush sample that tested positive for this constituent.

Definitive data on the human or environmental health of CECs is not available at this time, but the very fact that water utilities, including the Santa Cruz Water Department, are looking for and incorporating results of testing for these compounds into its planning demonstrates a strong commitment to providing a high quality source of drinking water to their customers. Resources available from the federal Environmental Protection Agency and the California Water Resources Control Board offer some insights about the needs for data collection on occurrence and work that needs to be done to further understand both the potential for impacts to aquatic ecosystems and human health from exposure through treated drinking water. And in California, the potential for highly purified reclaimed wastewater to become a greater part of California's water supply makes the presence and treatment of CECs in wastewater streams a clear focus of research and potential rule-making.

Another resource is the Minnesota Department of Health (MDH), which appears to have in place a robust program focused on CECs.[3] In 2014, MDH published an informative poster describing the work they were doing on exposure assessments for CECs, including a discussion of the relative source contribution from water for a selected group of CECs. This poster is available for review.[4] Another example of the resources available from the MDH is its Information Sheets on various CECs.[5] The Information Sheets on bisphenol A[6] provides some information relevant to the one positive sample, at 14 parts per trillion, for Bisphenol A found in the first flush sample of water collected at Felton Diversion on November 11, 2015.

In response to the question of, "what is the MDH guidance value for BPA in drinking water," the MDH Information Sheets states,

> "based on the best available data, MDH developed a guidance value of 20 ppb. A person drinking water at or below these levels would have little or no risk of any health effects from BPA."

Twenty ppb is roughly 1,000 times the level of bisphenol A found in the one San Lorenzo River sample where this compound was found.[7]

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[3] See: http://www.health.state.mn.us/divs/eh/risk/guidance/dwec/index.html.
[4] See: http://www.health.state.mn.us/divs/eh/risk/guidance/dwec/cecpostsra.pdf.

[5] See: http://www.health.state.mn.us/divs/eh/risk/guidance/dwec/chemunderrev.html#info).
[6] See http://www.health.state.mn.us/divs/eh/risk/guidance/dwec/acetamininfo.pdf)
[7] See also the MDPH Information Sheet on DEET at
http://www.health.state.mn.us/divs/eh/risk/guidance/gw/deetinfo.pdf

Next Steps

The Santa Cruz Water Department will continue to sample its water sources and work with regulatory agencies and the water industry to get a better understanding of the real and potential significance of CECs on human health. The sampling program will evolve as more is learned about how hydrologic conditions and watershed activities may influence the presence of low levels of CECs in the City's sources of drinking water. Data from the planned analyses will be made available on at least an annual basis and will be added to the information provided in this initial report.

ATTACHMENT 1

CITY OF SANTA CRUZ WATER DEPARTMENT

2015 - 2016 Constituents of Emerging Concerns Sampling Results

All Results in nanograms per Liter (1 part per trillion = 0.000000001 gram per Liter)
Results reflect only detected compounds -- analysis included testing for 96 Constituents of Emerging Concern

Sampling Dates		9/01/15: 1st quarter					11/02/15 First Flush		12/15/15: 2nd quarter					3/01/16: 3rd quarter					4/07/16: High steady flow					6/07/16: 4th quarter					
Sampling Locations (Note: Not all sampling locations were included in every sample collection)		GHWTP (treated water)	SLR @Felton	SLR @Tait	North Coast Composite	Loch Lomond	SLR @Felton	SLR @Tait	GHWTP (treated water)	SLR @Felton	SLR @Tait	North Coast Composite	Loch Lomond	GHWTP (treated water)	SLR @Felton	SLR @Tait	North Coast Composite	Loch Lomond	GHWTP (treated water)	SLR @Felton	SLR @Tait	North Coast Composite	Loch Lomond	GHWTP (treated water)	SLR @Felton	SLR @Tait	North Coast Composite	Loch Lomond	Raw Blend (treatment plant influent)
Chemical Type or Use with Common Name if Applicable	**Detected Analytes**																												
Herbicide	2,4-D						28																						
Artificial sweetener (Sunett and Sweet One)	Acesulfame- K	55	170	130			150	140		98	99			57	100	94				21	54		24	61	95	89			68
Beta blocker drug used to treat heart conditions	Atenolol						34	44	16		10			8.3	5.7	9.9		5.1											
Herbicide	Atrazine									6.2																			
Antibiotic	Azithromycin														68														
Fibrate drug used to treat high cholesterol	Bezafibrate							15																					
Industrial chemical found in polycarbonate plastics and epoxy resins	BPA (bisphenol A)						14																						
Stimulant (coffee, tea, some energy drinks)	Caffeine						270																						
Herbicide	Cyanazine							11		96	24	7.5	17			7.7													
Foaming agent and thickener used in cosmetics, shampoo and soaps	Diethanolamine (DEA)																										10		9.6
Insect repellent	DEET		30				32	13		12														20	27	33			44
Non steroidal anti-inflammation drug (NSADI) (Advil, Motrin)	Ibuprofen						63																						
Contrast media used for x-ray imaging	Iohexal							34	13	27			15																
Contrast media. IV use for CT scans	Iopromide						120																						
Paraben family of preservatives in personal care products (body lotion and deodorant)	Isobutylparaben						13																						
Paraben family of preservatives in personal care products (body lotion and deodorant)	Methylparaben						470																						
Non steroidal anti-inflammation drug (NSADI) (Aleve, Naprosyn)	Naproxen						29																						
An organic chemical used in the manufacture of a variety of other products such as dyes, some pharmaceuticals, and niacin (vitamin B3)	Quinoline																			12									
Artificial sweetener (Splenda)	Sucralose		110					230						150	300	280				150	160								190
Methylxanthine drug used to treat lung problems such as asthma, emphysema and chronic bronchitis.	Theophylline										41																		

GREEN	Detected only in 1st flush event
BLUE	Frequently detected in moderate parts per trillion amounts (50-300 ng/L)
BLACK	Infrequently detected in low parts per trillion amounts (<100 ng/L)
	Cells with no data = Non Detect (ND) or below Method Reporting Level (MRL)

Final July 29, 2016

-- eurofins
Eaton Analyttcal

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Fax: (626) 386-1101
1 800 566 LABS (1 800 566 5227)

AT-1807

Laboratory Report

for

City of Santa Cruz
Water Quality Laboratory
715 Graham Hill Road
Santa Cruz, CA 95060
Attention: Hugh Dalton
Fax: 831-420-5481

Date of Issue
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EUROFINS EATON
ANALYTICAL

ORELAP 4034

Report: 560847
Project: PPCP
Group: PersonalCare Products &CEC

YOM: Yolanda.O.Martin
Project Manager

- Accred1ted 1n accordance w1th TNI 2009 and ISOnEC 17025:2005.
- Laboratory cert1f1es that the test results meet all TNI2009 and ISOnEC 17026:2006 requirements unless noted under the 1nd1111dualanalys1s.
• Following the cover page are State Cert1ficat1on L1st ISO 17025 Accredited Method List. Acknowledgement of Samples Rece1ved Comments H1ts Report Data Report. QC Summary. QC Report and Regulatory Forms as applicable.
- Test results relate only to the sample(s) Jested.
' Th1s report shall not be reproduced except in full. without the wntten approval of the laboratory

.;:: eurofins
Eaton Analytical

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Laboratory Data
Report:660847

City of Santa Cruz
Water Quality Laboratory
Hugh Dalton
715 Graham Hill Road
Santa Cruz, CA 95060

Samples Received on:
11/04/2015 08:02

MRL is Method Recovery Limit

208-Felton Diversion (201511040048) Sampled on 11/02/2015 1511

LC-MS-MS • Endocrine Disruptors Positive Mode - SPE

Prepared	Analyzed	QC Ref #	Method	Analyte	Result	Units	MRL	Dilution
1210212015	22:00	876608	(LC-MS-MS)	1,7-0imethylxanthine	NO	ng/l	10	
1210212015	22:00	876608	(LC-MS-MS)	Acetaminophen	NO	ng	5	
1210212015	22:00	876608	(LC-MS-MS)	Albuterol	NO	ng/L	5	
1210212015	22:00	876608	(LC-MS-MS}	Amoxicillin (semi-quantitative)	NO	ng	20	
1210212015	22:00	876608	(LC-MS-MS)	Andorostenedione	NO	ng/L	5	
1210212015	22:00	876608	(LC-MS-MS)	Atenolol	34	ng/L	5	
1210212015	22:00	876608	(LC-MS-MS)	Atrazine	NO	ng/L	5	
1210212015	22:00	876608	(LC-MS-MS)	Azithromycln	NO (R7)	ng/L	20	
1210212015	22:00	876608	(LC-MS-MS)	Bezafibrate	NO	ng/L	5	
1210212015	22:00	876608	(LC-MS-MS)	Bromacil	NO	ng	5	
1210212015	22:00	876608	(LC-MS-MS)	Caffeine	270	ng/L	5	
1210212015	22:00	876608	(LC-MS-MS)	Carbadox	NO	ng/l	5	
1210212015	22:00	876608	(LC-MS-MS)	Carbemazepine	NO	ng/l	5	
1210212015	22:00	876608	(LC-MS-MS)	Carisoprodol	NO	ng/L	5	
1210212015	22:00	876608	(LC-MS-MS)	Chloridazon	NO	ng	5	
1210212015	22:00	876608	(LC-MS-MS)	Chlorotoluron	NO	ng	5	
1210212015	22:00	876608	(LC-MS-MS)	Cimetidine	NO (R7)	ng	5	
1210212015	22:00	876608	(LC-MS-MS)	Cotinine	NO	ngll	10	
1210212015	22:00	876608	(LC-MS-MS)	Cyanazine	NO	ng/L	5	
1210212015	22:00	876608	(LC-MS-MS)	OACT	NO	ng/L	5	
1210212015	22:00	876608	(LC-MS-MS)	OEA OEET	NO	ng	5	
1210212015	22:00	876608	(LC-MS-MS)	Oehydronifedipine	32	ngll	10	
1210212015	22:00	876608	(LC-MS-MS)	DIA	NO	ng	5	
1210212015	22:00	876608	(LC-MS-MS)	Diazepam	NO	ng	5	
1210212015	22:00	876608	(LC-MS-MS)	Oilantin	NO	ng	5	
12102/2015	22:00	876608	(LC-MS-MS)	Oiltiazem	NO (R7)	ng	20	
12102/2015	22:00	876608	(LC-MS-MS)		NO	ng	5	
12/02/2015	22:00	876608	(LC-MS-MS)	Oiuron	NO	ng/l	5	
1210212015	22:00	876608	(LC-MS-MS)	Erythromycin	NO	ngiL	10	
12102/2015	22:00	876608	(LC-MS-MS)	Flumeqine	NO (R7)	ngiL	10	
12102/2015	22:00	876608	(LC-MS-MS)	Fluoxetine	NO	ng/l	10	
1210212015	22:00	876608	(LC-MS-MS)	Isoproturon	NO	ng/L	100	
12102/2015	22:00	876608	(LC-MS-MS)	Ketoprofen	NO	ng/L	5	

Rounding on totals after 1ummauon.
(c) - lndleatea caJculated ruuh

eurofins
Eaton Analytical

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Fax: (626) 386-1101
1 800 566 LABS (1 800 566 5227)

Laboratory Data
Report: 560847

City of Santa Cruz
Water Quality Laboratory
Hugh Dalton
715 Graham Hill Road
Santa Cruz. CA 95060

Samples Received on:
11/04/2015 08:02

Prepared	Analyzed	QC Rei#	Method	Analyle	Result	Units	MRL	Dilution
	12/02/2015 22:00	876608	(LC-MS-MS)	Ketorolac	NO	ng/L	5	
	12/0212015 22:00	876608	(LC-MS-MS)	Lidocaine	NO	ng/L	5	
	12/0212015 22:00	876608	(LC-MS-MS)	Lincomycin	NO (R7)	ng/L	10	
	12/02/2015 22:00	876608	(LC-MS-MS)	Linuron	NO (R7)	ng/L	5	
	12/02/2015 22:00	876608	(LC-MS-MS)	Lopressor	NO	ng/L	20	
	12/02/2015 22:00	876608	(LC-MS-MS)	Meclofenamic Acid	NO	ng/L	5	
	12/0212015 22:00	876608	(LC-MS-MS)	Meprobamate	NO	ng/L	5	
	12/0212015 22:00	876608	(LC-MS-MS)	Metazachlor	NO	ng/L	5	
	12/02/2015 22:00	876608	(LC-MS-MS)	Nifedlpine	NO (R7)	ng/L	20	
	12/02/2015 22:00	876608	(LC-MS-MS)	Norethisterone	NO	ng/L	5	
	12/02/2015 22:00	876608	(LC-MS-MS)	OUST (Sulfameturon,methyl)	NO	ng/L	5	
	12/0212015 22:00	876608	(LC-MS-MS)	Oxolinic acid	NO	ng/L	10	
	12/0212015 22:00	876608	(LC-MS-MS)	Pentoxifylline	NO	ng/L	5	
	12/02/2015 22:00	876608	(LC-MS-MS)	Phenazone	NO	ng/L	5	
	12/02/2015 22:00	876608	(LC-MS-MS)	Primidone	NO	ng/L	5	
	12/0212015 22:00	876608	(LC-MS-MS)	Progesterone	NO	ng/L	5	
	12/02/2015 22:00	876608	(LC-MS-MS)	Propazine	NO	ng/L	5	
	12/0212015 22:00	876608	(LC-MS-MS)	Quinoline	NO	ng/L	5	
	12/02/2015 22:00	876608	(LC-MS-MS)	Simazine	NO	ng/L	5	
	12/02/2015 22:00	876608	(LC-MS-MS)	Sulfachloropyridazine	NO	ng/L	5	
	12/0212015 22:00	876608	(LC-MS-MS)	Sulfadiazine	NO (R7)	ng/L	5	
	12/0212015 22:00	876608	(LC-MS-MS)	Sulfadimethoxine	NO	ng/L	5	
	12/02/2015 22:00	876608	(LC-MS-MS)	Sulfamerazine	NO	ng/L	5	
	12/02/2015 22:00	876608	(LC-MS-MS)	Sulfamethazine	NO (R7)	ng/L	5	
	12/0212015 22:00	876608	(LC-MS-MS)	Sulfamethizole	NO	ng/L	5	
	12/02/2015 22:00	876608	(LC-MS-MS)	Sulfamethoxazole	NO	ng/L	5	
	12/02/2015 22:00	876608	(LC-MS-MS)	Sulfathiazole	NO	ng/L	5	
	12/02/2015 22:00	876608	(LC-MS-MS)	TCEP	NO	ng/L	10	
	12/02/2015 22:00	876608	(LC-MS-MS)	TCPP	NO	ng/L	100	
	12/02/2015 22:00	876608	(LC-MS-MS)	TOCPP	NO	ng/L	100	
	12/02/2015 22:00	876608	(LC-MS-MS)	Testosterone	NO	ng/L	5	
	12/02/2015 22:00	876608	(LC-MS-MS)	Theobromine	NO	ng/L	10	
	12/02/2015 22:00	876608	(LC-MS-MS)	Theophylline	NO (R7)	ng/L	20	
	12/02/2015 22:00	876608	(LC-MS-MS)	Thiabendazole	NO	ng/L	5	
	12/02/2015 22:00	876608	(LC-MS-MS)	Trimethoprim	NO	ng/L	5	

LC-MS-MS - Endocrine Disruptors Negative Mode • SPE

Rounding on totals after aummation
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eurofins
laton Analytical

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Monrovia, California 91016-3629
Tel (626) 386-1100
Fax: (626) 386-1101
1 800 566 IABS (1 800 566 5227)

Laboratory Data
Report: 560847

City of Santa Cruz
Water Quality Laboratory
Hugh Dalton
715 Graham Hill Road
Santa Cruz, CA 95060

Samples Received on:
11/04/2015 08:02

Prepared	Analyzed		QC Ref#	Method	Analyte	Result	Units	MRL	Dilution
	12103/2015	1:26	876974	(LC-MS-MS)	2,4-D	28	ng/L	5	
	12103/2015	1:26	876974	(LC-MS-MS)	4-nonylphenol- semi quantitative	NO (L5,LEJ	ng/L	100	
	1210312015		876974	(LC-MS-MS)	4-tert-Octylphenol	NO (LS,IE)	ng/L	50	
	12103/2015	1:26	876974	(LC-MS-MS)	Acesulfame-K	150	ng/L	20	
	12103/2015	1:26	876974	(LC-MS-MS)	Bendroftumethiazide	NO	ngll	5	
	12103/2015	1:26	876974	(LC-MS-MS)	BPA	14	ng/L	10	
	1210312015	1:26	876974	(LC-MS-MS)	Butalbital	NO	ng/L	5	
	12103/2015	1:26	876974	(LC-MS-MS)	Butylparaben	NO	ngll	5	
	1210312015	1:26	876974	(LC-MS-MS)	Chloramphenicol	NO	ng/L	10	
	12103/2015	1:26	876974	(LC-MS-MS)	Clofibric Acid	NO	ng/L	5	
	12103/2015	1:26	876974	(LC-MS-MS)	Diclofenac	NO	ng/L	5	
	12103/2015	1:26	876974	(LC-MS-MS)	Estradiol	NO	ng/L	5	
	12103/2015	1:26	876974	(LC-MS-MS)	Estriol	NO	ngiL	5	
	12103/2015	1:26	876974	(LC-MS-MS)	Estrone	NO	ng/L	5	
	12103/2015	1:26	876974	(LC-MS-MS)	EthinylEstradiol- 17 alpha	NO	ngiL	5	
	12103/2015	1:26	876974	(LC-MS-MS)	Ethylparaben	NO	ng/L	20	
	12103/2015	1:26	876974	(LC-MS-MS)	Gemfibrozil	NO	ng/L	5	
	12103/2015	1:26	876974	(LC-MS-MS)	Ibuprofen	63	ng/L	10	
	12/03/2015	1:26	876974	(LC-MS-MS)	Iohexal	NO	ng/L	10	
	12/03/2015	1:26	876974	(LC-MS-MS)	Iopromide	120	ngll	5	
	12/03/2015	1:26	876974	(LC-MS-MS)	Isobutylparaben	13	ng!L	5	
	12/03/2015	1:26	876974	(LC-MS-MS)	Methylparaben	470	ng/L	20	
	12103/2015	1:26	876974	(LC-MS-MS)	Naproxen	29	ng/L	10	
	12/03/2015	1:26	876974	(LC-MS-MS)	Propylparaben	NO	ng/L	5	
	12/03/2015	1:26	876974	(LC-MS-MS)	Sucralose	NO	ng/L	100	
	12/03/2015	1:26	876974	(LC-MS-MS)	Tridocarban	NO	ng/L	5	
	12/03/2015	1:26	876974	(LC-MS-MS)	Triclosan	NO (LS,R2)	ng/L	10	
	12/0312015	1:26	876974	(LC-MS-MS)	Warfarin	NO	ng/L	5	