VOLUNTARY OCCURRENCE MONITORING FOR CONTAMINANTS OF EMERGING CONCERN

January 2018 – May 2019

Albuquerque Bernalillo County Water Utility Authority

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Acronyms and Abbreviations

ABCWUA	Albuquerque Bernalillo County Water Utility Authority
AWWA	American Water Works Association
CEC	Contaminants of Emerging Concern
CFS	cubic feet per second
CWA	Clean Water Act
DWP	Drinking Water Project
EPA	Environmental Protection Agency
HPLC	high performance liquid chromatography with tandem mass spectrometry
HRGC	high-resolution gas chromatograph
HRMS	high-resolution mass spectrographic
LC-MS/MS	liquid chromatography with tandem mass spectrometry
mL	milliliters
ng/g	nanograms per gram
ng/L	nanograms per liter
ppb	part per billion
PPCP	Pharmaceutical and Personal Care Product
ppt	part per trillion
RL	Reporting Limit
SDWA	Safe Drinking Water Act
SJC	San Juan-Chama
SWRP	Southside Water Reclamation Plant
ug/L	micrograms per liter
UPLC/ESI-MS/MS	ultra performance liquid chromatography electrospray ionization tandem mass spectrometry
USGS	U. S. Geological Survey
WY	Water Year

Legend for Field Blank Tables

D	dilution data
H	concentration is estimated
N	authentic recovery is not within method/contract control limits
NQ	data not quantifiable
K	peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration
MAX	concentration is an estimated maximum value
U	undetected (blank corrected result < detection level)
B	blank corrected value
RL	reporting limit is the smallest concentration of a substance that can be reported with accuracy and precision

Executive Summary

In 2008-2009, the Water Authority performed pharmaceutical and personal care product (PPCP) monitoring to understand the occurrence of these unregulated chemicals, after expanding treatment processes to utilize San Juan-Chama Project water from the Rio Grande for drinking water supply. Throughout the following years, additional research led to a change in the way these contaminants are labeled; and they are now more broadly referred to as contaminants of emerging concern (CECs) by the Environmental Protection Agency (EPA) and other governing agencies to encompass more categories of substances, such as flame retardants. The CEC substances which the Water Authority monitored represent unregulated chemicals introduced to the sewer by personal use or consumption, such as flushing and showering.

In 2018-2019, the Water Authority elected to again monitor for these contaminants throughout the water and wastewater systems to identify changes over the last decade. This study of CECs was expanded to include more sample locations; and sucralose was added to the list of parameters previously sampled in 2008-2009. Sucralose is an artificial, non-caloric sweetener (commonly known by the brand name *Splenda*) that does not break down in the human body and is resistant to treatment processes; therefore, it can be used to identify wastewater contributions to source water supply (Mawhinney et al., 2011). All the samples in this study were originally planned to be collected during 2018; however, samples for high-flow season (May/June) were collected in May 2019 due to the drought during May/June of 2018.

Results showed a low occurrence of CECs in the drinking water system (pre- and post-treatment) and a much higher occurrence in the wastewater system. Of the more than one hundred substances tested, 91% were never detected in the treated drinking water (Figure 2). Of the almost five hundred analytical tests performed on the treated drinking water, CECs were detected in only 4% of the tests (Figure 2). Concentrations of detected CECs in the treated drinking water ranged between concentrations too low to detect and 630 nanograms per liter (ng/L), with an average concentration of the detected results of 23 ng/L and a median of 0 micrograms per liter (ug/L).

Introduction

What are CECs and where do they come from?

Contaminants of emerging concern (CECs) are unregulated chemicals from domestic, municipal, industrial, or agricultural sources that are not commonly monitored, but may have the potential for adverse environmental and human health effects. Although these contaminants have historically been present in the environment, they are emerging as an interest for the scientific community because even very low concentrations may have impact on aquatic life (EPA, 2013). Pharmaceuticals, personal care products, nanoparticles, estrogen-like compounds, flame retardants, detergents, industrial chemicals, and artificial sweeteners are categories of CECs in current research. The increase in scientific interest is pushing laboratories to build capacity to measure minuscule concentrations. CECs have been detected in waterbodies nationwide, but many compounds do not have guidelines established to define impacts to aquatic or human health (Koplin et al., 2002).

CECs are present in aquatic environments due to continuous release from wastewater discharges into streams and rivers (EPA, 2013). In 2008, the Associated Press investigated and reported on the presence of CECs in 24 public municipal drinking water systems nationwide. The information collected in CEC monitoring helps establish baseline data to understand if anything can be detected, and if so, to understand if treatment is currently impacting the prevalence of CECs.

A review of CEC Investigations in the ABCWUA Distribution System

In December 2008, the Water Authority implemented the San Juan-Chama (SJC) Drinking Water Project (DWP) which began adding purified surface water to the municipal drinking water supply. With the introduction of treated surface water from the Rio Grande as a new source of drinking water in 2008, the Water Authority investigated the presence of unregulated pharmaceuticals in the new drinking water source, as well as throughout the wastewater treatment process (2008-09 study).

The pharmaceuticals and personal care products (PPCP) selected in the study represent unregulated chemicals that are introduced to the sewer by human ingestion as medicine or as a part of routine diet, and are flushed, or washed down the drain during personal showering or washing. This study covered five sample locations to include raw and treated drinking water and raw and treated wastewater, with four quarterly events for each location. There were 113 substances tested and 91% were never detected in the drinking water; of the 9% that were detected, the concentration ranged from undetectable to 4060 nanograms per liter (ng/L). Substances in wastewater expectedly had higher detection frequencies and concentrations.

In 2021, the Water Authority completed the report for a second round of voluntary monitoring in 2018-2019 for the same 113 PPCPs, as well as sucralose, for 114 substances in total. Sucralose is an artificial, non-caloric sweetener that does not break down in the human body, hence most of it is excreted without any transformation. It is very soluble in water and has shown to be resistant to treatment processes during drinking water production at the bench scale, such as oxidation by free chlorine and ozone. Therefore, it can be used to indicate an amount of domestic wastewater contribution in the source water (Mawhinney et al., 2011). The water, wastewater, and reuse systems were all included in this study and increased the study to nine sample locations. The purpose was to identify changes in the occurrence and concentration over four, seasonal-grab sampling events for each location.

This study aims to understand the CEC occurrence and concentration in the Rio Grande source water; estimate treatment removal efficiencies; identify the presence of wastewater contributions in the Rio Grande source water supply; and identify any significant changes in concentrations over the time at each location to inform future planning. Future planning could include the design of advanced wastewater treatment plants for reuse and/or for regulations that may be promulgated in the future.

The Water Authority's CEC monitoring plan focused on a subset of 114 substances included in three laboratory analytical methods. None of these chemicals are currently regulated under the federal Safe Drinking Water Act (SDWA) or the Clean Water Act (CWA). However, the Environmental Protection Agency (EPA) which administers enforcement of both the SDWA and the CWA includes CECs as contaminants for review under the SDWA Unregulated Contaminant Monitoring Rule for possible future regulation. A new list of up to 30 contaminants is reviewed by EPA every five years; and to date, none of the 114 CEC substances tested by the Water Authority have been recommended for regulation.

Monitoring Plan and Analytical Methods

In general, this study's monitoring plan replicated the 2008-09 study, but added four new sample locations and one additional contaminant to be tested.

Monitoring Locations

The nine monitoring locations defined in Table 1 and Figure 1 selected for this study cover raw and treated drinking water, raw and treated wastewater, the two types of reuse water utilized for irrigation, and two interceptors (manholes on sewer lines where more detailed information is beneficial for future treatment plant design). The added reuse water locations serve only irrigation water for watering parks and fields.

Table 1. Monitoring Locations, Sample Point ID, and Description

Monitoring Location	Sample Point ID	Description
Alameda Non-Potable Pump Station (Northside Reuse) (before chlorination)	North Reuse	River water after bank filtration, before chlorination. Used for municipal irrigation on North side of town.
San Juan-Chama Drinking Water Plant (SJCDWP) Raw Water Pump Station	Rio Grande	River water before any treatment at Drinking Water Treatment Plant.
SJCDWP Source Water	(raw) Drinking-Influent	River water pumped to Drinking Water Treatment Plant after grit removal.
SJCDWP Treated Water (west side pump station)	Treated Drinking Water	Treated drinking water sent to distribution. The field blank was taken at this location.
Manhole at Bosque School	Westside Interceptor	Raw wastewater in area where a future wastewater treatment plant will be constructed.
Tijeras Arroyo Interceptor Line (on Murray Rd west of the South Diversion Channel)	Tijeras Interceptor	Raw wastewater to Tijeras Collector Line downstream of Kirtland Air Force Base (KAFB) property line (KAFB and Sandia Lab contributors). Source for potential future wastewater treatment plant.
Influent to the Southside Water Reclamation Plant (SWRP)	(raw) SWRP Influent	Raw wastewater to SWRP.
Effluent from the SWRP	(treated) SWRP Effluent	Effluent being discharged into the Rio Grande.
SWRP Reuse Water	SWRP Reuse	Tertiary treated effluent used for municipal irrigation on south side of town.

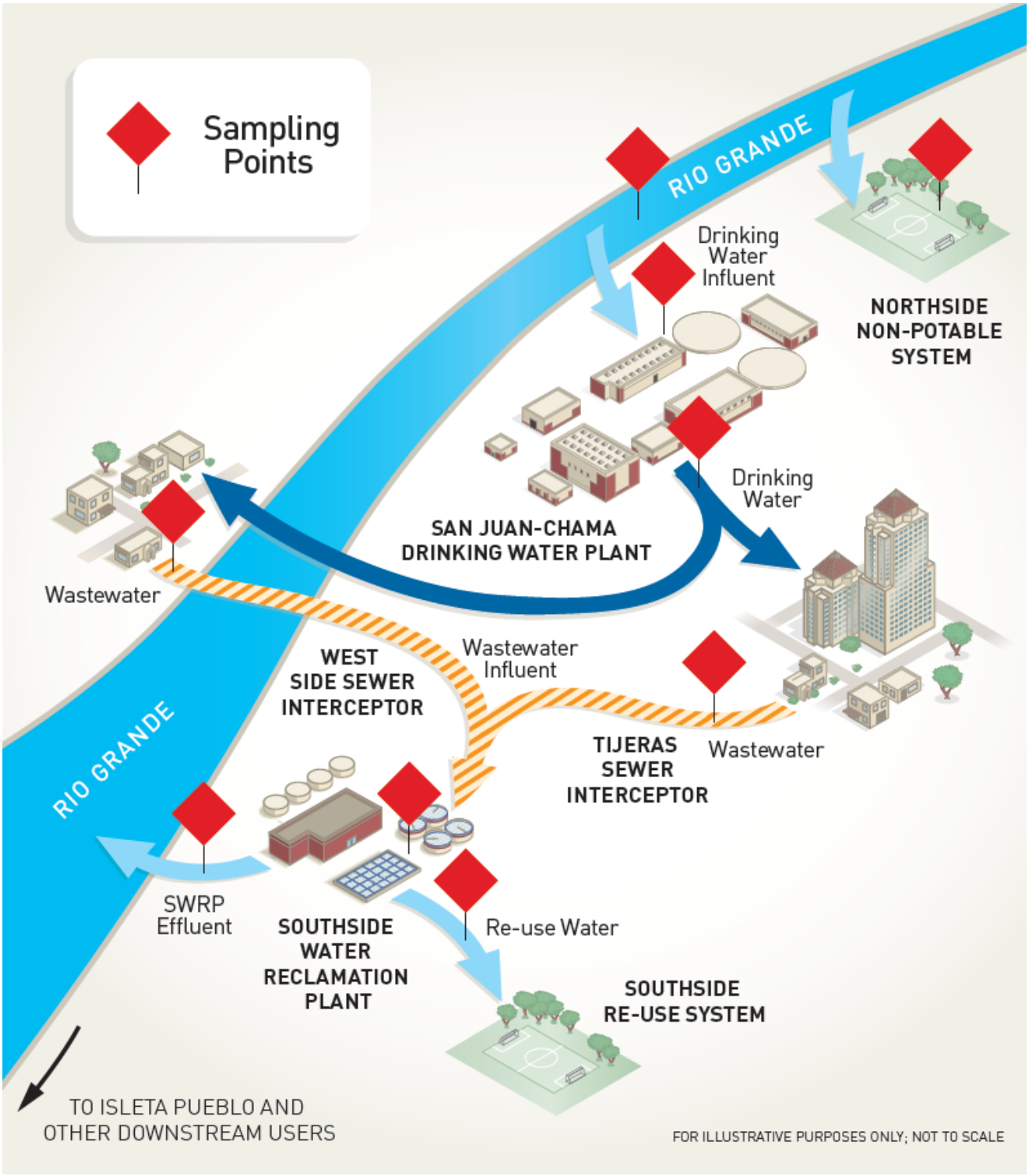

Figure 1. Illustration of Monitoring Locations

Monitoring Frequency and Seasonality

Samples were collected in 2018 and 2019 during four different seasonal periods to account for changes in streamflow. A similar study in the Denver, Colorado, Metropolitan area shows that concentrations of CECs often correlate to streamflow volume, typically showing higher concentrations in the river during baseflow season (Bai et al., 2018). The North Reuse and Rio Grande monitoring locations are expected to be impacted by seasonal changes in river flow. Wastewater flow throughout the year tends to be more stable and consistent. Collecting samples during each river level improves the ability to understand changes in concentrations across seasons. Based on U. S. Geological Survey (USGS) flow data (Table 2) for the gauge at Alameda near the Paseo del Norte Bridge (#08329928) from 1989 to 2017, the targeted time periods determined for sample collection were:

Base Flow: January - March
High flow: May - June
Irrigation: July - August
Low flow: September - November

Table 2. USGS Monthly Flow Data in cubic feet per second (CFS) for Water Years 1989-2017 and by Water Year (WY)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	702	761	1140	1940	2690	2300	935	666	516	447	769	877
Max	1130	1137	2060	3853	5124	5726	4958	2272	1202	1110	1498	1530
(Max WY)	(1993)	(1995)	(2008)	(1992)	(2005)	(1993)	(1995)	(1991)	(1991)	(2017)	(1991)	(1991)
Min	375	457	441	569	654	363	392	289	198	183	166	498
(Min WY)	(2013)	(2013)	(2013)	(2006)	(2006)	(1989)	(2013)	(2013)	(2012)	(2016)	(1989)	(2003)

Samples were collected from all locations in January 2018, August 2018, October 2018, and May 2019, to match the four targeted flow conditions. In May 2018, river flows were less than the targeted flow condition for that month because of drought. As a result, Water Authority decided to collect more representative high-flow samples in May of 2019, rather than in 2018.

Sample Collection Methods

To minimize error and any potential outside contamination from the sample composite process, grab samples were collected at all monitoring locations for this study instead of composite samples used in the previous study. Samples were collected following an established method that follows the "Clean Hands/Dirty Hands" protocol used to collect samples for trace metals analyses. The method dictates that two samplers avoid the use of any CECs the morning before collection and wear gloves and face shield during collection (U.S. EPA, 1996).

For each sampling event, the grab samples were timed to simulate capturing the same slug of water as it moves through the water and wastewater systems. For example, the treated drinking water location was collected six-to-eight hours after the Rio Grande and drinking water influent locations. Similarly, the Southside Water Reclamation Plant (SWRP) influent location was collected first, then the SWRP effluent location was collected 24 hours later, and four hours after that, the SWRP reuse location was collected.

A field blank was collected as an additional sample at the treated drinking water monitoring location. With a field blank, the laboratory provides prepared clean water to be transferred at the monitoring location to a collection bottle that is pre-preserved with ascorbic acid. This sample is used to determine if there is any potential contamination that occurs during the sample collection process or during sampling transport.

Analytical Methods

Analytical methods for a wide variety of CECs at low detection limits are available only for research purposes and offered by a limited number of laboratories. The Water Authority chose the two analytical methods generating 113 determinations used in the previous study, and one additional method to generate data on sucralose at very low levels [nanograms per liter (ng/L) or part per trillion (ppt)], for a total of 114 determinations.

For all but a few exceptions, data for regulated organic chemicals obtained through commonly available analytical methods are reported typically in the microgram per liter (ug/L) or part per billion (ppb) level. The analytical methods used for this occurrence monitoring provided results 1,000 times more sensitive at the nanogram per liter (ng/L) or part per trillion (ppt) level.

SGS AXYS Analytical Services Ltd. laboratory in Sidney, British Columbia, Canada was selected to perform the analyses because of their experience with the selected methods: MLA-068; MLA-075; and MLA-104/116; all of which are consistent with EPA parameters. The total cost for all three methods per sample was $2,775.00 (MLA-068: $950.00; MLA-075: $1,525.00; and MLA-104/116: $600.00). The total project cost of the lab analyses was approximately $117,000.00 for all seasons and all sample locations.

Samples were analyzed by AXYS Analytical Services using:

AXYS MLA-075 – Analytical Procedures for the Analysis of Pharmaceuticals and Personal Care Products in Solid and Aqueous Samples by liquid chromatography with tandem mass spectrometry (LC-MS/MS) based on EPA Method 1694: Pharmaceuticals and Personal Care Products in Water, Soil, Sediment, and Biosolids by HPLC/MS/MS December 2007
https://www.epa.gov/sites/production/files/2015-10/documents/method_1694_2007.pdf

AXYS MLA-068 – Analysis of Sterols and Hormones in Water and Solids Samples based on EPA Method 1698: Steroids and Hormones in Water, Soil, Sediment, and Biosolids by HRGC/HRMS December 2007
https://www.epa.gov/sites/production/files/2015-10/documents/method_1698_2007.pdf

AXYS MLA-104/116 - This method is suitable for the determination of sucralose in aqueous samples, including surface water, groundwater, wastewater influent and effluent, solid samples, and extracts. Aqueous samples are analyzed without filtration. The sample is acidified and extracted by solid phase extraction. Extracts are analyzed by ultra performance liquid chromatography electrospray ionization tandem mass spectrometry (UPLC/ESI-MS/MS) in the negative ionization mode. Extracts from MLA-075 or MLA-104 (acid extracts) are analyzed directly. The reporting limit is 10 nanograms per liter (ng/L) based on a 100-milliliters (mL) aqueous sample, 0.4 nanograms per gram (ng/g) for a solid sample, 0.8 ng/g for a biosolid. The detection limit is inversely proportional to sample size and the use of smaller sample sizes will result in higher detection limits. The upper calibration limit is 30,000 ng/L which will cover the range of most samples including wastewater influents.

The laboratory provided results for 114 substances: 86 substances for AXYS Method MLA-075, 27 substances for AXYS Method MLA-068, and the artificial sweetener Sucralose under AXYS Method MLA-104/116. The list of substances is provided in the Appendix, *Table A 1*.

Field and Method Blanks

The field blank collected at the treated drinking water location was analyzed in the same manner as the other samples to identify contamination in the sampling process. The field blank sample was compared to the sample from the same location to gain an understanding of the uncertainty that comes from the sampling process itself. Detections in the field blank could indicate false positives in other samples.

To determine if substances or interferences were present during analysis, method blanks were analyzed along with the samples. When the laboratory detected a substance in both the sample and in the associated method blank, the Water Authority "blank corrected"[1] the results. If the resulting difference was less than the detection limit[2] associated with the sample, the result is

[1] Blank correction: subtracting the concentration detected in the laboratory blank from the concentration detected in the sample.
[2] Detection Limit: the smallest amount of a substance that can be detected to a known level of certainty.

reported as not detected and indicated with "U." The summaries of results and detection limits are included in Tables *A 5* through *A 22* in the Appendix, organized by method, location, and quarter.

CEC Occurrence and Concentration

CECs detected within the system

A part per trillion is equivalent to:
three seconds out of every 100,000 years
or
one drop of water diluted in 20 Olympic-sized swimming pools (13,200,000 Gallons total).

Of 114 CECs, seven CECs (beta-Sitosterol, Campesterol, Cholestanol, Cholesterol, Diltiazem, Stigmasterol, and Sucralose) were detected at all nine locations. For the North Reuse, Rio Grande, drinking water influent, and treated drinking water, the number of occurrences and concentrations were generally very low. The field blank did contain trace amounts of five CECs: Androstenedione, beta-Sitosterol, Cholestanol, Cholesterol, and Stigmasterol. Table 3 below describes the substances detected in the field blank, indicating some contamination from the sampling process; and it likely contributed to the overall concentrations of these substances at other sampling locations.

Table 3. Field Blank and Treated Drinking Water Results

Field Blank and Treated Drinking Water Results (ng/L)								
	Treated Drinking Water Blank (WTPEP01Blank)							
Substance	18-Jan		18-Aug		18-Oct		19-May	
	Result	RL	Result	RL	Result	RL	Result	RL
Androstenedione	U	23.7	U	10.6	K 28.7	8.91	U	27
beta-Sitosterol	B MAX 26.3	2.34	U	2.27	B MAX 19.65	0.836	B D MAX 1079	4.08
Cholestanol	B K 2.456	0.887	U	0.546	K 1.47	0.738	U	5.52
Cholesterol	B 240	3.89	B 5.4	3.82	U	2.28	U	18.3
Stigmasterol	B MAX 3.4	2.3	U	2.08	K 6.8	1.01	B D MAX 221.4	4.25
	Treated Drinking Water (WTPEP01)							
Substance	18-Jan		18-Aug		18-Oct		19-May	
	Result	RL	Result	RL	Result	RL	Result	RL
Androstenedione	U	15.9	U	21.6	U	39.9	U	27.5
beta-Sitosterol	MAX 27.7	3.02	MAX 46.15	1.06	MAX 630.2	3.48	MAX 267	2.52
Cholestanol	2.02	1.03	U	1.1	U	1.49	U	1.87
Cholesterol	277	4.53	U	3.26	13.8	4.01	20.5	3.75
Stigmasterol	K 3.8	1.75	MAX 14.7	0.0444	MAX 113.3	2.98	MAX 50.6	4.69

As expected, the number of detected CECs for the raw wastewater at the Westside and Tijeras Interceptor, and Southside Water Reclamation Plant (SWRP) influent were significantly higher; 63% of the total list of analytes were detected from the Westside Interceptor, 71% at Tijeras Interceptor, and 68% of the total analyzed at SWRP influent. The occurrence as a percentage for the 114 substances at the nine monitoring locations, as well as the total substances detected throughout the sampling events are shown in Figure 2. Treated drinking water contained the fewest number of contaminants of the nine locations. Over four periods of monitoring, a total of 11 substances were detected at that location.

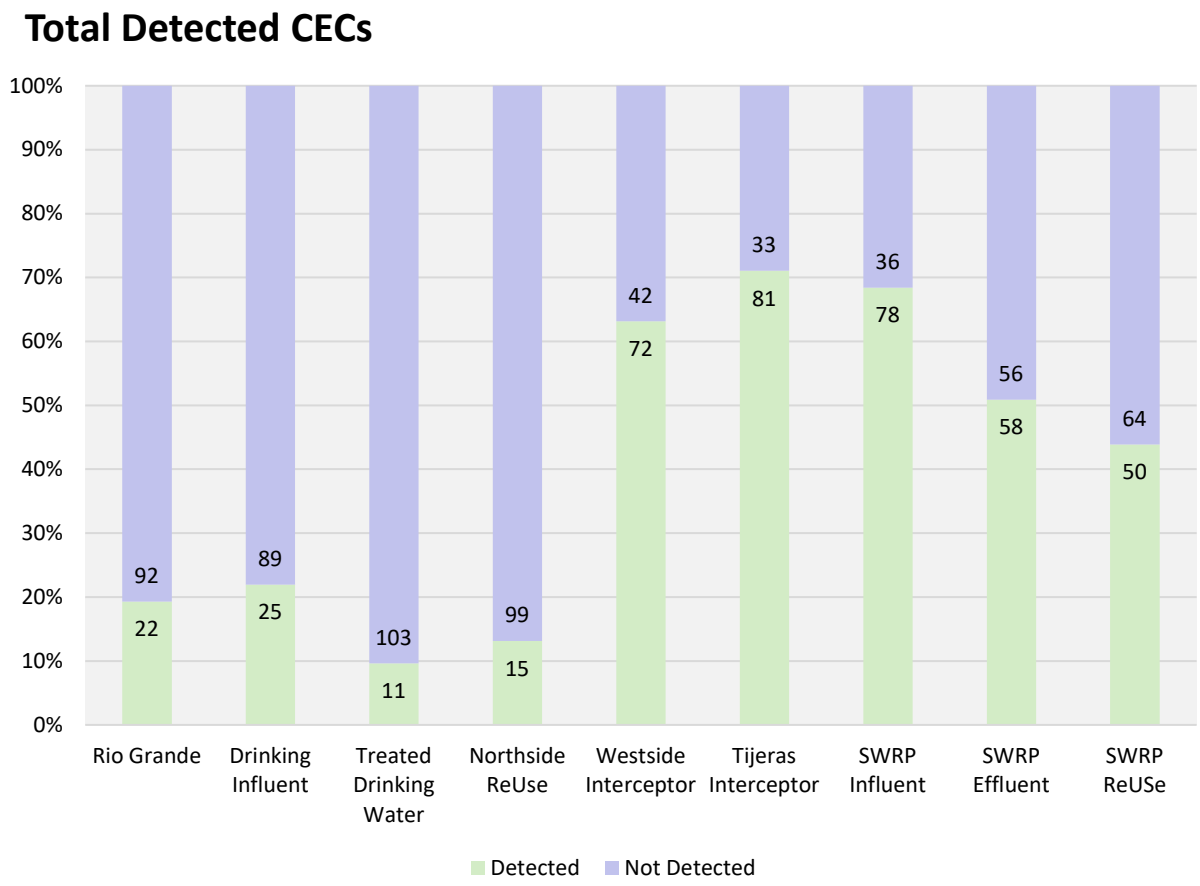

Figure 2. Total number of CECs detected at each sampling location

Only three substances were detected during every sampling event in treated drinking water shown in Figure 3 below: Sucralose, beta-Sitosterol, and Stigmasterol. This indicates that these substances are present in source water and persistent through treatment throughout the year.

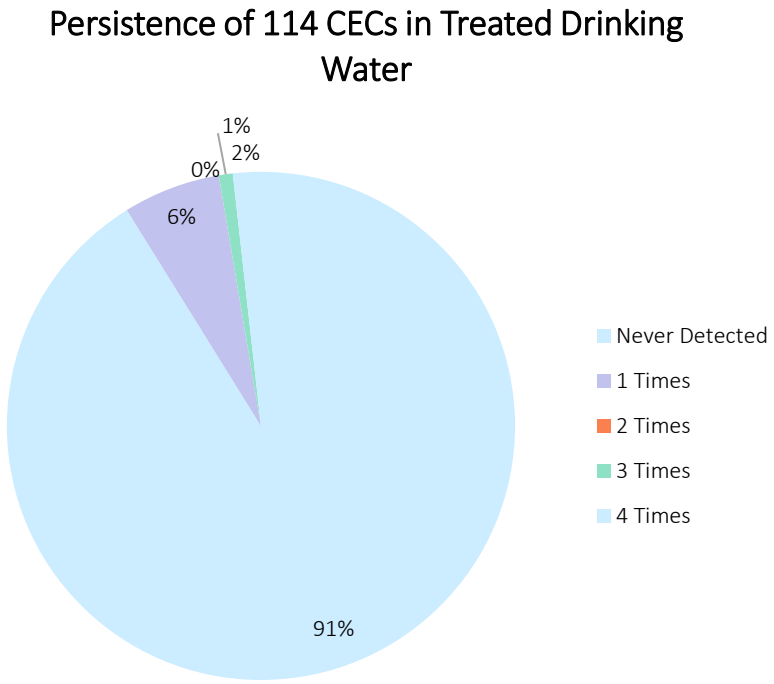

Figure 3. Frequency of Occurrence of CECs in Treated Drinking Water

Removal of CECs during treatment processes

Figure 4 shows the percent removal during each monitoring event in raw and treated drinking water at the San Juan-Chama Drinking Water Plant, and wastewater at the Southside Water Reclamation Plant, respectively. Sucralose was excluded from the following analysis because it is known to be resistant to treatment processes and is considered a conservative tracer through the system.

Percent removal was calculated by comparing the concentration of individual substances before and after treatment at the Surface Water Treatment Plant and Southside Water Reclamation Plant, then taking an average of the change in concentration across all substances. Percent removal of these substances ranged from 50%-95% in treated drinking water and from 66%-75% in treated wastewater. This shows the effectiveness of both treatment plants at removing contaminants of emerging concern. The data presented here is consistent with the current understanding of treatment plant performance as discussed in the American Water Works Association (AWWA)

Research Foundation Report 91188 (Removal of EDCs and Pharmaceuticals in Drinking and Reuse Treatment Processes, AWWA).

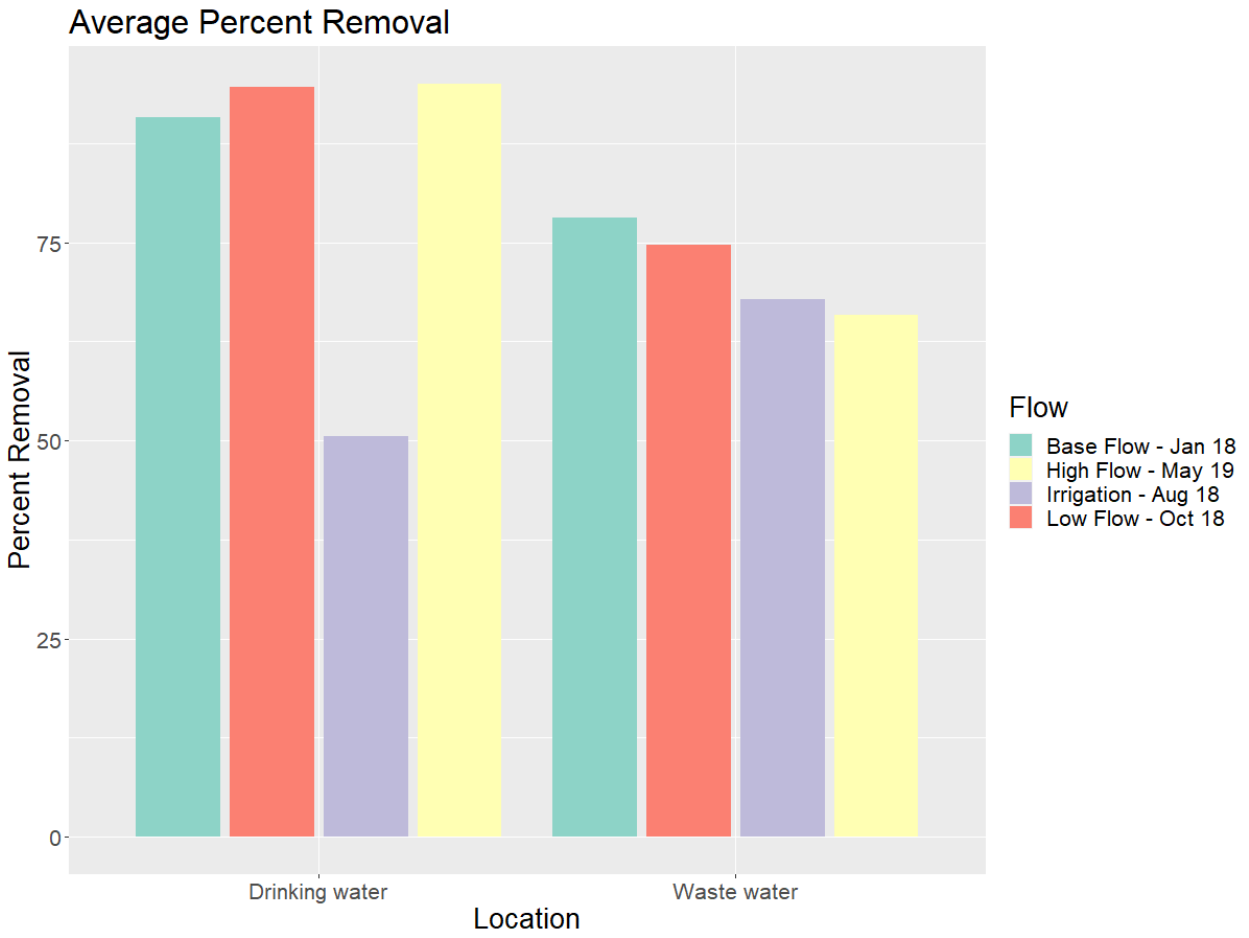

Figure 4. Percent Removal in Treated Drinking Water and Wastewater Effluent

For the compounds detected in the treated drinking water, Figure 5 shows highest concentrations of all detected substances from source water and after drinking water treatment, from left to right on the graph. The concentrations trend downward as water moves from the river through the Surface Water Treatment Plant, with the lowest concentrations and detections observed after treatment. There are a few exceptions where an increase in concentration was observed after treatment. This could be attributed to error due to the extremely low concentrations which are difficult to analyze, as is evident from the method blanks during analysis. It could also be an indicator that these substances, like sucralose, are resistant to treatment.

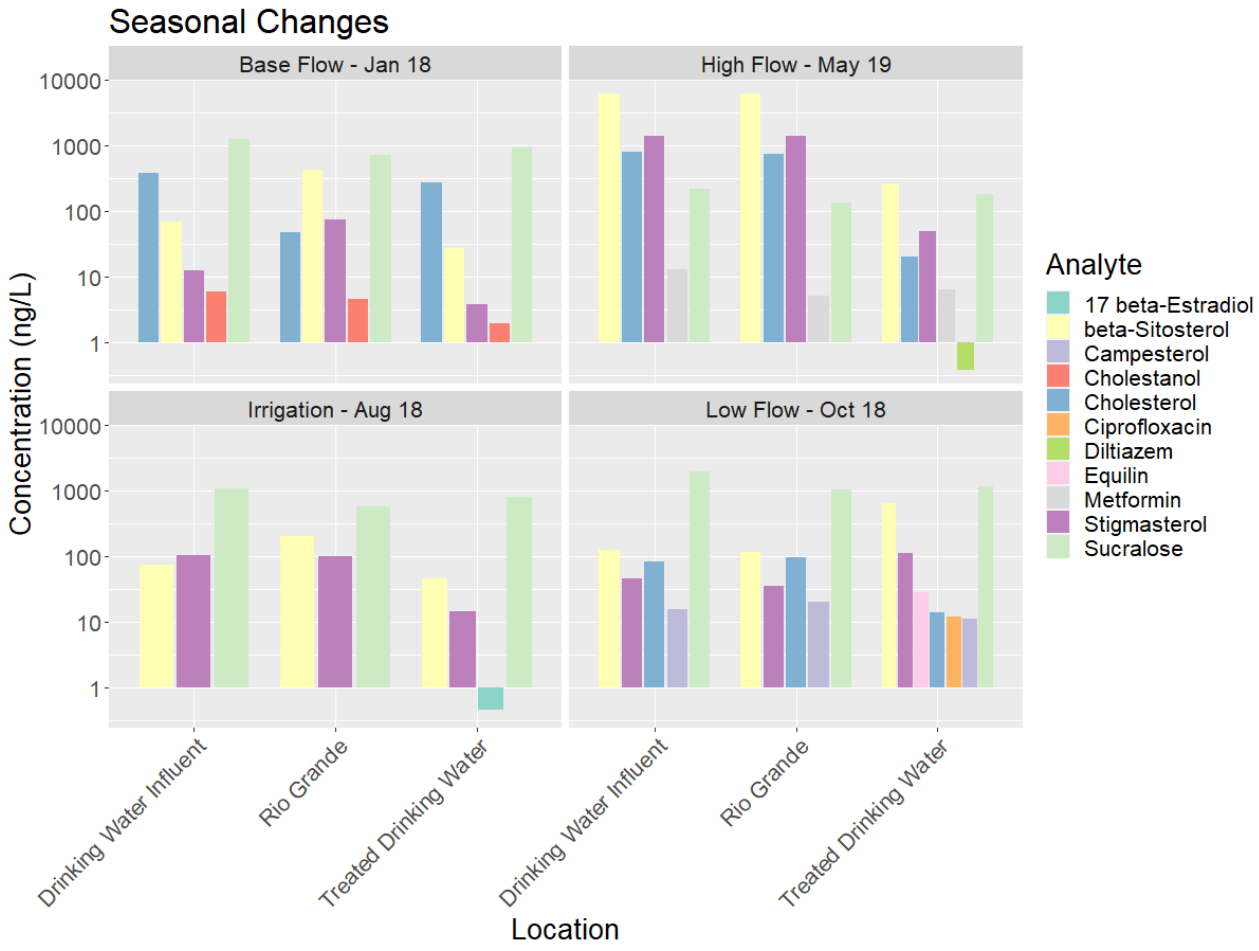

Figure 5. Seasonal Changes in CEC Concentrations at Sampling Locations

It is important to note that 89 out of 114 monitored CECs were not detected in the Rio Grande, the drinking water influent, or the treated drinking water. Seasonally, the highest concentrations were seen during high flow in May 2019. This is not in line with the observations seen in the Denver study which saw higher concentrations during base flow. The conclusions from the Denver study stated that the higher concentrations during base flow were due to less dilution during that season (Bai et al., 2018). In this study, higher concentrations during high flow could be attributed to several factors such as changing flow regimes and different sampling locations. While the base flow, irrigation, and low flow samples were taken in 2018, the high flow sample was taken the following year in 2019 and may have experienced different CEC levels than the previous year. Additionally, the volume of water in the river was lower in 2018 from drought conditions leading to less dilution, and therefore, could contribute to higher observed concentrations (Bai et al., 2018).

Drinking Water Then (2008-09) and Now (2018-19):

The number of detected substances found in 2018 was far lower than the number found in 2008. In the historical study, 22 different substances were detected in treated drinking water; in the current 2018 study only seven of those substances were detected in treated drinking water. Treated drinking water samples in 2018 had four, newly-detected substances that were not present in 2008. Figure 6 below shows the crossover of detected substances between the two studies. Sucralose may have been present in the system during the earlier study but was not monitored at the time. It is known to be resistant to treatment and was added to the study because it can be used as a conservative tracer to determine the anthropogenic influence on source water (Mawhinney et al., 2011). More detailed information on the number of detected substances between the two studies is found in Table 4.

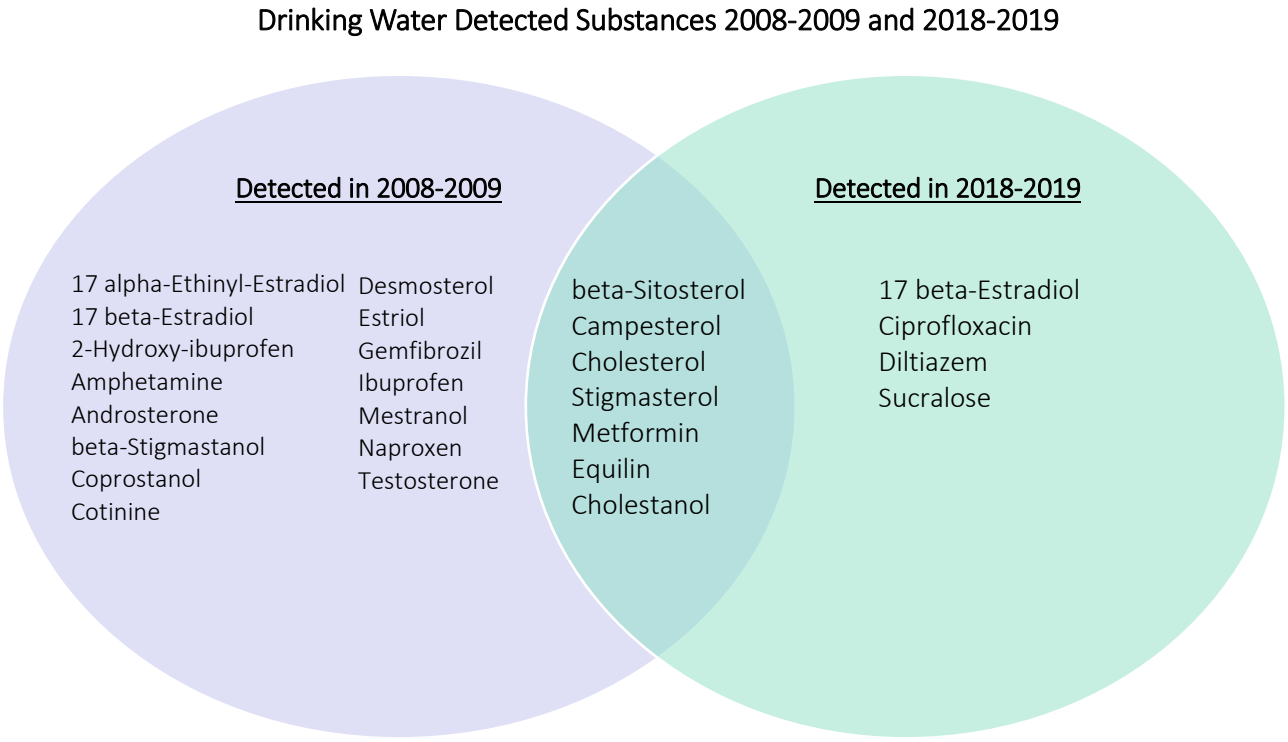

Figure 6. Drinking Water Detected Substances in 2008-2009 and 2018-2019

Note that sucralose was not tested for in the previous study but may have been present.

Table 4. 2008 vs. 2018 Change in Number of Substances Detected

Monitoring Location	Total Number of Detects (2008)	Total Number of Detects (2018)
Rio Grande	32/113	22/114
Drinking Influent	17/113	25/114
Treated Drinking Water	22/113	11/114
Southside Water Reclamation Plant (SWRP) Influent	82/113	78/114
SWRP Effluent	62/113	58/114
Northside Reuse	NA	15/114
Westside Interceptor	NA	72/114
Tijeras Interceptor	NA	81/114
SWRP Reuse	NA	50/114

The highest concentrations of detected substances in treated drinking water are displayed in Figure 7. Most substances decreased from 2008 to 2019 except for beta-Sitosterol, which increased by 36%. Sucralose is not included in this graph because it was not monitored during the previous study.

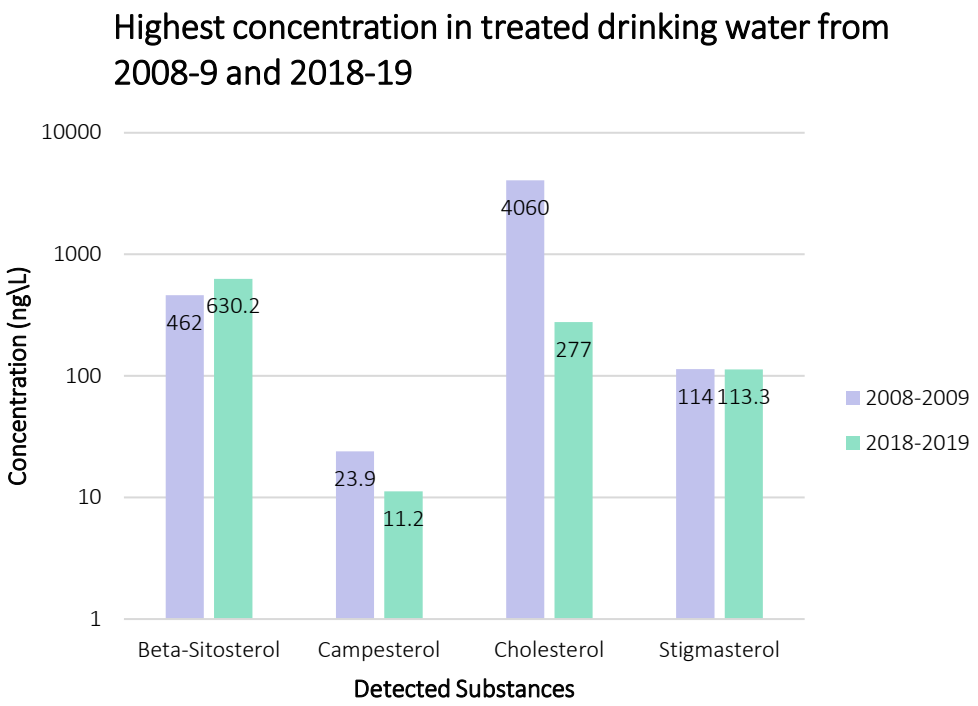

Figure 7. Concentration Fluctuation of Highest Detected CECs in Treated Drinking Water Between 2008-2019

Sucralose

Sucralose was detected at all monitoring locations. The sucralose concentration is found at levels below 1 microgram per liter (ug/L) in the raw water, influent water, and the treated water. As expected, higher sucralose levels between 9-61 ug/L were found in domestic manholes and in the wastewater plant.

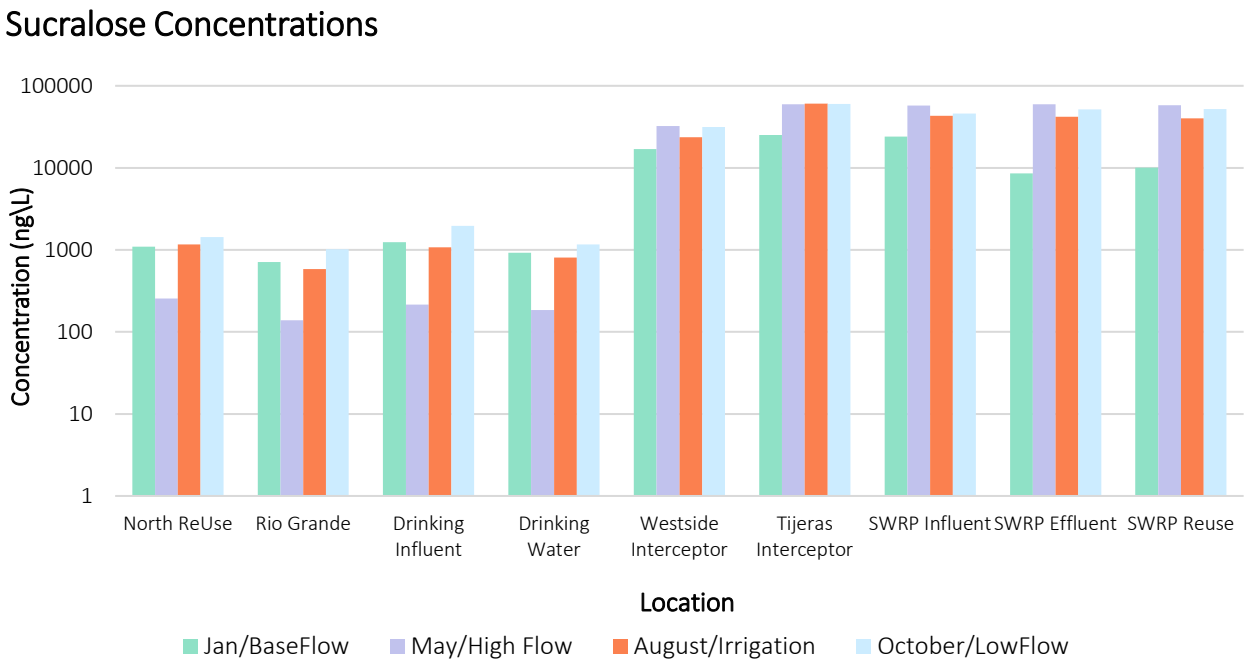

Figure 8. Sucralose Results

Figure 8 shows sucralose fluctuations between the different sampling locations. Sites to the left of the graph are not influenced by the metropolitan area, while sites toward the right side are influenced by water from the city. Mawhinney et al., 2011 showed that sucralose can be used as a conservative tracer to determine anthropogenic influence on source water. The graph in Figure 8 supports this idea, as sucralose concentrations increase ten-fold or greater after passing through Albuquerque. The lowest detected concentration for sucralose was 138 nanograms per liter (ng\L) at the Rio Grande and the highest was 60,900 ng\L at Tijeras Interceptor. The maximum sucralose concentration detected in treated drinking water was 1,170 ng/L. This indicates that source water for the Water Authority is somewhat impacted by wastewater contributions from farther upstream. The concentrations identified are far below recommended daily doses which can indicate minimal human impact, as demonstrated in Table 5. Additionally, it is important to note that the Southside Water Reclamation Plant (SWRP) Effluent sample reflects the water quality of the wastewater before discharge and dilution in the Rio Grande.

How small is a Nanogram(ng)?

One (1) gram is equivalent to a packet of sugar.

One thousandth of a gram is a milligram (10^{-3} grams).

One thousandth of a milligram is a microgram (10^{-6} grams).

One thousandth of a microgram is a nanogram (10^{-9} grams).

To provide perspective for several of the substances detected in the treated water, the Water Authority compared the greatest concentration detected for that substance to a commonly prescribed or recommended dose (Table 5).

Cholesterol was one of the CECs detected in the treated drinking water. The highest concentration of cholesterol was 277 nanograms per liter (ng/L). To put that concentration into perspective, on average an egg contains 200 milligrams of cholesterol. Drinking two liters of treated drinking water per day at a concentration of 277 ng/L of cholesterol would take a person nearly 1,000 years to ingest the amount of cholesterol in one egg.

Another example is displayed in the calculation below. Metformin, a diabetic treatment, was detected in the treated water in May 2019 at a concentration of 6.6 ng/L. A common daily dose of metformin is 850 milligrams (mg). To compare the wet and dry doses as an ingested amount, first one must convert the concentration detected into micrograms per liter (mg/L) and then divide the dose by the concentration to calculate the number of liters it would take to match the dose. There are 1,000,000 nanograms in 1 milligram.

$$\frac{6.60\ \text{ng}}{\text{L}} \times \frac{1\ \text{mg}}{1{,}000{,}000\ \text{ng}} = \frac{0.0000066\ \text{mg}}{\text{L}}$$

$$850\ \text{mg} \div \frac{0.0000066\ \text{mg}}{\text{L}} \cong 128{,}787{,}879\ \text{L}$$

In other words, a person would have to drink approximately 128,787,879 liters (34,022,158 gallons) of water at the detected concentration to ingest one 850 mg dose of metformin. This means that if one consumed the recommended two liters of water per day, it would take more than 176,421 years to ingest a single common daily dose of metformin.

Table 5. Comparison of Substance Concentration in Treated Drinking Water to Commonly Prescribed Dose or Dietary Amount

Substance	Classification	Highest Level Detected (ng/L)	Commonly Prescribed Dose or Dietary Intake Amount (mg/day)	Volume of Water Needed to Consume to Meet Prescribed Dose or Dietary Amount		Years of Consumption at Two Liters Daily to Meet One Prescribed Dose
				Liters	Gallons	
17 Beta-estradiol	Reproductive hormone	0.5*	0.5	1,087,000	287,000	1,500
Beta-Sitosterol	Plant sterol	630*	60	95,000	25,000	130
Campesterol	Plant sterol	11	28	2,500,000	660,000	3,400
Cholestanol	Stanol, waste biomarker	2*	1.9	942,000	249,000	1,300
Cholesterol	Animal sterol	277*	200	722,000	191,000	1,000
Ciprofloxacin	Antibiotic	12	1,000	81,300,000	21,500,00	111,000
Diltiazem	Calcium channel blocker and antihypertensive drug	0.4	120	304,600,000	80,500,000	417,000
Equilin	Equine hormone, constituent of HRT drug (Primarin)	28	0.6	22,000	5,900	30
Metformin	Anti-diabetic medication	7	850	129,000,000	34,020,000	176,000
Stigmasterol	Plant sterol	113	28	247,000	65,000	340
Sucralose	Artificial sweetener, sugar substitute	1,170	350	299,000	79,000	410

*Blank corrected result

Due to the very small concentrations of the CECs found in treated drinking water, there are no known human health impacts. Of course, future research is needed to quantify action levels and potential hazards.

At this time, none of these substances are regulated by the Environmental Protection Agency (EPA); they are presumed to pose no threat to human health. Some monitored substances may never pose a threat to human health as they are naturally occurring, and not a result of anthropogenic influence, such as plant sterols (U.S. EPA, 2009). As interest in monitoring for CECs continues to increase nationwide, laboratory analytical methods will also evolve and are expected to continue to improve the confidence of accuracy in measurements at such low levels.

Conclusion

The CECs monitored are not yet regulated at the federal or state level, but the Water Authority continues to take proactive steps to learn about contaminants of emerging concern as research continues and laboratory methods improve. The data collected in this report are used to characterize how the human consumption or personal use of unregulated chemicals can be identified in the local surface water supply and wastewater system, over time, and show how current treatment processes and seasonal changes in the river can impact the detected concentrations.

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APPENDIX

LIST OF CONTAMINANTS OF EMERGING CONCERN (CECs) 2018-2021 STUDY				
Protocol	**Method**	**Analytes**		
CEC Protocol (WT – PHARM Rev 03)	**AXYS Method MLA-075 (EPA Method 1694)**	1,7-Dimethylxanthine	Demeclocycline	Oxolinic acid
		2-hydroxy-ibuprofen	Digoxigenin	Oxycodone
		4-Epianhydrochlortetracycline	Digoxin	Oxytetracycline
		4-Epianhydrotetracycline	Diltiazem	Penicillin G
		4-Epichlortetracycline	Diphenhydramine	Penicillin V
		4-Epioxytetracycline	Doxycycline	Ranitidine
		4-Epitetracycline	Enalapril	Roxithromycin
		Acetaminophen	Enrofloxacin	Sarafloxacin
		Albuterol	Erythromycin-H20	Sulfachloropyridazine
		Amphetamine	Flumequine	Sulfadiazine
		Anhydrochlortetracycline	Fluoxetine	Sulfadimethoxine
		Anhydrotetracycline	Furosemide	Sulfamerazine
		Atenolol	Gemfibrozil	Sulfamethazine
		Atorvastatin	Glipizide	Sulfamethizole
		Azithromycin	Glyburide	Sulfamethoxazole
		Bisphenol A	Hydroclorothiazide	Sulfanilamide
		Caffeine	Hydrocodone	Sulfathiazole
		Carbadox	Ibuprofen	Tetracycline
		Carbamazepine	Isochlortetracycline	Thiabendazole
		Cefotaxime	Lincomycin	Triamterene
		Chlortetracycline	Lomefloxacin	Triclocarban
		Cimetidine	Metformin	Triclosan
		Ciprofloxacin	Miconazole	Trimethoprim
		Clarithromycin	Minocycline	Tylosin
		Clinafloxacin	Naproxen	Virginiamycin
		Clonidine	Norfloxacin	Warfarin
		Cloxacillin	Norgestimate	
		Codeine	Ofloxacin	
		Cotinine	Ormetoprim	
		Dehydronifedipine	Oxacillin	
	AXYS Method MLA-068 (EPA Method 1698)	17ß-Estradiol (E2)	Coprostanol	Mestranol
		17α-Dihydroequilin	Desmosterol	Norethindrone
		17α-Estradiol (E2)	Desogestrel	Norgestrel
		17α-Ethinyl Estradiol (EE2)	Epicoprostanol	Progesterone
		Androstenedione	Equilenin	ß-Estradiol-3-Benzoate
		Campesterol	Equilin	ß-Sitosterol
		Cholestanol	Ergosterol	ß-Stigmastanol
		Cholesterol	Estriol (E3)	Stigmasterol
		cis-Androsterone	Estrone (E1)	Testosterone
	AXYS Method MLA-104/116	Sucralose		

Table A 1 List of Contaminants of Emerging Concern

YEAR	Monthly mean in cubic feet per second (ft^3/s)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2018	542	566	459	461	513	498	534	445	235	237	241	353
2019	380	508	1,240	2,430	4,410	4,660	2,500	888	466	605	1,170	793

Table A 2. Flow data in 2020 at Alameda Bridge in Albuquerque, NM.

Field Blank Corrected Results (ng/L)									
	Treated Drinking Water Blank (WTPEP01Blank)								
Substance	18-Jan		18-Aug		18-Oct		19-May		
	Result	RL	Result	RL	Result	RL	Result	RL	Classification
Androstenedione	U	23.7	U	10.6	K 28.7	8.91	U	27	Hormone metabolite
beta-Sitosterol	B MAX 26.3	2.34	U	2.27	B MAX 19.65	0.836	B D MAX 1079	4.08	Plant sterol
Cholestanol	B K 2.456	0.887	U	0.546	K 1.47	0.738	U	5.52	Sterol
Cholesterol	B 240	3.89	B 5.4	3.82	U	2.28	U	18.3	Sterol
Stigmasterol	B MAX 3.4	2.3	U	2.08	K 6.8	1.01	B D MAX 221.4	4.25	Plant sterol

Table A 3. Field blank results

FLAG	=	DEFINITION
D	=	dilution data
H	=	concentration is estimated
N	=	authentic recovery is not within method/contract control limits
NQ	=	data not quantifiable
K	=	peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration
MAX	=	concentration is an estimated maximum value
U	=	undetected (blank corrected result < detection level)
B	=	blank corrected value

AXYS Method MLA-104/116

AXYS Method MLA-104/116 Sucralose Results (ng/L)								
Location	18-Jan		18-Aug		18-Oct		19-May	
	Result	RL	Result	RL	Result	RL	Result	RL
North Reuse (NPRSALA)	1090	94.2	1160	98.9	1430	9.89	D256	16.1
Rio Grande (RWPS)	709	154	H 582	264	1020	12.9	138	6.24
Drinking Water Influent (SWBA)	1240	140	H 1070	141	1970	10.1	216	5.4
Treated Drinking Water (WTPEP01)	919	196	809	77.5	1170	10.5	184	7.63
Westside Interceptor (F12131)	D 16900	151	23700	14.1	31600	13	32300	9.96
Tijeras Interceptor (Q14612)	D25100	135	D 60900	47.3	60300	18.5	59300	12.3
SWRP Influent (TP2.3A)	D 24000	138	D 43000	50.3	46000	13.3	57500	8.81
SWRP Effluent (TP2.7EMS)	D 8590	512	D 41800	87.2	51600	12	59700	7.91
SWRP Reuse (CLWRSNK)	D 10100	488	D 40200	49	51900	10.8	58100	10.8

Table A 4

AXYS Method MLA-068 (EPA Method 1698)

Blank Corrected Results for AXYS Method MLA-068 (EPA Method 1698) Detected Substances at WTP Monitoring Locations (ng/L)									
	Northside Reuse (NPRPSALA)								
Substance	Jan-18		Aug-18		Oct-18		May-19		
	Result	RL	Result	RL	Result	RL	Result	RL	Classification
Desogestrel	B 1.19	1	U	8.07	U	2.88	U	5.16	Ovulation inhibitor
beta Stigmastanol	U	2.6	U	2.8	U	1	U	48	Plant sterol
Coprostanol	U	2.34	U	2.02	10	1.57	U	14.1	Sterol
Desmosterol	U	2.58	U	4.89	U	2.02	U	85	Sterol
Ergosterol	U	1.79	U	1.39	U	0.918	U	511	Sterol
Cholestanol	B K 1.01	0.588	U	0.623	K 1.71	0.511	U	5.62	Sterol
17 beta-Estradiol	U	0.322	U	0.488	U	0.891	U	3.86	Sex Hormone
Campesterol	U	3.01	U	2.52	3.99	2.19	D 72.8	24.5	Plant sterol
Equilin	U	1.66	U	5.81	U	7.79	U	15.8	Hormone replacement
beta-Sitosterol	U	1.44	U	2.22	B MAX 48.65	0.0238	B D MAX 2789	4.54	Plant sterol
Cholesterol	95	3.29	U	3.12	B 5	1.99	B D 26.8	20.7	Sterol
Stigmasterol	U	1.54	U	2.2	MAX 12.5	0.619	B D MAX 537.4	4.94	Plant sterol

Table A 5

Blank Corrected Results for AXYS Method MLA-068 (EPA Method 1698) Detected Substances at WTP Monitoring Locations (ng/L)									
	Rio Grande (RWPS)								
Substance	Jan-18		Aug-18		Oct-18		May-19		
	Result	RL	Result	RL	Result	RL	Result	RL	Classification
Desogestrel	U	2.77	U	14.5	U	7.39	U	6.34	Ovulation inhibitor
beta Stigmastanol	K 7.88	4.19	B MAX 9.76	3.7	K 13.6	2.32	D MAX 218	109	Plant sterol
Coprostanol	4.82	3.79	6.18	2.73	8.6	1.97	D 84.9	26.4	Sterol
Desmosterol	U	4.86	K 20.8	6.58	K 9.95	4.22	U	126	Sterol
Ergosterol	U	3.54	H 5.57	1.64	U	1.45	U	2200	Sterol
Cholestanol	B 4.73	1.25	B 12.105	0.759	16.8	0.77	B D 86.16	17.7	Sterol
17 beta-Estradiol	U	0.373	U	0.639	U	1.18	U	8.28	Sex Hormone
Campesterol	K 13.3	4.89	B 22.25	3.66	20.4	2.58	K D 397	48.9	Plant sterol
Equilin	U	2.55	U	5.17	U	13.8	U	23.5	Hormone replacement
beta-Sitosterol	B MAX 421	3.35	B MAX 203	2.72	B MAX 116.15	0.964	B D MAX 6219	10.6	Plant sterol
Cholesterol	B 48	5.63	B 186.3	4.21	B 95	2.65	B D 733.6	46.5	Sterol
Stigmasterol	B MAX 74.8	2.43	B MAX 99.7	3.18	MAX 35.9	2.91	B D MAX 1395.4	31.9	Plant sterol

Table A 6

Blank Corrected Results for AXYS Method MLA-068 (EPA Method 1698) Detected Substances at WTP Monitoring Locations (ng/L)									
	Drinking Water Influent (SWBA)								
Substance	Jan-18		Aug-18		Oct-18		May-19		
	Result	RL	Result	RL	Result	RL	Result	RL	Classification
Desogestrel	U	2.62	U	22.2	U	3.85	U	7.63	Ovulation inhibitor
beta Stigmastanol	U	4.92	B K 10.46	4.95	MAX 9.4	3.03	U	180	Plant sterol
Coprostanol	U	4.2	U	3.51	4.86	2.17	D 73.6	26.6	Sterol
Desmosterol	U	3.86	9.9	7.18	11.9	4.31	D 222	176	Sterol
Ergosterol	U	2.48	H 9.98	1.6	U	1.76	K D H 1920	1080	Sterol
Cholestanol	B 6.13	1.08	B 8.175	0.934	16	1.31	B D 84.46	14.3	Sterol
17 beta-Estradiol	U	0.38	U	0.764	U	1.1	U	8.3	Sex Hormone
Campesterol	8.3	5.83	B 14.65	4.21	15.8	3.09	D 395	43.4	Plant sterol
Equilin	U	2.07	U	10.4	U	9.25	U	24.8	Hormone replacement
beta-Sitosterol	B MAX 70.3	3.86	B MAX 75	3.29	B MAX 125.15	3.21	B D MAX 6159	6.34	Plant sterol
Cholesterol	B 384	5.46	B 89.3	3.3	B 83	3.21	B D 792.6	37.9	Sterol
Stigmasterol	B MAX 12.8	2.78	B MAX 102.7	3.24	MAX 45.3	1.56	B D MAX 1405.4	6.3	Plant sterol

Table A 7

Blank Corrected Results for AXYS Method MLA-068 (EPA Method 1698) Detected Substances at WTP Monitoring Locations (ng/L)									
	Treated Drinking Water (WTPEP01)								
Substance	Jan-18		Aug-18		Oct-18		May-19		
	Result	RL	Result	RL	Result	RL	Result	RL	Classification
Desogestrel	U	1.37	U	1.2	U	2.59	U	2.69	Ovulation inhibitor
beta Stigmastanol	U	3.93	U	1.4	U	3.97	U	4	Plant sterol
Coprostanol	U	3.6	U	2.53	U	4.23	U	2.67	Sterol
Desmosterol	U	2.85	U	1.93	U	3.67	U	7.66	Sterol
Ergosterol	U	2.64	U	1.44	U	2.98	U	88.2	Sterol
Cholestanol	B 2.02	1.03	U	1.1	U	1.49	U	1.87	Sterol
17 beta-Estradiol	U	0.213	B K 0.46	0.384	U	4.23	U	2.67	Sex Hormone
Campesterol	U	4.15	U	3.02	11.2	5.18	U	5.03	Plant sterol
Equilin	U	1.74	U	1.88	K 28.2	27.3	U	6.62	Hormone replacement
beta-Sitosterol	B MAX 27.7	3.02	B MAX 46.15	1.06	B MAX 630.2	3.48	B MAX 267	2.52	Plant sterol
Cholesterol	B 277	4.53	U	3.26	B 13.8	4.01	B 20.5	3.75	Sterol
Stigmasterol	B K 3.8	1.75	MAX 14.7	0.0444	B MAX 113.3	2.98	B MAX 50.6	4.69	Plant sterol

Table A 8

Blank Corrected Results for AXYS Method MLA-068 (EPA Method 1698) Detected Substances at WTP Monitoring Locations (ng/L)									
	Westside Interceptor (F12131)								
Substance	Jan-18		Aug-18		Oct-18		May-19		
	Result	RL	Result	RL	Result	RL	Result	RL	Classification
17 alpha-Dihydroequilin	U	23	U	16	U	12.7	U	15.8	Sterol
17 alpha-Estradiol	K D 16.2	15.3	K D 27.1	7.67	U	21.5	U	21.6	Sex Hormone
17 alpha-Ethinyl-Estradiol	B K D 11.8	6.59	U	7.1	U	14.7	U	25	Ovulation inhibitor
17 beta-Estradiol	B D 11.7	9.08	B D 7.391	5.76	U	13	U	13.1	Sex Hormone
Androstenedione	K D 164	134	U	125	D 641	222	K D 216	97.6	Hormone metabolite
Androsterone	D 625	10.1	D 726	4.55	D 262	9.8	D 263	8.58	Hormone metabolite
beta Stigmastanol	B MAX 502	6.8	B D MAX 1777.36	47.5	B K D 357.73	3.01	D MAX 1160	90.9	Plant sterol
beta-Sitosterol	B MAX 5840	7.53	B D MAX 18411	40.7	B D MAX 4702.9	2.28	B D MAX 28766	50.9	Plant sterol
Campesterol	B 765	37.6	B D 6115.21	46.5	D 1030	30.7	B D 4394.12	106	Plant sterol
Cholestanol	B 375	15.4	D 2090	15.3	D 468	0.23	B D 1287.1	37.2	Sterol
Cholesterol	B 12068	48.6	B D 102973.7	110	B D 18482.5	28	B D 66904.9	130	Sterol
Coprostanol	4310	19.6	D 28400	35.2	D 6940	17.9	B D 22195.07	115	Sterol
Desmosterol	212	116	K D 997	694	U	275	U	719	Sterol
Epicoprostanol	357	21.3	D 1050	41.8	D 269	22.6	D 591	133	Sterol
Ergosterol	H 43.7	35.9	D H 138	41.3	U	24.1	D H 9800	3140	Sterol
Estriol	D 109	17.2	B D 637.514	18	D 217	0.868	D 325	59.6	Sex Hormone

Blank Corrected Results for AXYS Method MLA-068 (EPA Method 1698) Detected Substances at WTP Monitoring Locations (ng/L)									
Estrone	U	54.8	D 34.9	24	D 43.8	25.5	D 40.7	32.2	Sex Hormone
Norethindrone	U	180	K D 1140	50.1	U	294	U	347	Ovulation inhibitor
Norgestrel	U	64.6	U	137	U	67.6	U	373	Ovulation inhibitor
Stigmasterol	B MAX 830	6.83	B D MAX 2764.6	50.1	B D MAX 688.84	2.67	B D MAX 5450.1	20.2	Plant sterol
Testosterone	D 1060	161	D 1540	107	D 1800	133	D 1480	220	Sex Hormone

Table A 9

Blank Corrected Results for AXYS Method MLA-068 (EPA Method 1698) Detected Substances at WTP Monitoring Locations (ng/L)									
	Tijeras Interceptor (Q14612)								
Substance	Jan-18		Aug-18		Oct-18		May-19		
	Result	RL	Result	RL	Result	RL	Result	RL	Classification
17 alpha-Dihydroequilin	U	51.4	U	20.4	U	21.4	U	29.8	Sterol
17 alpha-Estradiol	144	23.8	K D 97.7	24.2	K D 51	28.4	K D 55.6	32.5	Sex Hormone
17 alpha-Ethinyl-Estradiol	B K 42.9	9.06	B K D 43.844	12.5	U	23.9	U	27.3	Ovulation inhibitor
17 beta-Estradiol	B 17.0	15.5	U	18.2	U	17.2	B K D 27.404	19.7	Sex Hormone
Androstenedione	513	247	U	278	U	604	U	310	Hormone metabolite
Androsterone	D 1140	33.3	D 611	9.29	D 507	54.8	D 502	11.6	Hormone metabolite
beta Stigmastanol	B MAX 2248	14.3	B D MAX 4367.36	91.6	B D MAX 1628.73	10	K D 2850	36.1	Plant sterol
beta-Sitosterol	B MAX 35070	16.1	B D MAX 40111	91.2	B D MAX 31352.9	6.62	B D MAX 51266	148	Plant sterol
Campesterol	B 5842	103	B D 12695.21	102	D 5210	87.9	B D 9034.12	208	Plant sterol
Cholestanol	B 2400	43	D 5490	19	D 2420	0.533	B D 2897.1	59.4	Sterol
Cholesterol	B 79268	169	B D 208973.7	117	B D 65182.5	78.6	B D 128904.9	209	Sterol
Coprostanol	36500	37.9	D 105000	79.7	D 35400	107	B D 62795.07	146	Sterol
Desmosterol	U	394	K D 1890	1510	U	1670	U	2340	Sterol
Epicoprostanol	1720	41.3	D 3180	94.8	D 395	135	D 675	170	Sterol
Ergosterol	U	84.5	K D H 626	50.5	U	99.7	U	5800	Sterol

Blank Corrected Results for AXYS Method MLA-068 (EPA Method 1698) Detected Substances at WTP Monitoring Locations (ng/L)									
Estriol	1320	24	B D 441.514	25	K D 464	0.458	D 342	57.5	Sex Hormone
Estrone	U	191	D 63.5	51	U	91.2	D 64	41.5	Sex Hormone
Norethindrone	NQ	NQ	K D 2500	135	U	411	U	170	Ovulation inhibitor
Norgestrel	B K 1006	450	U	359	U	122	U	480	Ovulation inhibitor
Stigmasterol	B MAX 5330	48.5	B D MAX 7074.6	89	B K D 6050.84	7.74	B D MAX 10470.1	39.5	Plant sterol
Testosterone	D 3580	598	D 3430	291	D 3960	361	D 2820	279	Sex Hormone

Table A 10

Blank Corrected Results for AXYS Method MLA-068 (EPA Method 1698) Detected Substances at WTP Monitoring Locations (ng/L)									
	SWRP Influent (TP2.3A)								
Substance	Jan-18		Aug-18		Oct-18		May-19		
	Result	RL	Result	RL	Sterol	RL	Result	RL	Classification
17 alpha-Dihydroequilin	U	58.5	U	18.4	Sex Hormone	32	U	31	Sterol
17 alpha-Estradiol	D 116	39.7	K D 11.3	10.9	Ovulation inhibitor	37.4	U	46.7	Sex Hormone
17 alpha-Ethinyl-Estradiol	B K D 22.7	14.3	B K D 21.044	11.4	Sex Hormone	30	U	36.2	Ovulation inhibitor
17 beta-Estradiol	K D 39.1	26.1	B K D 10.631	8.17	Hormone metabolite	22.7	U	27.1	Sex Hormone
Androstenedione	K D 799	730	U	292	Hormone metabolite	404	U	757	Hormone metabolite
Androsterone	D 2080	194	D 674	26.7	Plant sterol	31	D 814	59.6	Hormone metabolite
beta Stigmastanol	B MAX 1238	17.6	B D MAX 771.36	34.7	Plant sterol	3.75	B D MAX 255.78	50.1	Plant sterol
beta-Sitosterol	B MAX 34670	23.2	B D MAX 7211	34	Plant sterol	2.83	B D MAX 6388	41	Plant sterol
Campesterol	B 2652	108	B D 2505.21	35.3	Sterol	36.5	B D 1289.4	50.6	Plant sterol
Cholestanol	B 804	40.2	D 1180	10	Sterol	0.152	B D 461.08	44.8	Sterol
Cholesterol	B 30068	135	B D 40273.7	56.1	Sterol	41.7	B D 11861.7	43.7	Sterol
Coprostanol	12700	77.8	D 18900	123	Sterol	16.6	D 6400	38.4	Sterol
Desmosterol	U	420	D 1170	564	Sterol	529	U	307	Sterol
Epicoprostanol	594	84.7	D 635	147	Sterol	20.9	D 80.3	44.6	Sterol
Ergosterol	U	115	D H 81.6	22.4	Sex Hormone	40.1	U	2140	Sterol

Blank Corrected Results for AXYS Method MLA-068 (EPA Method 1698) Detected Substances at WTP Monitoring Locations (ng/L)									
Estriol	D 556	33.1	B D 1299.514	93.3	Sex Hormone	2.62	D 264	74.9	Sex Hormone
Estrone	U	170	D 51.2	32.2	Ovulation inhibitor	39.9	U	87.5	Sex Hormone
Norethindrone	U	351	K D 3510	466	Ovulation inhibitor	1170	U	550	Ovulation inhibitor
Norgestrel	U	243	U	320	Plant sterol	674	U	194	Ovulation inhibitor
Stigmasterol	B MAX 5480	87.1	B D MAX 1154.6	41.7	Sex Hormone	3.68	B D MAX 1212.6	7.6	Plant sterol
Testosterone	D 5490	1120	D 2390	209	D 2580	419	D 3800	286	Sex Hormone

Table A 11

Blank Corrected Results for AXYS Method MLA-068 (EPA Method 1698) Detected Substances at WTP Monitoring Locations (ng/L)									
	SWRP Effluent (TP2.7 EMS)								
Substance	Jan-18		Aug-18		Oct-18		May-19		
	Result	RL	Result	RL	Result	RL	Result	RL	Classification
17 alpha-Dihydroequilin	U	8.18	U	9.27	D 22	21.3	U	23.5	Sterol
17 alpha-Estradiol	U	3.79	U	3.36	U	10.1	U	13.8	Sex Hormone
17 alpha-Ethinyl-Estradiol	U	3.66	U	21.2	U	13.1	U	10	Ovulation inhibitor
17 beta-Estradiol	U	2.25	U	2.52	U	6.13	U	8.32	Sex Hormone
Androstenedione	U	30.4	U	28.4	U	83.2	U	92.8	Hormone metabolite
Androsterone	U	13.1	U	4.14	U	9.92	U	8.1	Hormone metabolite
beta Stigmastanol	B K D 39.7	34.4	B K D 33.76	5.33	U	3.68	K D 143	9.87	Plant sterol
beta-Sitosterol	B D MAX 1596	24	B D MAX 213	4.62	B D MAX 1622.9	2.44	B D MAX 6216	9.55	Plant sterol
Campesterol	K D 79.7	25.8	B K D 22.01	19.4	D 75.7	24.5	B D 237.12	61.5	Plant sterol
Cholestanol	B D 40.7	9.32	D 31.6	6.04	K D 77.9	0.225	B D 56.6	17.8	Sterol
Cholesterol	B D 543	26.3	B D 261.7	36.8	B D 620.5	24.6	B D 382.9	47.8	Sterol
Coprostanol	D 393	23	D 170	21.8	D 451	13.7	B D 287.07	34.3	Sterol
Desmosterol	U	28	U	30	U	110	U	295	Sterol
Epicoprostanol	D 25.9	25.9	D 36.7	25.9	D 26.1	17.3	U	39.9	Sterol
Ergosterol	D H 43.4	13.1	K D H 31.3	11.9	U	21	U	1100	Sterol
Estriol	U	7.71	U	54.1	K D 5.79	0.393	U	29.6	Sex Hormone

Blank Corrected Results for AXYS Method MLA-068 (EPA Method 1698) Detected Substances at WTP Monitoring Locations (ng/L)									
Estrone	D 21.8	12.6	U	9.87	U	27.8	U	23.6	Sex Hormone
Norethindrone	NQ	NQ	U	111	U	31.6	U	57.1	Ovulation inhibitor
Norgestrel	U	25.6	U	209	U	35.2	U	40.2	Ovulation inhibitor
Stigmasterol	B D MAX 421	18.4	B D MAX 87.6	11	B K D 431.84	3.26	B D MAX 1200.1	10.8	Plant sterol
Testosterone	U	29.4	U	29.7	U	75.9	U	46	Sex Hormone

Table A 12

Blank Corrected Results for AXYS Method MLA-068 (EPA Method 1698) Detected Substances at WTP Monitoring Locations (ng/L)									
	SWRP Reuse (CLWRSNK)								
Substance	Jan-18		Aug-18		Oct-18		May-19		
	Result	RL	Result	RL	Result	RL	Result	RL	Classification
17 alpha-Dihydroequilin	K 54.9	11	U	11.7	U	18.8	U	24.4	Sterol
17 alpha-Estradiol	U	1.25	U	2.96	U	6.18	U	16.5	Sex Hormone
17 alpha-Ethinyl-Estradiol	U	1.28	U	3.69	U	12	U	13.3	Ovulation inhibitor
17 beta-Estradiol	U	0.813	U	2.22	U	3.75	U	9.98	Sex Hormone
Androstenedione	U	19.9	U	47.5	U	76.3	U	67.9	Hormone metabolite
Androsterone	U	3.73	U	6.19	U	8.15	U	6.84	Hormone metabolite
beta Stigmastanol	B K 15.3	4.27	B MAX 20.86	4.43	B K D 75.73	3.27	U	100	Plant sterol
beta-Sitosterol	B MAX 141	3.48	B MAX 646	4.21	B D MAX 2822.9	2.48	B D MAX 13366	17.1	Plant sterol
Campesterol	28.4	5.52	B 44.41	4.18	D 107	25.5	B D 415.12	76.7	Plant sterol
Cholestanol	B 41.0	1.45	50.6	1.04	D 91.3	0.228	B K D 61.7	17.1	Sterol
Cholesterol	B 443	6.64	B 451.7	4.75	B D 624.5	23.3	B D 536.9	66.6	Sterol
Coprostanol	372	4.87	356	3.17	D 440	14.3	B D 303.07	38.3	Sterol
Desmosterol	K 11.4	8.73	U	54.7	U	81.3	U	352	Sterol
Epicoprostanol	28.3	5.3	20.6	3.53	D 33.6	18.1	U	44.6	Sterol
Ergosterol	K H 3.07	2.83	K H 17.4	2.23	U	17.4	U	1750	Sterol

Blank Corrected Results for AXYS Method MLA-068 (EPA Method 1698) Detected Substances at WTP Monitoring Locations (ng/L)									
Estriol	U	1.98	U	10.9	U	0.533	U	28.6	Sex Hormone
Estrone	K 8.60	5.28	U	10.9	U	19.8	U	22.1	Sex Hormone
Norethindrone	NQ	NQ	U	31.8	U	16.4	U	19.3	Ovulation inhibitor
Norgestrel	U	18	U	38.1	U	37.8	U	61.4	Ovulation inhibitor
Stigmasterol	B MAX 72.6	3.63	B MAX 227.6	4.33	B K D 842.84	3.31	B D MAX 2690.1	14.9	Plant sterol
Testosterone	U	10	U	27.3	U	50.3	U	42.8	Sex Hormone

Table A 13

AXYS Method MLA-075 (EPA Method 1694)

Blank Corrected Results for AXYS Method MLA-075 (EPA Method 1694) Detected Substances at WTP Monitoring Locations (ng/L)									
	Northside Reuse (NPRPSALA)								
Substance	Jan-18		Aug-18		Oct-18		May-19		
	Result	RL	Result	RL	Result	RL	Result	RL	Classification
Albuterol	U	0.328	U	0.28	U	0.305	U	0.288	Anti-asthmatic
Atenolol	U	0.657	U	0.561	U	0.61	U	0.577	Antihypertensive
Carbamazepine	7.97	1.68	7.49	1.49	7.32	1.51	2.21	1.49	Anticonvulsant
Cimetidine	U	0.0846	U	0.561	U	0.61	U	0.577	Anti-acid reflux
Ciprofloxacin	U	7.92	U	10.1	U	8.94	U	12.4	Quinoline antibiotic
Diltiazem	U	0.337	U	0.298	U	0.301	0.299	0.299	Antihypertensive
Erythromycin-H2O	U	2.58	U	2.29	U	2.31	2.32	2.29	Macrolide antibiotic
Gemfibrozil	U	1.68	U	1.49	U	1.51	U	1.49	Antilipemic
Metformin	U	3.28	U	3.77	U	3.05	U	2.88	Anti-diabetic drug
Naproxen	U	3.37	U	2.98	U	3.01	U	2.99	Non-steroidal anti-inflammatory drug
Oxycodone	U	0.657	0.792	0.561	U	0.61	K 0.685	0.577	Narcotic pain reliever
Ranitidine	U	2.19	U	0.561	U	0.61	U	0.577	Anti-acid reflux
Sarafloxacin	U	16.8	U	14.9	U	16.2	15.2	14.9	Quinoline antibiotic
Sulfadimethoxine	0.428	0.337	U	0.322	U	0.301	U	0.364	Sulfonamide antibiotic

Blank Corrected Results for AXYS Method MLA-075 (EPA Method 1694) Detected Substances at WTP Monitoring Locations (ng/L)									
Sulfamethoxazole	23.8	0.673	17.2	0.72	21.1	0.602	5.5	5.5	Sulfonamide antibiotic
Tetracycline [TC]	U	6.73	U	5.97	U	6.02	U	5.98	Tetracycline antibiotic
Thiabendazole	U	1.68	U	1.49	U	1.51	U	1.49	Fungicide and parasiticide
Triamterene	U	0.328	U	0.28	U	0.305	U	0.288	Diuretic
Triclocarban	U	3.37	U	2.98	U	3.01	U	2.99	Antimicrobial, disinfectant
Triclosan	U	67.3	U	59.7	U	60.2	U	59.8	Antimicrobial, disinfectant
Trimethoprim	U	1.68	U	1.49	U	1.51	U	1.49	Pyrimidine antibiotic
Tylosin	U	6.73	U	59.7	U	6.02	U	5.98	Antibiotic
Virginiamycin M1	U	3.37	U	2.98	U	3.01	U	2.99	Macrolide antibiotic
Warfarin	U	1.68	U	1.49	U	1.51	U	1.49	Anticoagulant

Table A 14

Blank Corrected Results for AXYS Method MLA-075 (EPA Method 1694) Detected Substances at WTP Monitoring Locations (ng/L)									
	Rio Grande (RWPS)								
Substance	Jan-18		Aug-18		Oct-18		May-19		
	Result	RL	Result	RL	Result	RL	Result	RL	Classification
Albuterol	U	0.334	U	0.287	U	489	U	0.303	Anti-asthmatic
Atenolol	U	0.668	U	0.618	U	2.93	U	0.606	Antihypertensive
Carbamazepine	3.03	1.66	3.97	1.49	U	58.7	U	1.47	Anticonvulsant
Cimetidine	U	0.0961	U	0.575	U	1.47	U	0.606	Anti-acid reflux
Ciprofloxacin	NQ	NQ	NQ		U	14.7	NQ		Quinoline antibiotic
Diltiazem	0.781	0.332	0.516	0.298	NQ		U	0.294	Antihypertensive
Erythromycin-H2O	U	2.55	U	2.29	NQ		U	2.25	Macrolide antibiotic
Gemfibrozil	1.7	1.66	U	1.49	NQ		U	1.47	Antilipemic
Metformin	42.8	3.34	18.1	2.87	U	1.47	5.12	3.03	Anti-diabetic drug
Naproxen	U	3.32	U	2.98	U	0.587	4.84	2.94	Non-steroidal anti-inflammatory drug
Oxycodone	1.27	0.668	0.995	0.575	U	2.93	U	0.606	Narcotic pain reliever
Ranitidine	2.68	2.23	U	0.575	U	5.87	U	0.606	Anti-acid reflux
Sarafloxacin	NQ	NQ	NQ		U	5.87	NQ		Quinoline antibiotic
Sulfadimethoxine	0.342	0.332	U	0.298	U	14.7	U	0.387	Sulfonamide antibiotic
Sulfamethoxazole	8.02	0.664	8.49	0.597	U	58.7	1.57	0.587	Sulfonamide antibiotic

Blank Corrected Results for AXYS Method MLA-075 (EPA Method 1694) Detected Substances at WTP Monitoring Locations (ng/L)									
Tetracycline [TC]	U	6.64	U	5.99	25.8	3.04	U	5.87	Tetracycline antibiotic
Thiabendazole	U	1.66	U	1.49	15.9	0.587	U	1.47	Fungicide and parasiticide
Triamterene	0.706	0.334	U	0.287	4.55	1.47	U	0.303	Diuretic
Triclocarban	U	3.32	U	2.98	2.15	0.304	U	2.94	Antimicrobial, disinfectant
Triclosan	U	66.4	U	59.7	1.21	0.293	U	58.7	Antimicrobial, disinfectant
Trimethoprim	U	3.06	U	1.49	1.17	0.609	U	1.47	Pyrimidine antibiotic
Tylosin	U	6.64	U	59.7	1.03	0.609	U	5.87	Antibiotic
Virginiamycin M1	U	3.32	U	2.98	0.75	0.609	U	2.94	Macrolide antibiotic
Warfarin	U	1.66	U	1.49	0.311	0.304	U	1.47	Anticoagulant

Table A 15

Blank Corrected Results for AXYS Method MLA-075 (EPA Method 1694) Detected Substances at WTP Monitoring Locations (ng/L)									
	Drinking Influent (SWBA)								
Substance	Jan-18		Aug-18		Oct-18		May-19		
	Result	RL	Result	RL	Result	RL	Result	RL	Classification
Albuterol	0.488	0.329	U	0.282	0.339	0.302	U	0.308	Antiasthmatic
Atenolol	0.786	0.657	K 0.605	0.566	1.54	0.605	U	0.617	Antihypertensive
Carbamazepine	7.67	1.6	6.62	1.5	8.17	1.49	U	1.47	Anticonvulsant
Cimetidine	0.915	0.121	U	0.564	U	0.605	U	0.617	Anti-acid reflux
Ciprofloxacin	NQ	NQ	NQ		NQ		NQ		Quinoline antibiotic
Diltiazem	1.11	0.32	U	0.3	1.45	0.298	U	0.293	Antihypertensive
Erythromycin-H2O	2.52	2.45	U	2.3	U	2.29	U	2.25	Macrolide antibiotic
Gemfibrozil	2.84	1.6	U	1.5	U	1.49	U	1.47	Antilipemic
Metformin	52.5	3.29	15.6	2.82	24.6	3.02	13.3	3.08	Anti-diabetic drug
Naproxen	U	3.2	U	3	U	2.98	2.97	2.93	Non-steroidal anti-inflammatory drug
Oxycodone	1.51	0.657	0.637	0.564	1.34	0.605	U	0.617	Narcotic pain reliever
Ranitidine	3.32	2.19	U	0.564	0.736	0.605	U	0.617	Anti-acid reflux
Sarafloxacin	NQ	NQ	NQ		NQ		NQ		Quinoline antibiotic
Sulfadimethoxine	0.364	0.32	U	0.315	U	0.298	U	0.547	Sulfonamide antibiotic
Sulfamethoxazole	17.2	0.639	15.3	0.599	28.6	0.597	2.37	0.586	Sulfonamide antibiotic

Blank Corrected Results for AXYS Method MLA-075 (EPA Method 1694) Detected Substances at WTP Monitoring Locations (ng/L)									
Tetracycline [TC]	U	6.39	U	5.99	U	5.97	U	5.86	Tetracycline antibiotic
Thiabendazole	U	1.6	U	1.5	U	1.49	U	1.47	Fungicide and parasiticide
Triamterene	1.56	0.329	0.588	0.282	2.85	0.302	0.309	0.308	Diuretic
Triclocarban	U	3.2	U	3	U	2.98	U	2.93	Antimicrobial, disinfectant
Triclosan	U	63.9	U	59.9	U	59.7	U	58.6	Antimicrobial, disinfectant
Trimethoprim	3.83	1.6	U	1.5	U	1.49	U	1.53	Pyrimidine antibiotic
Tylosin	U	6.39	U	59.9	U	5.97	U	5.86	Antibiotic
Virginiamycin M1	U	3.2	U	3	U	2.98	U	2.93	Macrolide antibiotic
Warfarin	U	1.6	U	1.5	U	1.49	U	1.47	Anticoagulant

Table A 16

Blank Corrected Results for AXYS Method MLA-075 (EPA Method 1694) Detected Substances at WTP Monitoring Locations (ng/L)									
	Treated Drinking Water (WTPEP01)								
Substance	Jan-18		Aug-18		Oct-18		May-19		
	Result	RL	Result	RL	Result	RL	Result	RL	Classification
Albuterol	U	0.314	U	0.292	U	0.301	U	0.308	Antiasthmatic
Atenolol	U	0.628	U	0.864	U	0.602	U	0.617	Antihypertensive
Carbamazepine	U	2.97	U	1.49	U	1.65	U	1.49	Anticonvulsant
Cimetidine	U	0.834	U	0.584	U	0.602	U	0.617	Anti-acid reflux
Ciprofloxacin	U	11.9	U	5.96	12.3	6.59	U	14	Quinoline antibiotic
Diltiazem	U	0.593	U	0.298	U	0.329	0.394	0.298	Antihypertensive
Erythromycin-H2O	U	4.55	U	2.28	U	2.52	U	2.28	Macrolide antibiotic
Gemfibrozil	U	2.97	U	1.49	U	1.65	U	1.49	Antilipemic
Metformin	U	3.24	U	5.79	U	3.01	6.6	3.08	Anti-diabetic drug
Naproxen	U	5.93	U	2.98	U	3.29	U	2.98	Non-steroidal anti-inflammatory drug
Oxycodone	U	0.628	U	0.584	U	0.602	U	0.617	Narcotic pain reliever
Ranitidine	U	2.18	U	0.584	U	0.602	U	0.617	Anti-acid reflux
Sarafloxacin	U	29.7	U	14.9	U	16.5	U	14.9	Quinoline antibiotic
Sulfadimethoxine	U	0.593	U	0.298	U	0.329	U	0.431	Sulfonamide antibiotic
Sulfamethoxazole	U	1.19	U	0.651	U	0.659	U	0.596	Sulfonamide antibiotic

Blank Corrected Results for AXYS Method MLA-075 (EPA Method 1694) Detected Substances at WTP Monitoring Locations (ng/L)									
Tetracycline [TC]	U	6.3	U	5.96	U	6.59	U	5.96	Tetracycline antibiotic
Thiabendazole	U	2.97	U	1.49	U	1.65	U	1.49	Fungicide and parasiticide
Triamterene	U	0.314	U	0.292	U	0.301	U	0.308	Diuretic
Triclocarban	U	5.93	U	2.98	U	3.29	NQ		Antimicrobial, disinfectant
Triclosan	U	119	U	59.6	U	65.9	U	59.6	Antimicrobial, disinfectant
Trimethoprim	U	2.97	U	1.49	U	1.65	U	1.49	Pyrimidine antibiotic
Tylosin	U	11.9	U	59.6	U	6.59	U	5.96	Antibiotic
Virginiamycin M1	U	5.93	U	2.98	U	3.29	U	2.98	Macrolide antibiotic
Warfarin	U	2.97	U	1.49	U	1.65	U	1.49	Anticoagulant

Table A 17

Blank Corrected Results for AXYS Method MLA-075 (EPA Method 1694) Detected Substances at SWRP Monitoring Locations (ng/L)									
	Westside Interceptor (F12131)								
Substance	Jan-18		Aug-18		Oct-18		May-19		
	Result	RL	Result	RL	Result	RL	Result	RL	Classification
1,7-Dimethylxanthine	22000	462	23200	326	44600	136	34400	105	Antispasmodic, caffeine metabolite
2-Hydroxy-ibuprofen	54200	320	64500	79.3	53700	101	69900	92.2	Anti-inflammatory
4-Epianhydrochlortetracycline [EACTC]	U	240	U	59.5	U	75.6	U	69.2	Chlorotetracycline degradate
4-Epianhydrotetracycline [EATC]	U	60	U	19.3	U	21.2	U	17.3	Oxytetracycline degradate
4-Epichlortetracycline [ECTC]	U	60	U	21.2	U	18.9	U	17.3	
4-Epioxytetracycline [EOTC]	U	24	U	9.69	U	7.88	U	6.92	
4-Epitetracycline [ETC]	U	24	U	16.6	11.5	8.11	8.6	6.92	Tetracycline degradate
Acetaminophen	158000	173	79600	83.9	85600	418	D 111000	173	Antipyretic, Analgesic
Albuterol	14.5	1.1	12.3	0.298	19.5	1.36	14.4	0.335	Antiasthmatic
Amphetamine	561	5.48	1810	13.8	1210	16	B K D 662.87	10	Stimulant
Anhydrochlortetracycline [ACTC]	U	60	U	25.9	U	63	U	57.6	
Anhydrotetracycline [ATC]	U	60	U	18.6	U	19.2	U	17.3	
Atenolol	839	5.14	D 783	39.8	H 1050	46.5	D 1200	11.4	Antihypertensive
Atorvastatin	78.2	5.48	D 163	4.47	40.9	1.79	51.7	1.67	Lowers blood cholesterol
Azithromycin	426	6	258	6.83	261	2.1	1330	236	Macrolide Antibiotic
Bisphenol A	U	2000	U	496	U	630	U	576	Used to make plastics

Blank Corrected Results for AXYS Method MLA-075 (EPA Method 1694) Detected Substances at SWRP Monitoring Locations (ng/L)									
Caffeine	39500	60	54100	64.1	50200	37.7	D 63500	173	Stimulant
Carbadox	U	6	U	1.49	U	5.92	U	5.76	
Carbamazepine	111	6	246	1.49	90.2	1.89	106	1.73	Anticonvulsant
Cefotaxime	U	24	U	78.1	U	7.56	NQ		
Chlortetracycline [CTC]	U	24	U	8.72	U	7.56	U	6.92	
Cimetidine	30	1.1	97.8	0.596	34.1	0.658	97.5	0.802	Anti-acid reflux
Ciprofloxacin	1140	24	685	26.6	591	16.7	379	61.2	Quinoline antibiotic
Clarithromycin	103	6	42.9	14.9	75.8	1.89	D 176	17.3	Macrolide antibiotic
Clinafloxacin	U	39.1	U	81.6	U	28	U	40.7	
Clonidine	U	5.48	U	1.49	U	1.65	U	1.67	
Cloxacillin	U	12	U	2.97	U	14.1	U	7.69	
Codeine	101	11	40	2.98	150	3.29	D 131	20.1	Opiate
Cotinine	838	548	1350	20.3	1900	2.43	D 1280	10	Nicotine metabolite
Dehydronifedipine	5.03	2.4	2.93	2.04	5.81	0.807	14.7	1.44	Nifedipine metabolite
Demeclocycline	U	60	U	16.6	U	18.9	U	17.3	
Digoxigenin	U	135	U	731	U	136	U	113	
Digoxin	U	24	28.4	19	U	7.56	U	69.2	Cardiac glycoside
Diltiazem	113	1.2	207	1.39	163	1.23	292	1.28	Antihypertensive
Diphenhydramine	2440	2.4	D 1190	1.78	1530	0.756	2500	0.692	Antihistamine

Blank Corrected Results for AXYS Method MLA-075 (EPA Method 1694) Detected Substances at SWRP Monitoring Locations (ng/L)									
Doxycycline	125	24	519	19.9	355	9.95	191	6.92	Tetracycline antibiotic
Enalapril	U	1.1	D 4.03	2.06	11.1	0.592	10.4	0.572	Treats hypertension
Enrofloxacin	U	12	5.26	5.26	U	3.82	U	3.46	
Erythromycin-H2O	20.2	9.19	8.15	2.28	6.97	2.9	8.6	2.65	
Flumequine	U	6	U	1.49	U	2.52	U	1.73	
Fluoxetine	26.2	6	42.3	1.49	56.7	1.89	44	5.76	SSRI Antidepressant
Furosemide	441	160	583	39.7	458	50.4	641	46.1	Diuretic
Gemfibrozil	1100	6	1370	1.49	1890	4.71	797	2.16	Antilipemic
Glipizide	U	24	13.8	5.95	U	7.56	32.3	6.92	Glucose control
Glyburide	U	12	U	2.97	U	3.78	U	3.46	Glucose control
Hydrochlorothiazide	463	80	267	19.8	218	25.2	265	23.1	diuretic
Hydrocodone	26.9	5.48	57.3	1.49	53.8	1.65	D 51	10	Narcotic pain reliever
Ibuprofen	20300	60	22500	44.9	22400	29.9	23500	21.7	Analgesic
Isochlortetracycline [ICTC]	U	24	U	7.22	U	7.56	U	6.92	
Lincomycin	U	12	U	6.3	U	3.78	U	11.5	Lincosamide antibiotic
Lomefloxacin	U	14.3	U	12.4	U	9.44	U	4.97	
Metformin	88200	11	D 80400	45.9	H 73400	813	D 137000	52.1	Anti-diabetic drug
Miconazole	9.01	6	10.3	3.91	18.4	2.05	K 22.4	22.4	Antifungal agent
Minocycline	U	240	U	59.5	U	75.6	U	69.2	

Blank Corrected Results for AXYS Method MLA-075 (EPA Method 1694) Detected Substances at SWRP Monitoring Locations (ng/L)									
Naproxen	15700	12	D 11500	29.7	D 22700	19.9	D 15500	17.6	Non-steroidal anti-inflammatory drug
Norfloxacin	U	98	U	77.4	U	18.9	U	104	
Norgestimate	U	12	U	16.5	U	19.2	U	11.9	
Ofloxacin	147	6	106	7.15	75.5	2.75	56.6	4.36	Quinoline antibiotic
Ormetoprim	U	2.4	U	0.595	U	0.756	U	0.921	
Oxacillin	U	12	U	2.97	U	16.3	U	4.81	
Oxolinic Acid	U	4.03	5.67	4.27	U	2.32	U	7.4	
Oxycodone	43.8	2.19	64.1	2.04	K 118	1.71	133	0.964	Narcotic pain reliever
Oxytetracycline [OTC]	U	24	U	7.39	U	7.56	U	6.92	
Penicillin G	U	12	U	9.91	U	12.6	U	11.5	β-lactam antibiotics
Penicillin V	U	12	U	29.7	U	13.3	U	8.19	β-lactam antibiotics
Ranitidine	57.3	7.96	192	5.49	5890	7.99	D 3470	7.14	Anti-acid reflux
Roxithromycin	U	1.2	U	0.651	U	0.553	U	1.15	
Sarafloxacin	U	60	U	18.6	U	18.9	U	17.3	
Sulfachloropyridazine	U	6	U	1.49	U	1.89	U	5.76	
Sulfadiazine	U	6	U	1.49	U	1.89	U	2.27	Sulfonamide antibiotic
Sulfadimethoxine	U	1.26	0.945	0.586	0.803	0.401	U	1.15	Sulfonamide antibiotic
Sulfamerazine	U	2.4	U	1.19	U	1.43	U	3.02	Sulfonamide antibiotic
Sulfamethazine	U	2.4	U	3.56	U	2.63	U	5.78	Sulfonamide antibiotic

Blank Corrected Results for AXYS Method MLA-075 (EPA Method 1694) Detected Substances at SWRP Monitoring Locations (ng/L)									
Sulfamethizole	U	2.4	U	2.86	U	1.41	U	2.31	Sulfonamide antibiotic
Sulfamethoxazole	1170	2.4	380	2.21	678	0.756	269	6.23	Sulfonamide antibiotic
Sulfanilamide	NQ	NQ	U	18.7	U	22.7	U	57.6	Sulfonamide antibiotic
Sulfathiazole	U	6	U	1.56	2.15	1.89	U	1.73	
Tetracycline [TC]	U	24	U	14.9	11.3	7.56	9.34	6.92	Tetracycline antibiotic
Thiabendazole	14.5	6	14.5	2.65	6.6	3.38	14.4	1.73	Fungicide and parasiticide
Triamterene	78.2	1.1	D 174	1.72	121	1.72	62.3	0.573	Diuretic
Triclocarban	U	12	8.27	2.97	9.09	3.78	12.8	3.46	Antimicrobial, disinfectant
Triclosan	U	240	437	59.5	U	227	210	69.2	Antimicrobial, disinfectant
Trimethoprim	1550	6	150	3.79	638	2.51	272	8.56	Pyrimidine antibiotic
Tylosin	U	24	U	6.55	U	7.56	U	6.92	
Virginiamycin M1	U	12	U	6.83	U	5.25	U	19.9	Macrolide antibiotic
Warfarin	U	6	2.85	1.49	U	1.89	4.2	1.73	Anticoagulant

Table A 18

Blank Corrected Results for AXYS Method MLA-075 (EPA Method 1694) Detected Substances at SWRP Monitoring Locations (ng/L)									
	Westside Interceptor (F12131)								
Substance	Jan-18		Aug-18		Oct-18		May-19		
	Result	RL	Result	RL	Result	RL	Result	RL	Classification
1,7-Dimethylxanthine	77200	1370	48300	1180	77400	349	62900	370	Antispasmodic, caffeine metabolite
2-Hydroxy-ibuprofen	116000	317	148000	206	101000	101	114000	86.4	Anti-inflammatory
4-Epianhydrochlortetracycline [EACTC]	U	238	U	58.5	U	75.5	U	64.8	Chlorotetracycline degradate
4-Epianhydrotetracycline [EATC]	U	59.5	U	22.7	U	19.8	U	16.2	Oxytetracycline degradate
4-Epichlortetracycline [ECTC]	U	59.5	U	24.9	U	18.9	U	16.2	
4-Epioxytetracycline [EOTC]	U	23.8	U	14.7	U	8.14	U	6.48	
4-Epitetracycline [ETC]	U	23.8	U	18	12.5	7.85	U	6.48	Tetracycline degradate
Acetaminophen	D 323000	179	D 170000	120	D 168000	129	D 186000	1370	Antipyretic, Analgesic
Albuterol	D 35.6	5.91	31	0.399	33.2	0.766	41.1	0.308	Antiasthmatic
Amphetamine	D 1110	29.6	D 829	4.37	1350	5.94	B D 1526.87	9.23	Stimulant
Anhydrochlortetracycline [ACTC]	U	59.5	U	32.4	U	62.9	U	54	
Anhydrotetracycline [ATC]	U	59.5	U	20	U	18.9	U	16.2	
Atenolol	D 1470	11.8	D 1800	3.11	1780	15.6	1060	0.664	Antihypertensive
Atorvastatin	D 171	29.6	382	1.46	312	1.63	128	2.64	Lowers blood cholesterol
Azithromycin	2610	6.59	998	10.6	656	5.14	2430	2.43	Macrolide Antibiotic

Blank Corrected Results for AXYS Method MLA-075 (EPA Method 1694) Detected Substances at SWRP Monitoring Locations (ng/L)									
Bisphenol A	U	1980	U	488	U	629	553	540	Used to make plastics
Caffeine	109000	95.1	88000	90.2	78500	40.1	D 96400	162	Stimulant
Carbadox	U	5.95	U	15.5	U	7.08	U	8.12	
Carbamazepine	244	5.95	294	1.46	598	1.89	300	1.62	Anticonvulsant
Cefotaxime	U	23.8	U	81.9	152	85.2	NQ		
Chlortetracycline [CTC]	U	23.8	U	9.92	U	7.55	U	6.48	
Cimetidine	D 750	5.91	D 641	1.75	524	1.22	D 1000	5.19	Anti-acid reflux
Ciprofloxacin	2220	23.8	D 625	36.5	723	26.7	568	38.2	Quinoline antibiotic
Clarithromycin	485	5.95	80.2	14.6	709	1.89	D 109	16.2	Macrolide antibiotic
Clinafloxacin	U	50.5	U	37.6	U	56.4	U	42.5	
Clonidine	U	29.6	U	1.46	U	1.63	U	1.54	
Cloxacillin	U	11.9	U	2.93	U	13	U	5.78	
Codeine	D 438	59.1	219	7.06	263	3.26	D 277	18.5	Opiate
Cotinine	D 4060	95	D 3950	47.3	5440	2.24	D 3210	9.23	Nicotine metabolite
Dehydronifedipine	2.53	2.52	U	6.06	4.37	2.96	U	2.22	Nifedipine metabolite
Demeclocycline	U	59.5	U	24.4	U	18.9	U	16.2	
Digoxigenin	U	405	U	692	U	203	U	108	
Digoxin	U	23.8	44.1	16.2	U	7.55	292	64.8	Cardiac glycoside
Diltiazem	297	1.96	263	0.83	270	0.507	452	0.488	Antihypertensive

Blank Corrected Results for AXYS Method MLA-075 (EPA Method 1694) Detected Substances at SWRP Monitoring Locations (ng/L)									
Diphenhydramine	6700	2.38	D 2400	2.93	3300	0.755	D 2280	6.48	Antihistamine
Doxycycline	183	23.8	318	15.4	128	11.4	107	6.48	Tetracycline antibiotic
Enalapril	D 17.1	5.91	5.66	0.835	15.7	1.36	12	0.308	Treats hypertension
Enrofloxacin	12.5	11.9	U	14.6	U	5.5	6.27	5.06	
Erythromycin-H2O	244	9.12	65	2.24	29.3	2.89	21.3	2.48	
Flumequine	U	7.04	U	1.46	U	1.89	U	1.62	
Fluoxetine	64	5.95	90.6	1.67	73.3	1.89	84.4	5.4	SSRI Antidepressant
Furosemide	2010	159	2100	39	1510	50.3	1450	43.2	Diuretic
Gemfibrozil	4450	6.45	2360	3.52	2870	1.89	5230	6.44	Antilipemic
Glipizide	36.7	23.8	45.8	5.85	46.6	7.55	22.6	6.48	Glucose control
Glyburide	U	11.9	4.11	2.93	U	3.77	U	3.24	Glucose control
Hydrochlorothiazide	1330	79.3	836	19.5	518	25.2	346	21.6	diuretic
Hydrocodone	D 106	29.6	77.3	2.15	169	3.38	72.8	1.54	Narcotic pain reliever
Ibuprofen	40100	64.9	52600	120	39900	72.5	34800	53.1	Analgesic
Isochlortetracycline [ICTC]	U	23.8	U	10.7	U	7.55	U	6.48	
Lincomycin	U	11.9	U	4.55	6.51	3.77	U	10.8	Lincosamide antibiotic
Lomefloxacin	U	18.2	U	56.8	U	9.29	U	14.5	
Metformin	D 196000	83.9	197000	679	133000	179	203000	23.2	Anti-diabetic drug
Miconazole	30.8	6.24	33.4	5.33	30.6	3.95	K 60.1	3.87	Antifungal agent

Blank Corrected Results for AXYS Method MLA-075 (EPA Method 1694) Detected Substances at SWRP Monitoring Locations (ng/L)									
Minocycline	U	238	U	66	U	75.5	U	64.8	
Naproxen	36800	41.4	D 35100	119	D 30800.000	69.4	D 32000	41.9	Non-steroidal anti-inflammatory drug
Norfloxacin	U	133	U	143	U	18.9	U	84	
Norgestimate	U	11.9	U	19.1	U	10.6	U	21.2	
Ofloxacin	353	5.95	D 101	7.31	69.1	3.4	443	6.22	Quinoline antibiotic
Ormetoprim	U	2.38	U	0.585	U	0.755	U	0.811	
Oxacillin	U	11.9	U	2.93	U	15.6	U	3.24	
Oxolinic Acid	U	4.66	4.19	3.73	U	2.83	U	4.78	
Oxycodone	D 243	11.8	170	1.48	K 179.000	3.39	D 104	3.69	Narcotic pain reliever
Oxytetracycline [OTC]	U	23.8	U	9.86	U	7.55	U	6.48	
Penicillin G	U	11.9	U	9.75	U	12.6	U	10.8	β-lactam antibiotics
Penicillin V	19	11.9	U	29.3	U	13.1	U	9.3	β-lactam antibiotics
Ranitidine	D 1810	39.4	D 9290	11.9	11400	11.2	D 6280	12.7	Anti-acid reflux
Roxithromycin	U	1.19	U	1.05	U	0.679	U	1.84	
Sarafloxacin	U	59.5	U	73.1	U	20.2	U	20.5	
Sulfachloropyridazine	U	5.95	U	1.46	U	2.46	U	5.4	
Sulfadiazine	U	5.95	U	1.82	U	1.89	6.62	1.62	Sulfonamide antibiotic
Sulfadimethoxine	28.6	1.46	U	1.98	U	0.964	U	1.08	Sulfonamide antibiotic
Sulfamerazine	7.79	2.38	U	2.38	U	1.46	U	3.47	Sulfonamide antibiotic

Blank Corrected Results for AXYS Method MLA-075 (EPA Method 1694) Detected Substances at SWRP Monitoring Locations (ng/L)									
Sulfamethazine	U	2.38	U	4.4	U	3.38	U	17.9	Sulfonamide antibiotic
Sulfamethizole	2.7	2.38	U	2.85	2.14	0.755	U	2.16	Sulfonamide antibiotic
Sulfamethoxazole	3090	2.38	3280	5.37	4980	2.92	D 4070	10.1	Sulfonamide antibiotic
Sulfanilamide	NQ	NQ	U	24.5	U	19.5	U	54	Sulfonamide antibiotic
Sulfathiazole	U	5.95	U	3.13	U	1.89	23	1.62	
Tetracycline [TC]	U	23.8	22	15.9	16	7.55	U	6.48	Tetracycline antibiotic
Thiabendazole	74.2	5.95	38.2	2.39	30.3	1.89	47.4	1.62	Fungicide and parasiticide
Triamterene	D 130	5.91	D 371	2.07	441	4.03	214	1.69	Diuretic
Triclocarban	44.5	11.9	21.1	2.93	17.1	3.77	9.64	3.24	Antimicrobial, disinfectant
Triclosan	248	238	326	74.4	264	75.5	119	64.8	Antimicrobial, disinfectant
Trimethoprim	1070	9.1	1010	3.89	1180	4.98	1210	19	Pyrimidine antibiotic
Tylosin	U	23.8	U	11.5	U	7.55	U	10.9	
Virginiamycin M1	U	11.9	U	26.3	U	3.77	U	3.24	Macrolide antibiotic
Warfarin	10.4	5.95	9.34	1.46	7.03	1.89	8.94	1.62	Anticoagulant

Table A 19

Blank Corrected Results for AXYS Method MLA-075 (EPA Method 1694) Detected Substances at SWRP Monitoring Locations (ng/L)									
	SWRP Influent (TP2.3A)								
Substance	Jan-18		Aug-18		Oct-18		May-19		
	Result	RL	Result	RL	Result	RL	Result	RL	Classification
1,7-Dimethylxanthine	65600	1410	54000	511	60700	549	50300	209	Antispasmodic, caffeine metabolite
2-Hydroxy-ibuprofen	91200	306	85500	100	77700	91.8	85800	86.1	Anti-inflammatory
4-Epianhydrochlortetracycline [EACTC]	U	230	U	62.2	U	68.8	U	64.5	Chlorotetracycline degradate
4-Epianhydrotetracycline [EATC]	U	57.4	U	24.9	U	18.9	U	16.1	Oxytetracycline degradate
4-Epichlortetracycline [ECTC]	U	57.4	U	25.9	U	17.2	U	16.1	
4-Epioxytetracycline [EOTC]	U	23	U	13.3	U	7.42	U	6.45	
4-Epitetracycline [ETC]	U	23	U	13.5	8.05	6.97	U	6.45	Tetracycline degradate
Acetaminophen	193000	179	D 107000	4950	D 104000	5310	D 126000	208	Antipyretic, Analgesic
Albuterol	D 31.3	5.7	19.3	0.789	27.8	0.343	30.5	0.291	Antiasthmatic
Amphetamine	D 791	28.5	1260	3.28	1290	13.6	B D 1256.87	8.74	Stimulant
Anhydrochlortetracycline [ACTC]	U	57.4	U	33.1	U	57.4	U	53.8	
Anhydrotetracycline [ATC]	U	57.4	U	21.7	U	17.2	U	16.1	
Atenolol	D 928	11.4	D 1030	3.75	986	7.78	D 746	3.64	Antihypertensive
Atorvastatin	D 196	28.5	265	1.5	111	1.5	144	4.31	Lowers blood cholesterol
Azithromycin	1740	7.45	128	6.45	D 725	7.37	287	1.81	Macrolide Antibiotic

Blank Corrected Results for AXYS Method MLA-075 (EPA Method 1694) Detected Substances at SWRP Monitoring Locations (ng/L)									
Bisphenol A	U	1910	U	518	U	574	689	538	Used to make plastics
Caffeine	88100	72.2	105000	185	80200	106	D 93300	161	Stimulant
Carbadox	U	5.74	U	3.44	U	5.94	U	7.73	
Carbamazepine	285	5.74	259	1.56	277	1.72	293	1.61	Anticonvulsant
Cefotaxime	U	23	U	69	U	129	NQ		
Chlortetracycline [CTC]	U	23	U	10.4	U	6.88	U	6.45	
Cimetidine	D 397	22.3	204	0.602	179	0.828	D 202	3.49	Anti-acid reflux
Ciprofloxacin	543	47	D 180	25.7	239	26.8	236	50	Quinoline antibiotic
Clarithromycin	194	5.74	161	15.6	106	1.72	D 172	16.1	Macrolide antibiotic
Clinafloxacin	32.9	30.4	U	70.6	U	42.2	U	40.6	
Clonidine	U	28.5	U	1.5	U	1.5	U	1.46	
Cloxacillin	U	11.5	U	3.11	U	14.3	U	6.76	
Codeine	D 289	57	138	3.01	134	7.31	D 238	17.5	Opiate
Cotinine	D 2910	28.5	D 2760	4.51	3010	91.5	D 1980	8.74	Nicotine metabolite
Dehydronifedipine	U	6.01	U	2.21	1.84	0.993	U	2.93	Nifedipine metabolite
Demeclocycline	U	57.4	U	21.5	U	17.2	U	16.1	
Digoxigenin	U	235	U	477	U	95.7	U	256	
Digoxin	38.2	23	U	18.2	U	10.4	71.1	64.5	Cardiac glycoside
Diltiazem	240	1.15	132	0.611	130	0.595	226	11.8	Antihypertensive

Blank Corrected Results for AXYS Method MLA-075 (EPA Method 1694) Detected Substances at SWRP Monitoring Locations (ng/L)									
Diphenhydramine	2260	2.3	248	0.825	D 653	2.06	1630	0.645	Antihistamine
Doxycycline	U	23	40.8	13.9	26	9.97	18.7	6.73	Tetracycline antibiotic
Enalapril	D 11.7	5.7	9.62	0.413	11.5	0.3	9.07	0.438	Treats hypertension
Enrofloxacin	U	11.5	U	9.91	U	4	U	3.47	
Erythromycin-H2O	212	8.8	37.2	2.38	47.2	2.64	42.4	3.02	
Flumequine	U	5.74	U	1.56	U	2.06	U	1.61	
Fluoxetine	35.6	5.74	12	2.03	D 29.400	5.16	29.7	5.38	SSRI Antidepressant
Furosemide	1340	153	1200	41.5	1170	45.9	1470	43	Diuretic
Gemfibrozil	2730	5.74	2200	2.96	1920	5.61	2220	10.5	Antilipemic
Glipizide	29.1	23	30.6	6.22	26.5	6.88	26	6.45	Glucose control
Glyburide	U	11.5	4.47	3.11	U	3.44	U	3.23	Glucose control
Hydrochlorothiazide	695	76.5	494	20.7	384	22.9	368	21.5	diuretic
Hydrocodone	D 68.0	28.5	55.6	1.68	73.6	1.87	25.6	1.46	Narcotic pain reliever
Ibuprofen	30500	83.8	31300	54.1	26100	64	27300	40.9	Analgesic
Isochlortetracycline [ICTC]	U	23	U	9.9	U	6.88	U	6.45	
Lincomycin	65.4	11.5	U	4.51	U	3.44	U	10.8	Lincosamide antibiotic
Lomefloxacin	U	12.2	U	43.9	U	9.2	U	8.75	
Metformin	D 150000	57	144000	238	99600	81	159000	14.8	Anti-diabetic drug
Miconazole	12.5	5.74	7.13	2.77	7.57	2.36	K 12.7	3.7	Antifungal agent

Blank Corrected Results for AXYS Method MLA-075 (EPA Method 1694) Detected Substances at SWRP Monitoring Locations (ng/L)									
Minocycline	U	230	U	62.2	U	68.8	U	64.5	
Naproxen	21800	46.7	D 16400.	31.1	19200	17.4	D 19500	47.4	Non-steroidal anti-inflammatory drug
Norfloxacin	U	57.4	U	15.6	U	17.2	U	93.4	
Norgestimate	U	31.9	U	15.4	U	10	U	10.8	
Ofloxacin	132	6.54	D 44.8	7.4	29.8	1.98	76	1.61	Quinoline antibiotic
Ormetoprim	U	2.3	U	0.622	U	0.688	U	0.645	
Oxacillin	U	11.5	U	3.11	U	14.5	U	4.58	
Oxolinic Acid	U	5.88	U	3.03	U	2.62	U	3.99	
Oxycodone	D 198	11.4	149	4.05	K 123	3.7	136	0.884	Narcotic pain reliever
Oxytetracycline [OTC]	U	23	U	9.34	U	6.88	U	6.45	
Penicillin G	U	11.5	U	10.4	U	11.5	U	10.8	β-lactam antibiotics
Penicillin V	12.1	11.5	U	31.1	U	16.7	U	4.31	β-lactam antibiotics
Ranitidine	D 724	38	378	6.84	D 252	5.3	D 2520	3.49	Anti-acid reflux
Roxithromycin	1.25	1.15	U	0.606	U	0.599	U	2.47	
Sarafloxacin	U	57.4	U	46.7	U	19.1	U	16.1	
Sulfachloropyridazine	U	5.74	U	1.56	U	1.72	U	5.38	
Sulfadiazine	23.6	5.74	17.8	1.68	12.2	1.72	27.1	3.61	Sulfonamide antibiotic
Sulfadimethoxine	23.7	3.58	U	1.89	6.89	2.18	U	1.08	Sulfonamide antibiotic
Sulfamerazine	U	2.3	U	3.95	U	1.18	U	4.65	Sulfonamide antibiotic

Blank Corrected Results for AXYS Method MLA-075 (EPA Method 1694) Detected Substances at SWRP Monitoring Locations (ng/L)									
Sulfamethazine	2.79	2.79	U	5.64	U	2.15	U	9.39	Sulfonamide antibiotic
Sulfamethizole	4.89	2.95	4.02	2.01	U	4.93	U	2.15	Sulfonamide antibiotic
Sulfamethoxazole	1650	3.81	2120	3.95	D 2260	3.43	2540	4.9	Sulfonamide antibiotic
Sulfanilamide	NQ	NQ	U	31.6	U	18.2	U	53.8	Sulfonamide antibiotic
Sulfathiazole	U	5.74	U	2.64	U	1.72	U	2.25	
Tetracycline [TC]	U	23	U	12.7	9.41	6.88	U	6.45	Tetracycline antibiotic
Thiabendazole	32.2	5.74	26.7	5.09	29	2.14	33.1	1.61	Fungicide and parasiticide
Triamterene	D 121	5.7	D 198	0.902	420	2.94	205	1.29	Diuretic
Triclocarban	24.9	11.5	6.06	3.11	6.17	3.44	7.28	3.79	Antimicrobial, disinfectant
Triclosan	468	230	258	62.2	D 371	210	144	127	Antimicrobial, disinfectant
Trimethoprim	745	9.09	535	4.28	663	2.69	776	6.05	Pyrimidine antibiotic
Tylosin	U	23	U	17.5	U	6.88	U	6.45	
Virginiamycin M1	U	11.5	U	14.8	U	3.44	U	3.23	Macrolide antibiotic
Warfarin	7.2	5.74	5.48	1.53	5.11	1.72	7.09	1.61	Anticoagulant

Table A 20

Blank Corrected Results for AXYS Method MLA-075 (EPA Method 1694) Detected Substances at SWRP Monitoring Locations (ng/L)									
	SWRP Effluent (TP2.7 EMS)								
Substance	Jan-18		Aug-18		Oct-18		May-19		
	Result	RL	Result	RL	Result	RL	Result	RL	Classification
1,7-Dimethylxanthine	197	61.4	64.8	60	123	71.2	110	63.9	Antispasmodic, caffeine metabolite
2-Hydroxy-ibuprofen	178	81.9	86.4	80	144	95	U	85.3	Anti-inflammatory
4-Epianhydrochlortetracycline [EACTC]	U	61.4	64.8	60	U	71.2	U	63.9	Chlorotetracycline degradate
4-Epianhydrotetracycline [EATC]	U	15.4	16.2	15	U	17.8	U	16	Oxytetracycline degradate
4-Epichlortetracycline [ECTC]	U	15.4	19.6	15	U	17.8	U	16	
4-Epioxytetracycline [EOTC]	U	6.14	7.73	6	U	7.12	U	6.39	
4-Epitetracycline [ETC]	U	6.14	9.21	6	U	7.12	U	6.39	Tetracycline degradate
Acetaminophen	U	15.4	26.6	15	U	20.4	U	16	Antipyretic, Analgesic
Albuterol	D 28.6	1.5	0.321	0.3	20.2	0.311	23.4	0.314	Antiasthmatic
Amphetamine	D 9.04	7.51	4.81	1.5	D 18.1	4.67	B K D 8.07	4.72	Stimulant
Anhydrochlortetracycline [ACTC]	U	15.4	19.7	15	U	59.4	U	53.3	
Anhydrotetracycline [ATC]	U	15.4	16.5	15	U	17.8	U	16	
Atenolol	D 326	3	1.72	0.6	315	0.751	47	0.629	Antihypertensive
Atorvastatin	U	7.51	1.6	1.5	U	1.56	6.44	1.57	Lowers blood cholesterol
Azithromycin	1250	1.54	7.4	5.21	461	1.78	654	3.78	Macrolide Antibiotic

Blank Corrected Results for AXYS Method MLA-075 (EPA Method 1694) Detected Substances at SWRP Monitoring Locations (ng/L)									
Bisphenol A	U	512	540	500	U	594	U	533	Used to make plastics
Caffeine	105	15.4	44.4	15	123	20	40.3	16	Stimulant
Carbadox	U	1.54	2.19	1.5	U	5.51	U	5.33	
Carbamazepine	331	1.54	1.62	1.5	336	1.78	327	1.6	Anticonvulsant
Cefotaxime	U	6.14	27.6	6.94	U	7.12	NQ		
Chlortetracycline [CTC]	U	6.14	8.33	6	U	7.12	U	6.39	
Cimetidine	D 75.2	1.5	0.642	0.6	54.2	0.622	58.1	0.629	Anti-acid reflux
Ciprofloxacin	106	11.7	12.1	6	61.3	9	57.9	44.3	Quinoline antibiotic
Clarithromycin	91.9	1.54	16.2	15	35.1	1.78	56.4	1.6	Macrolide antibiotic
Clinafloxacin	U	23.7	36.1	7	U	17.1	U	68.8	
Clonidine	U	7.51	1.6	1.5	U	1.56	U	1.57	
Cloxacillin	U	3.07	3.24	3	U	11.9	U	3.93	
Codeine	D 66.7	15	3.21	3	8.4	3.41	41.3	3.14	Opiate
Cotinine	D 23.4	7.51	4.81	1.5	22.5	1.56	19.4	1.57	Nicotine metabolite
Dehydronifedipine	8.57	0.692	0.902	0.6	6.21	3.58	5.14	0.718	Nifedipine metabolite
Demeclocycline	U	15.4	16.2	15	U	17.8	U	16	
Digoxigenin	U	66	328	20	U	96.6	U	90.3	
Digoxin	U	6.14	7.36	6	11.6	7.12	U	63.9	Cardiac glycoside
Diltiazem	D 70.4	0.921	0.324	0.3	74.4	0.356	119	0.32	Antihypertensive

Blank Corrected Results for AXYS Method MLA-075 (EPA Method 1694) Detected Substances at SWRP Monitoring Locations (ng/L)									
Diphenhydramine	386	0.614	0.648	0.6	97.9	0.712	251	0.639	Antihistamine
Doxycycline	20.7	6.14	7.21	6	14.8	8.15	16.9	6.39	Tetracycline antibiotic
Enalapril	U	1.5	0.321	0.3	U	0.334	U	0.314	Treats hypertension
Enrofloxacin	U	3.07	4.96	3	U	3.68	U	3.2	
Erythromycin-H2O	101	2.35	2.48	2.3	61.2	2.73	35.6	2.45	
Flumequine	U	1.54	1.62	1.5	U	1.78	U	1.6	
Fluoxetine	34.9	1.54	1.98	1.5	15.6	1.78	23.6	5.33	SSRI Antidepressant
Furosemide	473	40.9	43.2	40	184	47.5	516	42.6	Diuretic
Gemfibrozil	10.3	1.54	1.62	1.5	11.8	1.78	9.1	1.6	Antilipemic
Glipizide	U	6.14	6.48	6	U	7.12	U	6.39	Glucose control
Glyburide	U	3.07	3.24	3	U	3.56	U	3.2	Glucose control
Hydrochlorothiazide	585	20.5	21.6	20	490	23.7	293	21.3	diuretic
Hydrocodone	D 40.6	7.51	1.6	1.5	63.9	1.56	38.3	1.57	Narcotic pain reliever
Ibuprofen	U	15.4	16.2	15	U	17.8	K 36.5	16	Analgesic
Isochlortetracycline [ICTC]	U	6.14	6.48	6	U	7.12	U	6.39	
Lincomycin	23.8	3.07	3.24	3	6.42	3.56	U	10.7	Lincosamide antibiotic
Lomefloxacin	U	8.62	12.1	26.2	U	11.3	U	8.71	
Metformin	D 463	15	15.5	3	217	32.9	133	3.14	Anti-diabetic drug
Miconazole	U	1.54	1.62	1.5	U	1.78	U	1.6	Antifungal agent

Blank Corrected Results for AXYS Method MLA-075 (EPA Method 1694) Detected Substances at SWRP Monitoring Locations (ng/L)									
Minocycline	U	61.4	64.8	60	U	71.2	U	63.9	
Naproxen	23.3	3.07	10.4	3	U	17	22.8	8.64	Non-steroidal anti-inflammatory drug
Norfloxacin	U	53.6	43.7	15	U	17.8	U	77.8	
Norgestimate	U	3.07	6.49	3	U	4.84	U	10.7	
Ofloxacin	79	2.81	3.17	1.5	35.6	2.47	39.7	2.67	Quinoline antibiotic
Ormetoprim	U	0.614	1.33	0.6	U	0.712	U	0.779	
Oxacillin	U	3.07	3.24	3	U	13.7	U	3.2	
Oxolinic Acid	U	1.69	2.27	2	U	1.34	U	2.13	
Oxycodone	D 95.4	3	0.92	0.6	K 76.9	0.988	76.8	0.629	Narcotic pain reliever
Oxytetracycline [OTC]	U	6.14	6.62	6	U	7.12	U	6.39	
Penicillin G	U	3.07	10.8	10	U	11.9	U	10.7	β-lactam antibiotics
Penicillin V	U	3.07	32.4	30	U	13.1	U	3.2	β-lactam antibiotics
Ranitidine	D 56.7	10	2.89	0.6	148	1.67	190	0.727	Anti-acid reflux
Roxithromycin	0.549	0.307	0.343	0.3	U	0.356	U	1.07	
Sarafloxacin	U	15.4	18.5	15	U	17.8	U	16	
Sulfachloropyridazine	U	1.54	1.62	1.5	U	1.78	U	5.33	
Sulfadiazine	8.8	1.54	1.62	1.5	6.88	1.78	8.07	1.6	Sulfonamide antibiotic
Sulfadimethoxine	3.38	0.537	0.514	0.3	U	0.356	U	1.07	Sulfonamide antibiotic
Sulfamerazine	U	0.794	0.839	0.6	U	0.895	U	2.13	Sulfonamide antibiotic

Blank Corrected Results for AXYS Method MLA-075 (EPA Method 1694) Detected Substances at SWRP Monitoring Locations (ng/L)									
Sulfamethazine	U	0.614	3.31	0.6	U	1.79	U	7.25	Sulfonamide antibiotic
Sulfamethizole	U	1.06	1.09	0.6	U	0.829	U	2.13	Sulfonamide antibiotic
Sulfamethoxazole	581	1.68	1.08	0.6	696	0.712	572	1.18	Sulfonamide antibiotic
Sulfanilamide	NQ	NQ	16.2	15	U	40.4	U	53.3	Sulfonamide antibiotic
Sulfathiazole	U	2.4	2.98	1.5	U	1.78	U	1.6	
Tetracycline [TC]	U	6.14	9.62	6	U	7.12	U	6.39	Tetracycline antibiotic
Thiabendazole	30.4	1.54	2.24	1.5	21.4	1.81	29.5	1.6	Fungicide and parasiticide
Triamterene	D 111	1.5	0.495	0.3	234	0.445	134	0.322	Diuretic
Triclocarban	4.38	3.07	3.24	3	U	3.56	U	3.2	Antimicrobial, disinfectant
Triclosan	U	61.4	64.8	60	U	71.2	U	63.9	Antimicrobial, disinfectant
Trimethoprim	113	1.54	2.76	1.5	10.8	1.78	101	5.33	Pyrimidine antibiotic
Tylosin	U	6.14	10.4	6	U	7.12	U	6.39	
Virginiamycin M1	U	3.07	5.06	3	U	3.56	U	3.2	Macrolide antibiotic
Warfarin	3.63	1.54	1.62	1.5	3.21	1.78	5.17	1.6	Anticoagulant

Table A 21

Blank Corrected Results for AXYS Method MLA-075 (EPA Method 1694) Detected Substances at SWRP Monitoring Locations (ng/L)									
	SWRP Reuse (CLWRSNK)								
Substance	Jan-18		Aug-18		Oct-18		May-19		
	Result	RL	Result	RL	Result	RL	Result	RL	Classification
1,7-Dimethylxanthine	168	62.4	143	60.6	132	60.8	109	64.1	Antispasmodic, caffeine metabolite
2-Hydroxy-ibuprofen	169	83.2	U	80.8	U	81.1	U	85.5	Anti-inflammatory
4-Epianhydrochlortetracycline [EACTC]	U	62.4	U	60.6	U	60.8	U	64.1	Chlorotetracycline degradate
4-Epianhydrotetracycline [EATC]	U	15.6	U	15.2	U	15.2	U	16	Oxytetracycline degradate
4-Epichlortetracycline [ECTC]	U	15.6	U	18.6	U	15.2	U	16	
4-Epioxytetracycline [EOTC]	U	6.24	U	8.05	U	6.08	U	6.41	
4-Epitetracycline [ETC]	U	6.24	U	8.7	U	6.08	U	6.41	Tetracycline degradate
Acetaminophen	18.5	15.6	U	27	U	16.2	U	16	Antipyretic, Analgesic
Albuterol	18.4	0.306	8.72	0.301	10.7	0.3	10.8	0.306	Antiasthmatic
Amphetamine	12.8	1.53	31.2	1.5	24.8	1.51	B K D 13.07	4.58	Stimulant
Anhydrochlortetracycline [ACTC]	U	15.6	U	18.5	U	50.7	U	53.4	
Anhydrotetracycline [ATC]	U	15.6	U	15.2	U	15.2	U	16	
Atenolol	240	0.611	138	0.601	210	1.19	192	0.611	Antihypertensive
Atorvastatin	1.66	1.53	U	1.5	U	1.5	U	1.53	Lowers blood cholesterol
Azithromycin	1050	1.58	105	34.9	353	1.52	334	2.22	Macrolide Antibiotic
Bisphenol A	U	520	U	505	U	507	U	534	Used to make plastics

Blank Corrected Results for AXYS Method MLA-075 (EPA Method 1694) Detected Substances at SWRP Monitoring Locations (ng/L)									
Caffeine	22.3	15.6	U	23.8	33.1	18.4	20.4	16	Stimulant
Carbadox	U	4.66	U	3.79	2.48	2.1	U	5.34	
Carbamazepine	302	1.56	311	1.52	216	1.52	251	1.6	Anticonvulsant
Cefotaxime	U	6.24	U	28.8	U	6.08	NQ		
Chlortetracycline [CTC]	U	6.24	U	7.89	U	6.08	U	6.41	
Cimetidine	U	0.306	U	0.601	U	0.601	U	0.611	Anti-acid reflux
Ciprofloxacin	U	6.83	U	25.4	U	14.7	U	17.3	Quinoline antibiotic
Clarithromycin	98.2	1.56	38.5	15.2	34.9	1.52	52.7	1.6	Macrolide antibiotic
Clinafloxacin	U	35.1	U	34.3	U	18.7	U	27	
Clonidine	U	1.53	U	1.5	U	1.5	U	1.53	
Cloxacillin	U	3.12	U	3.03	U	10.1	U	3.2	
Codeine	37	3.06	U	3.01	6.81	3	19.4	3.06	Opiate
Cotinine	21.3	1.53	D 21.8	4.51	21.6	1.5	19.1	1.53	Nicotine metabolite
Dehydronifedipine	8.96	0.624	4.54	0.8	6.15	0.608	5.12	0.641	Nifedipine metabolite
Demeclocycline	U	15.6	U	15.2	U	15.2	U	16	
Digoxigenin	U	71.9	U	103	U	59.7	U	35	
Digoxin	U	6.24	U	6.91	9.62	6.08	U	64.1	Cardiac glycoside
Diltiazem	40.4	0.361	17.1	0.303	16.5	0.304	13.9	0.32	Antihypertensive
Diphenhydramine	293	0.624	56.9	0.606	64.8	0.608	123	0.641	Antihistamine

Blank Corrected Results for AXYS Method MLA-075 (EPA Method 1694) Detected Substances at SWRP Monitoring Locations (ng/L)									
Doxycycline	U	6.24	U	6.91	U	6.59	U	6.41	Tetracycline antibiotic
Enalapril	U	0.306	U	0.301	U	0.3	U	0.306	Treats hypertension
Enrofloxacin	U	3.12	U	3.39	U	3.04	U	3.2	
Erythromycin-H2O	81.1	2.39	41.6	2.32	54	2.33	30.1	2.46	
Flumequine	U	1.56	U	1.52	U	1.52	U	1.6	
Fluoxetine	25.6	1.56	12.1	1.52	11.7	1.52	18.7	5.34	SSRI Antidepressant
Furosemide	234	41.6	95.4	40.4	50.4	40.5	212	42.7	Diuretic
Gemfibrozil	23.8	1.56	10.6	1.52	21	1.52	22.2	1.6	Antilipemic
Glipizide	U	6.24	U	6.06	U	6.08	U	6.41	Glucose control
Glyburide	U	3.12	U	3.03	U	3.04	U	3.2	Glucose control
Hydrochlorothiazide	512	20.8	274	20.2	327	20.3	201	21.4	diuretic
Hydrocodone	24.9	1.53	28.2	1.5	32.1	1.5	15.1	1.53	Narcotic pain reliever
Ibuprofen	U	15.6	U	15.2	U	15.2	K 36	16	Analgesic
Isochlortetracycline [ICTC]	U	6.24	U	6.06	U	6.08	U	6.41	
Lincomycin	U	3.12	U	3.03	U	3.04	U	10.7	Lincosamide antibiotic
Lomefloxacin	U	5.86	U	5.64	U	9.19	U	6.45	
Metformin	1010	3.52	453	10.4	390	8.07	330	3.06	Anti-diabetic drug
Miconazole	U	1.56	U	1.52	U	1.52	U	1.6	Antifungal agent
Minocycline	U	62.4	U	60.6	U	60.8	U	64.1	

Blank Corrected Results for AXYS Method MLA-075 (EPA Method 1694) Detected Substances at SWRP Monitoring Locations (ng/L)									
Naproxen	51.8	3.12	19.5	11.3	U	3.04	29.5	8.29	Non-steroidal anti-inflammatory drug
Norfloxacin	U	28.7	U	27.7	U	15.2	U	77.5	
Norgestimate	U	3.12	U	6.53	U	5.41	U	10.7	
Ofloxacin	42.8	2.07	18.9	5.34	18.3	2.51	9.63	1.6	Quinoline antibiotic
Ormetoprim	U	0.624	U	0.777	U	0.608	U	0.641	
Oxacillin	U	3.12	U	3.03	U	11.7	U	3.2	
Oxolinic Acid	U	1.76	U	3.24	U	1.41	U	2.14	
Oxycodone	88.7	0.866	71	1.24	K 62.3	0.601	50.2	0.622	Narcotic pain reliever
Oxytetracycline [OTC]	U	6.24	U	6.61	U	6.08	U	6.41	
Penicillin G	U	3.12	U	10.1	U	10.1	U	10.7	β-lactam antibiotics
Penicillin V	U	3.12	U	30.3	U	10.2	U	3.2	β-lactam antibiotics
Ranitidine	U	2.06	U	1.06	U	1.1	U	0.611	Anti-acid reflux
Roxithromycin	0.38	0.312	H 0.678	0.303	U	0.318	U	1.07	
Sarafloxacin	U	15.6	U	15.2	U	15.2	U	16	
Sulfachloropyridazine	U	1.56	U	1.52	U	1.52	U	5.34	
Sulfadiazine	8.05	1.56	5.22	1.52	5.32	1.52	6.12	1.6	Sulfonamide antibiotic
Sulfadimethoxine	U	0.677	U	0.645	U	0.304	U	1.07	Sulfonamide antibiotic
Sulfamerazine	U	0.624	U	1.31	U	0.789	U	2.14	Sulfonamide antibiotic
Sulfamethazine	U	0.624	U	2.65	U	1.07	U	4.33	Sulfonamide antibiotic

Blank Corrected Results for AXYS Method MLA-075 (EPA Method 1694) Detected Substances at SWRP Monitoring Locations (ng/L)									
Sulfamethizole	U	0.73	U	1.21	U	0.67	U	2.14	Sulfonamide antibiotic
Sulfamethoxazole	398	0.681	364	2.01	504	1.01	367	1.86	Sulfonamide antibiotic
Sulfanilamide	NQ	NQ	U	15.2	U	15.2	U	53.4	Sulfonamide antibiotic
Sulfathiazole	U	1.63	U	1.58	U	1.52	U	1.6	
Tetracycline [TC]	U	6.24	U	9.06	U	6.08	U	6.41	Tetracycline antibiotic
Thiabendazole	27	1.56	26.6	1.52	19.1	1.52	24.2	1.6	Fungicide and parasiticide
Triamterene	116	0.306	D 116	0.902	189	0.414	94.6	0.336	Diuretic
Triclocarban	4.57	3.12	3.62	3.03	U	3.04	U	3.2	Antimicrobial, disinfectant
Triclosan	U	62.4	U	60.6	U	60.8	U	64.1	Antimicrobial, disinfectant
Trimethoprim	78.8	1.56	15.8	2	15.1	1.52	63.4	5.34	Pyrimidine antibiotic
Tylosin	U	6.24	U	6.26	U	6.08	U	6.41	
Virginiamycin M1	U	3.12	U	4.96	U	3.04	U	3.2	Macrolide antibiotic
Warfarin	U	1.56	U	1.52	U	1.52	U	1.6	Anticoagulant

Table A 22

FLAG	=	DEFINITION
D	=	dilution data
H	=	concentration is estimated
N	=	authentic recovery is not within method/contract control limits
NQ	=	data not quantifiable
K	=	peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration
MAX	=	concentration is an estimated maximum value
U	=	undetected (blank corrected result < detection level)
B	=	blank corrected value