Summary Report

Constituents of Emerging Concern: South Lake Tahoe Wastewater Effluent Monitoring

Alpine County, CA

April 2018 – October 2021

Report No. A2

Alpine Watershed Group Executive Director: Kimra McAfee

Alpine Watershed Group
P.O. Box 296
Markleeville, CA 96120
(530) 694-2327

Study Timetable:
Initiation Date: December 5, 2017
Sampling Start Date: April 23, 2018
Sampling End Date: October 11, 2021
Analysis End Date: November 3, 2021
Report Date: April 18, 2022

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Abstract:

Pharmaceuticals and personal care products (PPCPs) along with various constituents of emerging concern (CECs) were evaluated in treated effluent from the South Tahoe Public Utility District (STPUD) wastewater treatment facility's source at South Lake Tahoe, CA, and at three sampling locations in the Upper Carson River watershed, Alpine County, CA. This four-year seasonal wastewater monitoring program, initiated in the spring of 2018 and continuing through the fall of 2021, was conducted by Alpine Watershed Group to determine the presence or absence of California State Water Resources Control Board (SWRCB) priority PPCP and CEC contaminants. Between 40 and 103 contaminants were individually evaluated per reclaimed wastewater sample over the spring, summer, and fall monitoring seasons using established USEPA multiresidue analytical methods. The combined results from all sampling sites over the four-year timeframe observed from 37% to 68% of the screened CECs above part per trillion analytical detection. Flame retardant chemicals, industrial surfactants, antibiotics, pain relief-anxiety disorder medications, insect repellents, artificial sweeteners, and caffeine (and its associated breakdown metabolites) were consistently the more abundant contaminants observed at the STPUD reclaimed wastewater effluent source and within the Upper Carson River watershed. All measured environmental concentrations (MECs) were compared to a conservatively-derived threshold human toxicological monitor triggering level (MTL) developed by the SWRCB Scientific Advisory Committee from the scientific literature. For those screened contaminants where MLT data was available, only caffeine and associated breakdown metabolites triggered MEC/MTL monitoring trigger quotients (MTQ) greater then unity (i.e., 1) during Year 1 monitoring, signifying seasonal trends for this constituent (and its associated metabolites) should be closely monitored. The combined multiresidue results of the remaining three years of monitoring consistently showed that the majority of screened SWRCB priority CECs from STPUD reclaimed water were either not detected or, if so, constituent concentrations fell below their corresponding MTQs. Based on SWRCB monitoring criteria and number of priority CECs screened in this investigation, STPUD treated effluent should not pose a significant human, ecological, or agricultural risk when this reclaimed water is exclusively used for forage crop irrigation purposes in the Upper Carson River watershed.

Executive Summary:

Overview:
Chemicals of emerging concern (CECs) signify many man-made substances that can be environmentally persistent and often detected in wastewater treatment effluent at very low part per billion (ppb) to part per trillion (pptr) concentrations and typically are not regulated under current environmental laws (Anderson et al., 2010). Even at these extremely low concentrations, many CECs have documented endocrine disruption-bioaccumulation properties and may deleteriously impact survivability of sensitive aquatic organisms and can potentially pose a risk to public health (Fono et al., 2008). Some examples of emerging constituents include industrial products and their intermediates (i.e,, *non-stick* perfluorinated alkyl derivatives alkyl phenol surfactants and plasticizers), food additives (i.e., artificial sweeteners), X-ray dyes, flame retardants, and insect repellants to name a few. Pharmaceuticals and personal care products (PPCPs) also fall under this broad CEC category. Pharmaceuticals are generally comprised of prescription, over-the-counter medications and veterinary drugs for preventing/treating human and animal diseases, while personal care products (skin care products, soaps, and disinfectants) are used mainly to improve the quality of daily life. Along with certain CECs, many PPCPs are also inherently

estrogenic (i.e., synthetic human birth control reproductive hormones and various organic ingredients in soaps and body lotions).

Wastewater treatment effluent is often reclaimed for urban landscape irrigation, ground water recharge, and agricultural irrigation uses (Anderson et al., 2010). As such, it becomes essential to understand what can be in the reclaimed water. Furthermore, can detected concentrations of the above constituents pose deleterious impacts on aquatic organisms and environment? With the above in mind, the goal of this four-year monitoring program was to assess the presence/absence, concentrations, yearly trends and possibility of environmental impacts from CECs discharged into the Upper Carson River watershed in Alpine County from South Lake Tahoe Public Utility District (STPUD) reclaimed effluent.

In September 2017, Alpine Watershed Group (AWG) formulated a PPCP Committee project team consisting of Alpine County public health experts and administrators. AWG staff along with the project team input subsequently developed a field sampling-analytical protocol (Project Protocol, Year One for STPUD Contract Commission Testing for Pharmaceuticals and Personal Care Products (PPCPs) and Constituents of Emerging Concern (CECs) 2018; see Appendix A). The site locations, sampling design, constituent selection, analytical procedures, and reporting timelines from this initial Year One protocol were closely followed (with certain improved analytical method modifications) in subsequent seasonal sampling events over the four-year monitoring timeframe and are summarized below. When lab analyses shifted from Weck Labs to Eurofins Eaton Analytical (EEA) as described below, sample collection protocols were updated to adhere to EEA PPCP Sample Collection Protocols (see Appendix B).

Site Description:
Starting at the STPUD treatment facility, the treated water is pumped 1,235 feet to the Luther Pass summit and then gravity fed through a 27-mile pipeline (referred to as the C-line) to a drainage wetland before being received at Lower Harvey Place Reservoir located in the Upper Carson River watershed of Alpine County (see Figure 1). This reservoir receives STPUD reclaimed water starting mid-October to the beginning of April (Vance and Loden, 2018). The reclaimed water that is held within Harvey Place Reservoir is for forage crop irrigation purposes.

Over the four-year monitoring timeframe, reclaimed water was seasonally sampled by AWG staff at four site locations with one at the STPUD wastewater source, one at the C-line terminus location, one within Harvey Place Reservoir, and the forth location at a lower ditch location where reclaimed water is pumped out of the reservoir for forage crop irrigation purposes (see Figure 1). A more complete site description with mapping coordinates at the source (Site A: STPUD Final Effluent), C-line terminus location (Site B: C-line), within reservoir (Site C: Harvey Place Reservoir), and ditch irrigation pumping location (Site D: Diamond Valley Ditch) can be found in the study protocol, Appendix A. Seasonal effluent monitoring at these four sampling sites was performed consistently over the entire four-year monitoring timeframe with field sampling taking place during the months of April, July, and October. These months were selected to coincide with seasonality of weather, intensity of tourism in South Lake Tahoe (i.e., July 4th holiday), and scheduled reservoir effluent transfer times.

Field Sampling Methods and Quality Control:
The reclaimed water was sampled into either 40ml or 1L amber glass bottles then stored in coolers with ice by AWG staff. Coolers were then shipped 2-day delivery with chain of custody information to the analytical laboratory. In 2018, 2019, and 2021 six total effluent samples/year were respectively taken with three in April at Sites A, B, and C, one in July at Site D, and two in October at sites A and D (see Appendix A, Table 3). In 2020, single sampling was again conducted at sites A, B, and C. However, duplicate sampling was performed at Site D in July and at Site A in October. These 2020 July and October duplicate quality control samples were taken to assess field sampling and analytical laboratory precision/reliability. A duplicate sampling of Site A was also taken in April 2018 and separately analyzed by both Weck Labs and Eurofins Eaton Analytical (EEA) for comparative purposes.

CEC Laboratory Assessments:
Two analytical laboratories were employed by AWG for generating CEC/PPCP residue data. In April and July 2018, Weck Labs in City of Industry, CA, provided sample bottles and performed multiresidue determinations for 39 California State Water Resources Control Board (SWRCB) priority CECs and one urea herbicide used for reservoir and stream bank sterilization (see Table 1 of Appendix A). Starting in October 2018, Eurofins Eaton Analytical (EEA), of Monrovia, CA, provided sampling bottles and conducted SWRCB priority residue determinations for over 103 wastewater constituents through October 2021. Refer to Appendix C for a complete description of priority CECs that were evaluated over the four-year study timeframe.

Laboratory Quality Control:
EEA refrigerated on arrival and extracted/analyzed AWG effluent samples within stated holding times. Analyte quality control recovery information for each assayed priority contaminant was provided, and for the vast majority of analyses was within acceptable EPA 1694 multiresidue method recovery (i.e. 60-140%) and relative percent difference (RPD) precision ranges. When high concentration compounds fell out of instrument linearity range, the samples was appropriately diluted and reanalyzed. Any measured environmental contaminant falling outside acceptable quality control (QC) criteria was highlighted.

Weck Labs performed residue extractions within stated holding times and subsequently performed using EPA 1694M multiresidue methods for 30 CECs, method ASTM D7065 for 8 alkyl phenols, EPA Method 532M for the urea herbicide diuron, and a laboratory-specific method for iohexol, an x-ray imaging dye. Many of the evaluated wastewater residues exceeded the instrument linear calibration range. These effluent samples were not diluted-reanalyzed and therefore could not be precisely quantitated. Weck Labs qualified these residues as semi-quantitative estimates. Moreover, sample matrix interferences for four of five screened hormones appreciably raised the minimum reporting limit rendering these estrogenic substances to not be accurately determined at low concentrations. This qualified data for 17 of the 40 screened contaminants impacted the degree of confidence in estimation but did not mean the data was not reportable. On April 23, 2018, wastewater effluent was sampled at Site A by EEA who was contracted by STPUD. The EEA results were made available by STPUD for comparison to the Site A April 23, 2018, sampling event conducted by AWG staff. The reported residue concentrations from the two laboratories were found to be comparable. The general similarity in results increased confidence in the Weck generated residue data and has therefore been included in this summary report.

Results Summary and Discussion:
The results from analytical reports provided by EEA and Weck laboratories were compiled into a single four-year CEC summary table (see Appendix C). This table provides a description of each CEC evaluated and residues that were (or were not) detected/quantitated over the four-year seasonal monitoring timeframe.

The consistency in CECs evaluated and seasonal field sampling times provided a means to directly compare on a year-to-year basis constituent concentrations and observe if there were any evident seasonal data trends. From Appendix C, on a year-by year basis, the sugar substitutes, acesulfame-K and sucralose were consistently reported to be most abundant and sometimes observed at concentrations greater than 10 parts per billion (ppb) (i.e., greater than 10,000 nanograms per liter (ng/L). Sugar substitutes are also reported to be at more abundant concentrations in many reclaimed municipal wastewater facilities throughout California and the US (Drewes et al., 2018). Notably, caffeine and its three major breakdown metabolites were observed at effluent concentrations exceeding 10 ppb (10,000 ng/L) within the Upper Carson River watershed during October 2018 with reported maximum caffeine concentrations of 52 ppb (52,000 ng/L) at the STPUD Site A reclaimed effluent source. These caffeine concentrations are some of the highest ever reported from any reclaimed treatment water within the US (Lim et al., 2017). Surfactants and detergents were another CEC class present throughout each sampling season. Of these substituents, 4-nonylphenol was observed at some seasonal concentrations exceeding 1 ppb (1,000 ng/L). This substance is considered to have weak estrogenic properties. The contrast x-ray agent iohexol was also observed to routinely have high seasonal concentrations greater than 1 ppb.

A number of PPCPs were also routinely observed at seasonal concentrations that sometime exceeded 1 ppb. These include atenol (a beta blocker), atorvastin (a statin medication), gemfibrozil (a lipid regulator), lidocaine (a numbing agent), ibuprofen and naproxen (anti-inflammatory agents), the antibiotics quinolone and sulfamethoxazole, and the antimicrobial disinfectant triclosan. The flame retardant constituents tris (1, 3-dichloroisopropyl) phosphate (TDCPP) and tris (2-chloro-1-methylethyl) phosphate (TCPP) were also reported to be at effluent concentrations exceeding 1 ppb during the monitoring timeframe. These CECs have reported estrogenic activity. Hormones screened in this effluent monitoring program included 17-a-ethynylestradiol, 17-b-estradiol, estradiol, estriol, estrone and testosterone. All were reported to be at or near non-detectable concentrations over the four-year monitoring period.

Assigning Risk: Three factors enter into whether any of the above reported constituents can pose a potential human health or environmental risk. Besides the measured environmental concentration (MEC), its inherent toxicity and human route/duration of exposure(s) have to be accounted before assigning an appropriate CEC predicted no effect concentration (PNEC) and monitoring trigger level (MTL). A conceptual framework for evaluating CECs in wastewater using a MTL approach developed by a scientific advisory panel for the SWRCB was utilized in assessing the human-environmental risk of measured effluent constituents in this study (see Drewes et al., 2018).

The PNEC toxicological threshold is derived from values in the scientific literature. Here, the PNEC signifies the concentration which marks the limit at which the constituent will likely have no human or environmental toxic effect. Second, the route/duration of exposure has to be accounted for. If potable

water is directly ingested, the PNEC will be equal to the MTL. In the case of Alpine County, non-potable reclaimed irrigation water with disinfection is the end use product for forage crop irrigation. As a result, any human exposure should be appreciably less. In 2018, the SWRCB Scientific Advisory Panel recommended deriving MTLs for non-potable reuse by multiplying the potable reuse MTL by a safety factor of 10 to derive the monitoring trigger quotient (MTQ) or MEC/MTL ratio.

For example, the MEC (i.e., measured effluent concentration) for the sugar substitute acesulfame-K, taken at Site A on October 2018 was 28,000 ng/L (see Appendix C). The potable water MTL for this substance is reported at 200,000,000 ng/L (from Drewes et al., 2018).

Therefore, the MEC/MTL times 10X safety factor = 28,000 ng/L / 200,000,000 ng/L x 10

The monitoring trigger quotient (MTQ) = 0.00014 and is very much less than 1. Or in other words, this low toxicity substance, even at high effluent concentrations, should not pose a human health risk. It is important to note that this quotient is conservative and operationally defined using existing human health toxicological information. A MTQ greater than 1.0 does not necessarily represent any immediate threat to public health but does indicate further effluent monitoring for that constituent is warranted (Drewes et al., 2018).

As stated above, in October 2018 caffeine and its associated metabolites (1,7-dimethylxanthine, theobromine and theophylline) were observed in STPUD treated effluent at extremely high concentrations that warrant attention. Caffeine was respectively measured at 52 and 43 ppb at Sites A and D. The 1,7-dimethylxanthine concentrations were 8.1 and 9.8 ppb at Sites A and D. Theobromine concentrations at Sites A and D were respectively 17 and 15 ppb, while theophylline Site A and D concentrations were respectively 12 and 16 ppb. The relatively similar caffeine and proportional metabolite concentration behavior at both A and D sampling sites together with good laboratory QC recovery values provides strength to the reliability of this effluent monitoring data. MTQ risk values for caffeine for site A and D were respectively 14.6 and 12.3, well above unity (1). MLT values were only available for 1,7-dimethylxanthine and were respectively 1.16 and 1.4.

The fall 2018 caffeine effluent data, in and of itself, indicates STPUD should routinely monitor for this constituent and its associated metabolites at Site A on a regular basis. It is, however, important to note that caffeine was not observed in effluent concentrations that exceeded the MTQ after the fall of 2018. The combined multiresidue results for the remainder of the four-year monitoring program consistently showed that the majority of screened SWRCB priority CECs were either not detected or, if detected, these constituent concentrations fell below their corresponding MTQs. Based on the body of monitoring work performed and SWRCB risk criteria, STPUD treated effluent should not pose any significant human, ecological, or agricultural risk when this reclaimed water is exclusively used for forage crop irrigation purposes in the Upper Carson River watershed.

Acknowledgements:
Many AWG staff (past and present) have contributed towards the completion of this four-year program. Many thanks go to Gavin Feiger for his early program development work, Mo Loden for steering the ship and seeing to the project's near completion and success, AmeriCorps Member Marina Vance for project leadership during AWG staff transitions, and Rachel Kieffer and AmeriCorps Member Sierra Riker for

assisting Kimra McAfee in finalizing this Summary Report. The AWG staff also wish to acknowledge PPCP Committee members Dr. Richard Harvey (AWG Board Chair, STPUD Contract Commission Member, and former Alpine County Public Health Officer), Dr. Richard Johnson (Alpine County Public Health Officer), Ron Hames (Alpine County Supervisor), and Dennis Lampson (Alpine County Director of Environmental Health) for providing study oversight and advisement. We wish to also thank Dr. Vincent Hebert (Citizen at Large) for providing his critical review and for drafting this final report.

Funding for this program came from funds provided by South Tahoe Public Utility District to Alpine County for water quality monitoring associated with the District's treated effluent discharge in Alpine County. Alpine County contracted with Alpine Watershed Group to oversee monitoring project design, conduct sampling, and provide basic data analysis and recommendations.

References:

Anderson P, Denslow N, Drewes JE, Olivieri A, Schlenk D, and S Snyder. 2010. Monitoring Strategies for Chemicals of Emerging Concern (CECs) in Recycled Water: Recommendations of a Science Advisory Panel. State Water Resources Control Board. 217 pp.

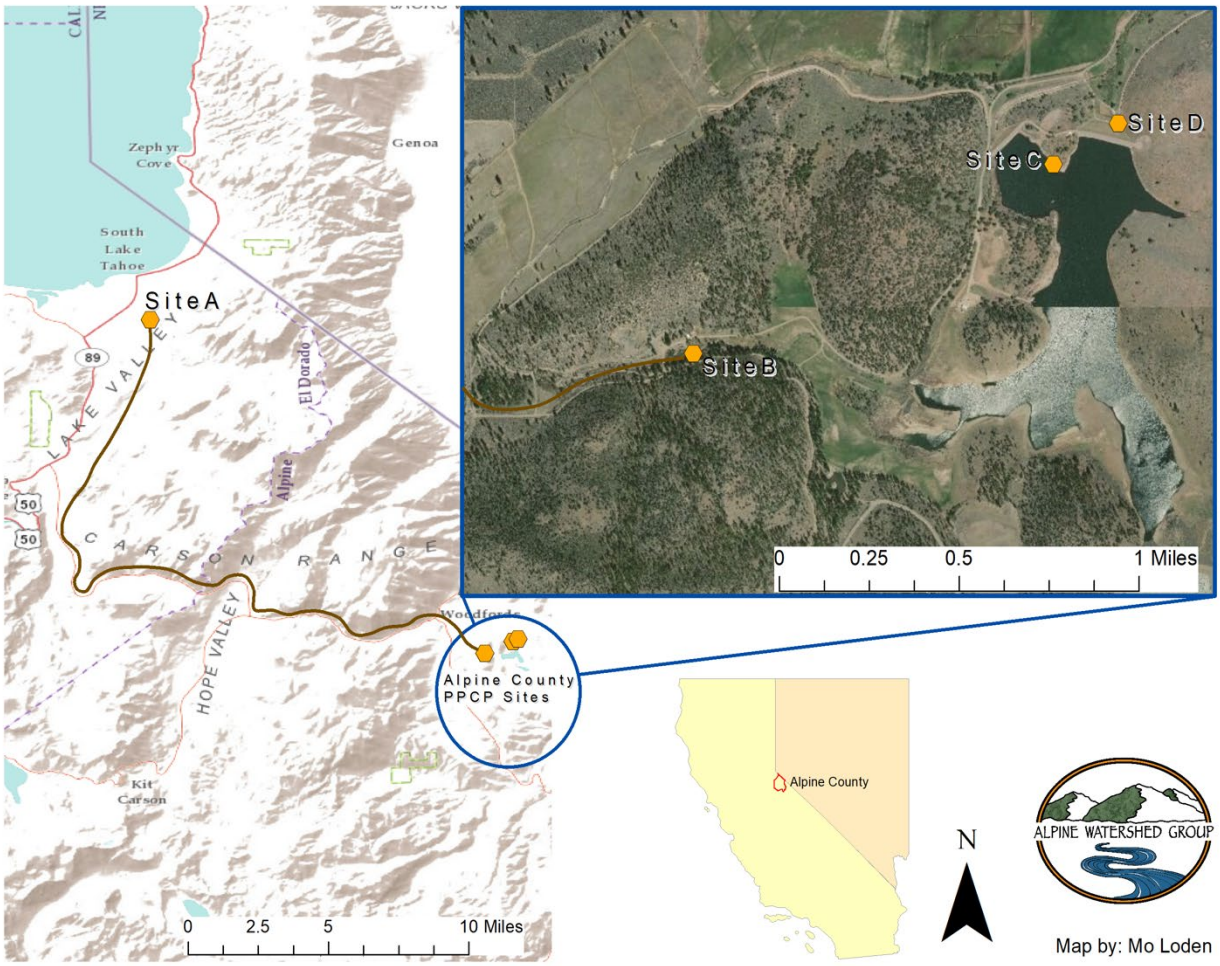
Drewes JE, Anderson P, Denslow N, Jakubowski W, Olivieri A, Schlenk D, and S Snyder. 2018. Monitoring Strategies for Constituents of Emerging Concern (CECs) in Recycled Water. Recommendations of a Science Advisory Panel convened by the State Water Resources Control Board. SCCWRP Technical Report 1032. 155 pp.

Fono LJ and HS McDonald. 2008. Emerging compounds: A concern for water and wastewater utilities. *Journal AWWA* 100: p 50-57.

Lim FY, Ong SL, and J Hu. 2017. Recent advances in the use of chemical markers for tracing wastewater contamination in aquatic environment. *Water.* 217 9, 143. 26 pp.

Vance M and M Loden. 2018. Pharmaceutical and Personal Care Products Monitoring Project-Year One. Interim report. Report No. 1A. Alpine Watershed Group. 39 pp.

Figure 1. Sampling Locations



Appendix A
Project Protocol

Project Protocol, Year One
for STPUD Contract Commission
Testing for Pharmaceuticals and Personal Care Products (PPCPs)
and Contaminants of Emerging Concern (CECs)
2018

Background

The goal of this monitoring project is to document the presence, concentrations, and trends of Pharmaceuticals and Personal Care Products (PPCPs) and other Contaminants of Emerging Concern (CECs) in wastewater (effluent) discharged into the Upper Carson Watershed in Alpine County by the South Lake Tahoe Public Utility District (STPUD). Effluent is exported 26 miles from South Lake Tahoe to Harvey Place Reservoir in Alpine County. During the first year of water testing, Alpine Watershed Group (AWG) hopes to establish baseline conditions for subsequent monitoring years in relation to CECs and PPCPs within Alpine County.

In September 2017, AWG convened a Project Team which consists of Richard Harvey (AWG Board Member, STPUD Contract Commission Member, and former Alpine County Public Health Officer), Richard Johnson (current Alpine County Public Health Officer), Ron Hames (Alpine County Supervisor), Dennis Lampson (Alpine County Director of Environmental Health), and AWG Staff. The Project Team, with input from Alpine County officials, decided to use Weck Labs from the City of Industry, California, to analyze the samples. The contaminants chosen to test for include: 9 Alkyl Phenols, 5 Hormones, 21 Pharmaceuticals, 1 Urea Pesticide, and 5 Organic Compounds (see Table 1). Weck Labs is certified through the U.S. Department of Defense Environmental Laboratory Accreditation Program (ELAP).

Table 1. Contaminants of Emerging Concern (CEC)

Alkyl Phenols	Diuron/ linuron	Hormones	Pharmaceuticals (-)	Pharmaceuticals (+)	Organic Compounds
4-Nonylphenol	Diuron	17-a-Ethynylestradiol	Bisphenol A	Acetaminophen	TCEP
4-Octylphenol		17-b-Estradiol	Diclofenac	Amoxicillin	TCPP
4-tert-Octylphenol		Estrone	Gemfibrozil	Azithromycin	TDCPP
4-tert-Octylphenol diethoxylate		Progesterone	Ibuprofen	Caffeine	Trimethoprim
4-tert-Octylphenol monoethoxylate		Testosterone	Iopromide	Carbamazepine	Iohexol
Nonylphenol			Naproxen	DEET	
Nonylphenol diethoxylate			Salicylic Acid	Diazepam	
Nonylphenol monoethoxylate			Triclosan	Fluoxetine	
4-Nonylphenol-d4				Meprobamate	
				Methadone	
				Phenytoin	
				Primidone	
				Sulfamethoxazole	

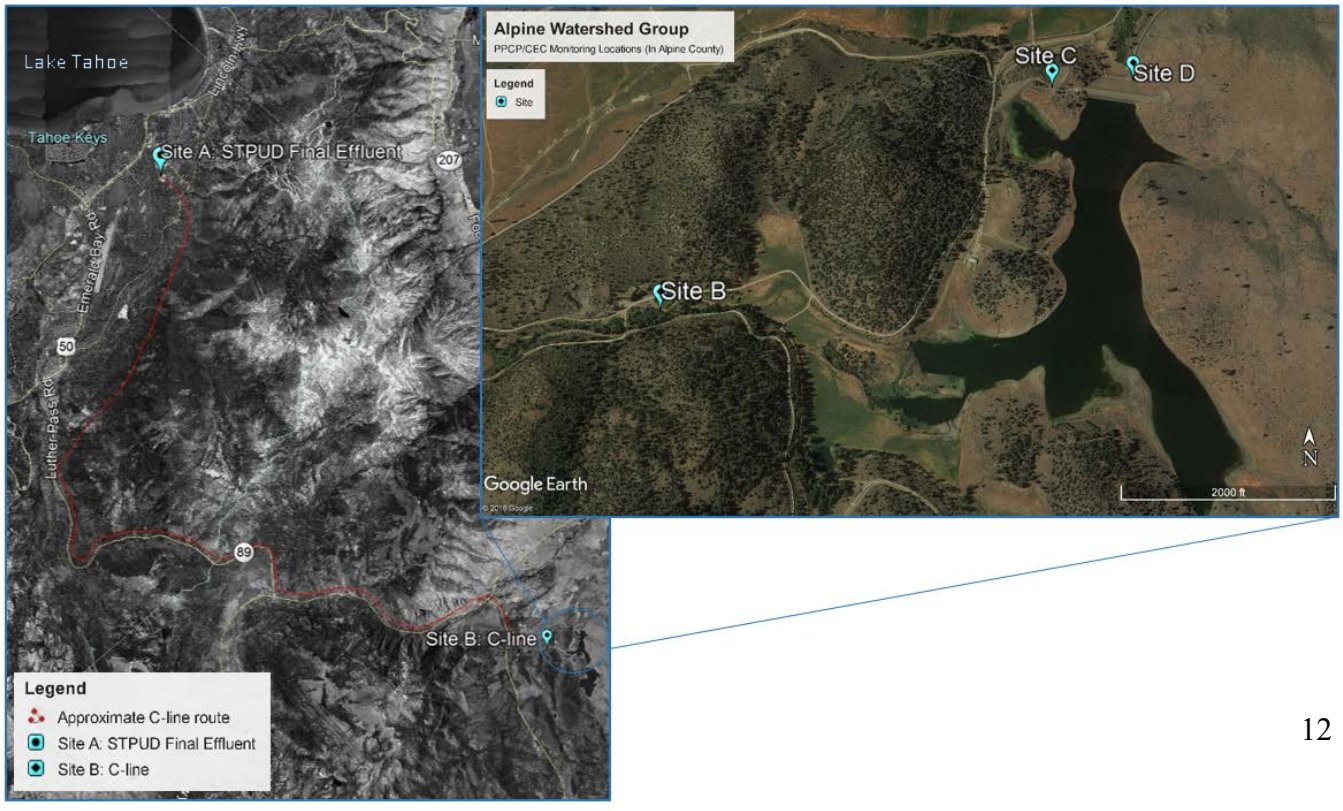
Monitoring Sites

These four sites were chosen based on their relationship and proximity to the C-line and the general distribution of effluent within Harvey Place Reservoir. The C-line is the pipeline that delivers the secondary treated effluent from the STPUD facility in South Lake Tahoe to Alpine County. See Table 2 for monitoring site information and Figure 1 for sampling locations. The Project Team coordinated the monitoring schedule of these locations based on seasonality of weather and tourism in South Lake Tahoe, effluent transfer system design, holding time in Harvey Place Reservoir, and the project budget.

Table 2. Monitoring Site Information

Site ID	Site Name	Site Description/Significance	Coordinates
A	STPUD Final Effluent	Located in South Lake Tahoe at the Public Utility District facility, this site is sampled at the valve that connects to the effluent C-line pipe after all treatments are completed.	38.922775, -119.970664
B	C-line	Located at the end of the pipeline in Alpine County, this site is sampled mid-stream from a bridge before it comes into contact with any environmental conditions.	38.758606, -119.797722
C	Harvey Place Reservoir	Located along the shore at the downstream northwest end, this site represents the concentrations of the reservoir.	38.765262, -119.783764
D	Diamond Valley Ditch	Located at the most upstream end of the ditch where water pumps out of the reservoir, this site is sampled from a bridge at mid-stream and represents concentrations flowing into ranches within Diamond Valley and Alpine County.	38.765470, -119.780575

Figure 1. Sampling Locations



Monitoring Timeline

AWG launched this PPCP and CEC monitoring project in Spring 2018 and will conclude our first year of preliminary data collection in Fall 2018. Ideally, Alpine County will contract AWG again for the next year in hopes of continuing monitoring for contaminants if not for our own analysis but for development of increasing data for an emerging field of water quality and public health.

Specifically, within this first year, AWG has enough funds in the budget for six samples. The sampling bottles sent from Weck Labs have a shelf life of up to six months. With the background information in mind, sampling early April before the pump opens would represent the most concentrated effluent level. Another high priority sample date would be during the week following Independence Day (July 4th) due to the population surge for the holiday. The last sample date would be in October shortly before the irrigation supply is suspended for the season. To maintain consistency, the sampling should be at the same time of day each event (e.g., 9 a.m.).

Table 3. First Year Sampling Date

Sampling Site	April 23rd	July 9th	October 10th
Site A: STPUD Final Effluent	x		x
Site B: C-line	x		
Site C: Harvey Place Reservoir	x		
Site D: Diamond Valley Ditch		x	x

Monitoring Equipment

Sampling kits will be provided by Weck Labs which will include a cooler with:
2X 1L Amber glass containers containing NaN3 and Ascorbic Acid
2X 1L Amber Glass with H2SO4
2X 40mL VOAs

Return coolers with samples on wet ice and ship 2-day.

Conducting Samples

Standard Operating Procedures (SOP) for field methods include filling the containers up to the neck while not overfilling them and shipping them back on ice. The sampling bottles will be shipped to AWG with preservative in them and returned to Weck Labs. See detailed SOP in AWG's Quality Assurance Project Plan (QAPP).

Excerpt from QAPP:
Field personnel must be thoroughly trained

- *in the proper use of sample collection gear,*
- *in distinguishing acceptable versus unacceptable samples in accordance with pre-established criteria,*

- *to recognize and avoid potential sources of sample contamination.*

Sampling equipment and utensils that come in direct contact with the sample should be made of non-contaminating materials and should be thoroughly cleaned between sampling stations. Sample storage containers should be of the recommended type and must be free of contaminants. Conditions for sample collection, preservation, and holding times should be followed, and relevant field observations should be recorded. On the day of sampling, field personnel should avoid contact with or consumption of products that contain the target analytes. This may include soaps, detergents, fragrances, sunscreen, and pharmaceuticals. Storage containers with Teflon should not be used to store samples that are slated for analysis of perfluorinated compounds (PFCs).

Reporting

After sample analysis has been sent to AWG in the form of a PDF document, AWG will create a summary of the data for the STPUD Contract Commission, watershed stakeholders, and the general public. The data will be input into the CEDEN database for the Statewide CEC Monitoring interactive map.

Project Budget

Alpine County agreed in 1967 to take treated sewage from the STPUD "assuring the protection of the health and welfare of the residents of the County and Agency…" Alpine County has the legal right to independently monitor for any possible contaminants in the treated secondary effluent received from STPUD. Alpine County can receive $15,000/year from the STPUD to monitor for contaminants that may have negative effects on the environment and on human health. Alpine County has not done independent monitoring since 2009. There has been increasing concern that the wastewater received from the STPUD may contain hormones and personal care products. At the August 1, 2017, STPUD Contract Commission meeting, a decision was made to monitor the STPUD effluent for CECs. Further, the Commission agreed to contract Alpine Watershed Group (AWG) to conduct the monitoring.

Sampling Collections:

Location	Date	Time	Ambient Temperature*
Site A: STPUD Final Effluent	4.23.18	8:10 a.m.	
Site B: C-line	4.23.18	9:30 a.m.	
Site C: Harvey Place Reservoir	4.23.18	10:00 a.m.	
Site D: Diamond Ditch	7.09.18	9:30 a.m.	
Site A: STPUD Final Effluent	10.10.18	TBD	
Site D: Diamond Ditch	10.10.18	TBD	

*Collect ambient temperature day of from STPUD weather station at https://cimis.water.ca.gov/WSNReportCriteria.aspx# Weather Station Number 246.
For first two sampling events, used weatherunderground.com

Appendix B
PPCP Sample Collection Protocols from Eurofins Eaton Analytical

Appendix B: PPCP Sample Collection Protocols from Eurofins Eaton Analytical

eurofins | Eaton Analytical	**PPCP Sample Collection Protocols**	**Sampling Instruction No. 33** **Revision Date: 10/22/13** **Page 1 of 2**

1. a) FREEZE GELPAKS UPON RECEIPT OF SAMPLE KIT AND ADD FROZEN GELPAKS TO THE COOLER ON THE DAY OF SAMPLING.
   b) WHEN SAMPLING, BRING OTHER AVAILABLE BAGGED WET ICE IN SEALED BAGS OR FROZEN GELPAKS TO CHILL SAMPLES DURING SAMPLE COLLECTION.

2. The sampler will receive a sample kit from our lab as follows:
   2 x 40 ml amber vials with preservative are provided for the small volume test, **or**
   2 x 500 ml or 1L amber glass bottles with preservative are provide for large volume tests

   Upon special request, our lab might include one or both additional kits below:
   Field Blank (FB) or Equipment blank (EB): 1 container filled with DI water and 1 container of FB/EB Sample Bottle

   Note: Sample bottle contains toxic preservatives to prevent biological degradation of PPCP. Be sure to NOT rinse out the container. Preservatives vary, depending upon the matrix being sampled and the target analyte(s).

3. We are measuring compounds at ng/L levels, so it is very prone to contamination. **Please take additional precautions below when sampling for PPCPs**
   a) Put on powderless nitrile gloves at all times, during sampling and processing. Change to clean gloves with each change in activity to avoid potential glove contamination.
   b) Avoid touching or even breathing into the samples and/or equipment.
   c) Avoid direct contact between yourself (including clothing) and the sample, sampling device, and processing equipment. Clothing is a source of detergents, fragrances, and fire retardants
   d) On the day of sampling activities, avoid contact with or consumption of the products listed below. Where contact with or consumption of these products is unavoidable, the collection of field blanks is strongly recommended.

   Wastewater and Personal Care or Pharmaceutical Product compounds:
   - Soaps and detergents, including antibacterial cleansers
   - DEET (active ingredient in most insect repellents)
   - Fragrances (cologne, aftershave, perfume)
   - Caffeine or Sweeteners (coffee, tea, colas)
   - Prescription drugs, medications, and hormonal substances
   - Over-the-counter medication
   - Human antibiotics
   - Veterinary antibiotics
   - Tobacco
   - Sunscreen
   - Antibiotics

4. If your kits include any additional blank samples, please follow the special instruction below:
   Field Blank (FB):
   - Transfer the DI water provided with your sample kit into the FB sample bottle.
   - Cap both containers and return them to the laboratory.

   Equipment Blank(EB):
   - Pour the DI water provided with your sample kit into the equipment (i.e. bailer or other non-tap sampling device) and transfer it into the EB sample bottle(s).
   - Cap all containers and return them to the laboratory.

5. Use indelible ink to clearly identify the sample bottles with the information listed below.
   - Client Name
   - Sample ID
   - Source of sample, if not already on label
   - Analysis required, if not already on label
   - Date and Time of collection
   - Preservative used, if not already on label

6. If sampling from a faucet,
   a) Remove the aerator, screen and/or hose attachments.
   b) Open the tap and let the water of the sample source run at fast flow for approximately 5 minutes.

c) Slow water flow to thickness of a pencil (to minimize splashing) and fill sample bottles.

7. Fill sample bottles to the base of the neck. Make sure the mouth of the bottle does not come in contact with anything other than the sample water. **DO NOT RINSE OUT PRESERVATIVE.**

8. Cap and invert the bottles at least 5 times to mix the sample and preservative.

9. Use indelible ink to clearly identify the sample bottles with the information listed below.
   - Client Name
   - Sample ID
   - Source of sample, if not already on label
   - Analysis required, if not already on label
   - Date and Time of collection
   - Preservative used, if not already on label

10. Store at 1-4˚C but above the freezing point of water for a minimum of 2 hours until transported to the lab. Note that some test suites do not require chilling. Check with your analytical service manager for details.

11. If sampling **NOT** from a faucet, please follow the following instruction to collect and process the sample(s):
    a) Select sampling and processing equipment made of fluorocarbon polymers, glass, aluminum, or stainless steel. **Avoid** equipment made of Tygon, polyethylene, or other plastics.
    b) Clean equipment thoroughly before use.
    c) Use non-antibacterial detergents.
    d) Take extra care to ensure that equipment is copiously rinsed with deionized (DI) water after the detergent wash. (Detergents are a source of interference in the analysis of pharmaceutical compounds and may include a target analyte (triclosan) of the method.)
    e) Follow the DI water rinse with a methanol rinse. Collect the used methanol solution into an appropriate container for disposal.
    f) **DO NOT** clean or field-rinse the sample bottles from the laboratory.
    g) And follow steps 7-10 above.

SAMPLE SHIPPING AND STORAGE

1. If shipping samples on the same day of sampling, chill samples until ≤6°C by exchanging the ice used during sampling with available sealed bags of fresh frozen ice or frozen gelpaks.

2. **Pack chilled samples** in a cooler with **FROZEN** gelpaks or sealed bags of **WET ICE**.

3. Complete the Chain of Custody during sample collection. Place Kit Order and completed Chain of Custody in a ziplock bag in the cooler on top of packing material. The following information is required on the completed Chain of Custody.
   - Collector's name & signature
   - Client Name
   - Sample site
   - Date and time of collection
   - Comments about the sample, if applicable
   - Sample type

4. **Ship via overnight service such as FEDEX, UPS, or DHL, etc.** Maintain an environment at ≤6˚C but above the freezing point of water during transit. It is recommended that samples arrive within 48 hours of sampling, with no more than 40 hours for transit.

5. If samples are received on the same day as collection, temperature may be >10˚C with evidence of cooling.

6. Maximum **HOLDING TIME FOR SAMPLES** varies by test list, but it is generally **30 days** from time of collection.

7. Alternatively, cool the samples down by placing them **overnight** in a cooler with frozen refrigerant packs or water ice, or in a refrigerator (store chilled for at least 12 hours before packing for shipment). Maintain the cold samples until repacked in the cooler for shipment to the lab.

Appendix C
Table 1 — Monitored Priority CECs

Appendix C

Table 1. Monitored Priority CECs

High detections > 1,000ng/L

Very high detections >10,000ng/L

Results (ng/L) NA: Not Available, ND: Not Detected

		August 2017	April 2018				July 2018	October 2018		April 2019			July 2019	October 2019		April 2020			July 2020		October 2020			April 2021			July 2021	October 2021	
Compounds Analyzed	**Descriptions/Functions**	EEA Site A	Weck Site A	EEA Site A	Weck Site B	Weck Site C	Weck Site D	EEA Site A	EEA Site D	EEA Site A	EEA Site B	EEA Site C	EEA Site D	EEA Site A	EEA Site D	EEA Site A	EEA Site B	EEA Site C	EEA Site D	Site D Duplicate	EEA Site A	Site A Duplicate	EEA Site D	EEA Site A	EEA Site B	EEA Site C	EEA Site D	EEA Site A72	EEA Site D5
1,7-Dimethylxanthine	caffeine metabolite	34	NA	396	NA	NA	NA	8100	9800	84	170	160	350	52	350	390	470	40	350	350	150	150	280	240	220	340	280	76	91
17-a-Ethynylestradiol	reproductive hormone, synthetic hormone in pharmaceuticals	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	120	NA	NA
17-b-Estradiol	reproductive hormone, synthetic hormone in pharmaceuticals, natural hormone/steroid	NA	ND	ND	ND	ND	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1H-Benzotriazole	poorly degraded-water soluble corrosion inhibitor	NA	NA	NA	NA	NA	NA	NA	NA	810	200	420	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-D	plant growth hormone mimic, herbicide	ND	NA	5.05	NA	NA	NA	3400	970	ND	ND	46	41	42	620	2300	260	380	260	260	ND	ND	ND	ND	ND	ND	NA	34	92
4-n-Octylphenol diethoxylate	detergent, surfactant	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-n-Octylphenol monoethoxylate	detergent, surfactant	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Nonylphenol	detergent, surfactant - weak estrogenic effects	ND	ND	6840	ND	ND	ND	1400	2300	1300	1400	ND	ND	1600	400	2600	2900	1900	1200	1600	6200	7500	ND	5100	NA	ND	310	5400	1900
4-Octylphenol	detergent, surfactant	NA	ND	NA	ND	ND	ND	NA	NA	NA	NA	NA	NA	220	46	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-tert Octylphenol diethoxylate	detergent, surfactant	NA	ND	NA	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	87	76	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-tert-Octylphenol	detergent, surfactant	ND	370	ND	170	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	380	380	27	NA	NA	520	500	170	310	240	ND	37	230	57
4-tert-octylphenol monoethoxylate	detergent, surfactant	NA	ND	NA	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acesulfame-K	sugar substitute	ND	NA	8310	NA	NA	NA	28000	23000	17000	17000	15000	12000	28000	20000	21000	20000	24000	15000	16000	16000	16000	10000	33000	26000	ND	3000	4800	1900
Acetaminophen	pharmaceutical - fever reducer	15.6	27	159	29	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.4
Albuterol	bronchodilator, asthma treatment	78	NA	20.7	NA	NA	NA	ND	8	ND	ND	ND	ND	ND	ND	ND	16	4.7	ND	ND	5.1	8.6	9	7.6	12	4.7	3.8	7.4	7.9
Amoxicillin	antibiotic	122	840	399	30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Androstenedione	androgen steroid hormone	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	3.8	4.4	ND	ND	ND	8.7	7.7	ND	ND	ND	ND	ND	ND	5.9	44	36
Atenolol	beta-blocker, treat high blood pressure	ND	NA	1030	NA	NA	NA	1000	450	640	520	51	100	790	150	700	700	93	90	82	640	680	190	550	530	76	86	290	83
Atorvastatin	statin, lowers level of cholesterol	NA	NA	4920	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Atrazine	herbicide	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Azithromycin	antibiotic	NA	150	NA	160	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bendroflumethiazide	thiazide diuretic, hypertension drug	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bezafibrate	lipid-lowering agent to treat hyperlipidemia	ND	NA	ND	NA	NA	NA	55	51	27	34	26	15	13	26	17	23	8	6.7	7.5	6.2	6.9	9.4	65	71	12	5.4	12	13
Bisphenol A	plasticizer - added to plastics to improve flexibility	NA	87	79.8	82	ND	12	ND	23	77	59	ND	ND	90	14	60	72	ND	12	12	130	150	21	81	62	ND	11	100	36
Bromacil	herbicide	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Butalbital	barbiturate	ND	NA	ND	NA	NA	NA	ND	ND	8.1	8.9	ND	14	12	15	23	28	23	32	32	24	25	26	27	ND	ND	25	14	20
Butylparaben	paraben, preservative	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Caffeine	stimulant	66.7	68	175	170	5400	1400	52000	43000	150	250	410	1300	26	810	1000	1300	120	1200	1000	250	230	880	680	390	500	600	190	110
Carbadox	antibiotic	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.4	ND
Carbamazepine	pharmaceutical - antiepileptic	137	130	204	130	130	100	170	170	120	100	110	100	190	290	180	180	170	120	120	170	160	140	180	160	140	120	150	180
Carisoprodol	muscle relaxant	9.78	NA	11.3	NA	NA	NA	32	36	6.8	8.4	18	29	11	16	22	42	28	37	35	18	21	33	53	21	41	46	18	35
Chloramphenicol	antibiotic	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloridazon	herbicide	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlortoluron	herbicide	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cimetidine	antihistamine	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	7.4	ND	ND	ND	9.5	7.1	ND	ND	21	ND	ND	ND	8.4	ND	ND
Clofibric acid	herbicide	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cotinine	nicotine metabolite	ND	NA	ND	NA	NA	NA	360	360	370	330	100	98	2100	450	360	250	55	90	100	95	140	64	52	62	NA	64	39	25
Cyanazine	pesticide	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	NA	NA	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	65	NA	NA	NA
Diaminochlorotriazine (DACT)	herbicide	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	ND	ND
Diethanolamine (DEA)	cosmetic ingredient	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	20	ND	ND	ND	ND	ND	ND	ND	ND	ND	14	19	13	12	5	11
N,N-Diethyl-meta-toluamide (DEET)	insect repellent	36.4	600	579	780	460	140	580	410	350	310	220	250	300	240	650	680	560	530	510	260	240	310	210	190	290	350	ND	ND
Dehydronifedipine	antihypertensive drug metabolite	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	1.8	2.6	ND	ND	ND	ND	ND	ND	ND	ND	1.9	3	ND	ND	ND	ND
Diisopropylatrazine (DIA)	triazine herbicide degradation product	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Diazepam	treat anxiety, alcohol withdrawal, seizures (valium)	ND	2.5	ND	2.2	2.9	2.2	ND	ND	ND	ND	ND	ND	7.9	3.5	ND	ND	ND	ND	ND	ND	ND	ND	3.4	3.2	2.1	2.8	2.8	2.7
Diclofenac	nonsteroidal anti-inflammatory drug (NSAID)	ND	46	109	84	ND	ND	8.1	17	100	73	ND	ND	240	27	260	180	ND	55	40	160	180	25	260	200	ND	28	690	57
Dilantin	anticonvulsant, treat seizures	ND	NA	69.6	NA	NA	NA	50	78	ND	ND	20	31	42	50	24	20	21	24	24	40	35	39	36	39	43	32	29	32
Diltiazem	calcium channel blocker, antihypertensive drug	ND	NA	113	NA	NA	NA	200	35	160	130	9.9	7.1	290	23	84	140	9	3.9	4	120	120	12	190	230	21	6.7	220	30
Diuron	herbicide	448	ND	102	ND	ND	ND	170	180	68	39	26	58	210	170	140	110	53	75	73	390	410	350	280	190	84	120	110	140
Erythromycin	gut motility stimulator, antibiotic	ND	NA	57.9	NA	NA	NA	23	41	49	23	ND	ND	17	12	ND	ND	ND	10	13	ND	16	ND	83	100	19	300	63	77
Estradiol	hormone	ND	NA	ND	NA	NA	NA	ND	ND	6.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Estriol	hormone	ND	NA	ND	NA	NA	NA	ND	ND	13	11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Estrone	hormone	46.2	ND	83.2	46	ND	ND	ND	74	44	35	7.8	ND	23	11	62	57	ND	9.3	9.2	60	64	58	39	40	ND	ND	130	14
Ethinyl Estradiol - 17 alpha	estrogen steroid hormone	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylparaben	paraben, preservative	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Flumeqine	antibiotic	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoxetine	antidepressant	ND	19	41.2	23	1	2.7	48	9.7	28	29	ND	ND	26	4.7	89	86	8.3	ND	ND	29	34	ND	88	82	ND	ND	76	ND
Gemfibrozil	lipid regulator	95.6	66	52.7	70	330	290	1100	930	620	510	500	530	830	660	960	880	380	370	400	610	580	450	850	NA	ND	430	1000	1000
Ibuprofen	anti-inflammatory	907	100	ND	180	690	65	ND	290	51	68	220	ND	260	140	5500	4000	560	70	ND	160	200	350	1400	1700	ND	98	180	230
Iohexol	contrast agent for x-ray	50.3	86	112	94	430	420	2360	1730	260	190	1500	1100	4100	2700	550	830	780	1200	1100	6600	7600	2400	430	450	98	2400	310	2800
Iopromide	non-ionic x-ray contrast agent	ND	ND	6.63	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.8	ND	ND
Isobutylparaben	paraben, preservative	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Isoproturon	pesticide	ND	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ketoprofen	anti-inflammatory drug	10.3	NA	33.9	NA	NA	NA	ND	ND	9.2	ND	ND	ND	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	14	10	ND	3.1	5.8	5.4
Ketorolac	anti-inflammatory drug	ND	NA	12.7	NA	NA	NA	ND	ND	6.4	ND	ND	ND	11	9.3	ND	4.7	ND	ND	ND	9	8.4	6.3	17	14	ND	3	18	18
Lidocaine	numbing agent	526	NA	97.6	NA	NA	NA	580	400	560	350	180	150	780	470	460	630	350	240	250	1000	1100	750	1200	1000	480	140	ND	ND
Lincomycin	antibiotic	842	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Linuron	herbicide	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lopressor	beta blocker/heart medication	239	NA	190	NA	NA	NA	330	250	230	170	68	84	290	110	140	120	77	46	58	360	320	260	590	600	330	220	260	200
Meclofenamic Acid	Non-steroidal anti-inflammatory agent (NSAID)	135	NA	192	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Meprobamate	anxiolytic drug, treats tension and anxiety (sedative)	131	640	71.5	420	470	170	140	100	51	58	71	140	360	400	240	260	97	250	230	150	150	170	140	150	220	410	90	160
Metazachlor	herbicide	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Metformin	anti-diabetic	214	NA	3950	NA	NA	NA	150	100	NA	NA	NA	21	8.2	7.1	ND	68	ND	21	18	18	28	5.5	18	38	39	44	2.5	6

Appendix C
Table 1. Monitored Priority CECs

High detections > 1,000ng/L	Very high detections >10,000ng/L	Results (ng/L) NA: Not Available, ND: Not Detected																											
		August 2017	April 2018				July 2018	October 2018		April 2019			July 2019	October 2019		April 2020			July 2020		October 2020			April 2021			July 2021	October 2021	
Compounds Analyzed	Descriptions/Functions	EEA Site A	Weck Site A	EEA Site A	Weck Site B	Weck Site C	Weck Site D	EEA Site A	EEA Site D	EEA Site A	EEA Site B	EEA Site C	EEA Site D	EEA Site A	EEA Site D	EEA Site A	EEA Site B	EEA Site C	EEA Site D	Site D Duplicate	EEA Site A	Site A Duplicate	EEA Site D	EEA Site A	EEA Site B	EEA Site C	EEA Site D	EEA Site A72	EEA Site D5
Methadone	opioid, treat pain	12.9	32	45.2	31	5.1	4	ND	ND	NA	NA	NA	ND	32	14	20	22	4.9	4.8	3.9	31	29	16	6.5	NA	ND	15	37	12
Methylparaben	paraben, preservative	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	11	ND	ND
Metolachlor	herbicide	ND	NA	ND	NA	NA	NA	ND	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Morphine	narcotic	503	NA	167	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	NA	NA	NA
Naproxen	anti-inflammatory	ND	1100	2900	990	400	150	ND	800	460	330	150	55	860	600	7700	4600	730	540	520	490	520	1800	1300	NA	ND	210	44	340
Nifedipine	calcium channel blocker, antihypertensive drug	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nonylphenol	non-ionic detergent metabolite	NA	1700	NA	1500	630	1300	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nonylphenol diethoxylate	surfactant, detergent	269	620	370	ND	550	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nonylphenol Monoethoxylate	surfactant, detergent	ND	1600	1680	570	580	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Norethisterone	synthetic birth control hormone	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
OUST (Sulfometuron, methyl)	herbicide	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	3.3	4.1	56	29	28	ND	ND	ND	ND	ND	ND	ND	ND	ND
Oxolinic acid	antibiotic	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Oxybenzone	aromatic ketone, sunscreen agent, PCP	12.5	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pentoxifylline	vasodilator and anti-inflammatory	ND	NA	6.85	NA	NA	NA	13	7.6	ND	ND	ND	ND	15	4.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.5	33	8.9
Phenazone	analgesic, anti-inflammatory	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phenytoin	anticonvulsant, treat seizures	NA	120	NA	33	56	54	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Praziquantel	antiparasite, tapeworm	ND	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Primidone	anticonvulsant, treat seizures	51.9	36	ND	24	76	41	86	74	44	38	37	45	74	120	60	63	54	61	67	82	96	120	46	94	95	57	21	26
Progesterone	sex hormone in ovaries, natural hormone/steroid	ND	ND	ND	1.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Propazine	herbicide	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.9
propranolol	beta blocker/heart medication	5.61	NA	19.7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Propylparaben	paraben, preservative	ND	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5	46	ND	ND	ND	37
Quinoline	antibiotic/antiseptic	63	NA	6601	NA	NA	NA	89	17	ND	ND	ND	26	ND	ND	37	60	ND	25	29	60	50	18	26	34	50	52	14	3.5
Salicylic Acid	Natural product, major component in aspirin	277	63	ND	100	ND	ND	ND	ND	NA	NA	NA	ND	ND	84	330	240	650	ND	ND	430	410	ND	ND	ND	ND	34	36	ND
Simazine	herbicide	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sucralose	artificial sweetener	103000	NA	33100	NA	NA	NA	32000	31000	20000	22000	22000	23000	45000	40000	39000	34000	30000	35000	36000	56000	60000	46000	42000	NA	860	28000	50000	51000
Sulfachloropyridazine	antibiotic	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4	ND	2.6
Sulfadiazine	antibiotic	ND	NA	ND	NA	NA	NA	ND	ND	55	49	21	ND	6.4	22	ND	ND	23	ND	ND	ND	ND	ND	51	59	6.3	27	21	9.5
Sulfadimethoxine	antibiotic	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sulfamerazine	antibiotic	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	71	82	23	ND	41	29
Sulfamethazine	antibiotic	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sulfamethizole	antibiotic	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sulfamethoxazole	antibiotic	1590	1500	1390	1100	730	520	920	670	480	470	500	440	920	770	670	790	580	500	490	600	600	560	1000	1000	610	680	950	480
Sulfathiazole	antibiotic	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tris (2-chloroethyl) phosphate (TCEP)	flame retardant	84.3	140	344	87	70	72	170	160	450	330	160	230	260	400	70	290	240	150	150	260	210	270	300	470	320	450	270	220
Tris (2-chloro-1-methylethyl) phosphate (TCPP)	flame retardant	ND	2500	1170	2300	1800	1800	1400	1100	780	720	680	480	500	510	770	900	710	900	880	850	970	880	1100	1200	1100	860	830	930
Tris (1,3-dichloroisopropyl) phosphate (TDCPP)	flame retardant	911	300	912	360	300	830	220	180	ND	ND	ND	270	330	300	170	240	110	340	290	360	330	270	320	330	310	690	410	1000
Testosterone	reproductive hormone, natural hormone/steroid	8.81	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	30	5.2	7.8
Theobromine	caffeine metabolite	44.8	NA	610	NA	NA	NA	17000	15000	99	160	40	350	ND	ND	370	500	ND	250	190	ND	ND	ND	330	300	410	96	510	330
Theophylline	caffeine metabolite	238	NA	264	NA	NA	NA	12000	16000	130	280	330	630	64	420	710	780	81	530	440	160	180	360	280	220	700	740	280	310
Thiabendazole	fungicide	ND	NA	6.29	NA	NA	NA	22	12	ND	ND	ND	ND	2.7	4.9	7.4	7.9	ND	4.5	4.8	ND	ND	ND	30	33	10	11	16	20
Triclocarban	antibiotic	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	15	48	ND	ND	18	56
Triclosan	antimicrobial disinfectant	1490	130	242	95	11	5.2	ND	32	160	130	ND	ND	150	13	340	140	ND	ND	ND	ND	ND	ND	44	41	ND	11	43	31
Trimethoprim	antibiotic	632	400	474	520	180	110	210	220	210	210	150	91	250	240	62	97	95	88	93	140	140	140	300	390	150	89	290	210
Venlafaxine	antidepressant	NA	NA	NA	NA	NA	NA	NA	NA	150	130	81	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Warfarin	Blood thinner	ND	NA	ND	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Qty NA	Qty NA	14	78	12	78	78	78	15	15	17	17	17	19	20	20	19	19	19	20	20	20	20	20	20	26	20	20	20	20
Qty ND	Qty ND	67	11	57	10	18	18	68	62	60	63	69	67	50	50	57	54	62	55	56	58	57	60	47	47	65	44	45	44
Total NA/ND	Total NA/ND	81	89	69	88	96	96	83	77	77	80	86	86	70	70	76	73	81	75	76	78	77	80	67	73	85	64	65	64
Total Compounds Detected	Total Compounds Detected	37	29	49	30	22	22	35	41	41	38	32	32	48	48	42	45	37	43	42	40	41	38	51	45	33	54	53	54
Total Compounds Measured	Total Compounds Measured	104	40	106	40	40	40	103	103	101	101	101	99	98	98	99	99	99	98	98	98	98	98	98	92	98	98	98	98
% Compounds Detected	% Compounds Detected	35.58%	72.50%	46.23%	75.00%	55.00%	55.00%	33.98%	39.81%	40.59%	37.62%	31.68%	32.32%	48.98%	48.98%	42.42%	45.45%	37.37%	43.88%	42.86%	40.82%	41.84%	38.78%	52.04%	48.91%	33.67%	55.10%	54.08%	55.10%
Average of Compounds Detected/sampling event		**35.58%**	**67.50%**				**55.00%**	**36.89%**		**36.63%**			**32.32%**	**48.98%**		**41.75%**			**43.37%**		**40.48%**			**44.88%**			**55.10%**	**54.59%**	