Memo

To: Tom Dodson and Kaitlyn Dodson, TDA

From: Ashley Ficke, Mark Ashenfelter, and Jackie Takeda, GEI Consultants

Date: October 19, 2023

Re: Analysis of Aquatic Life Effects and Water Quality of Replenish Big Bear Program's Discharge to Stanfield Marsh and Big Bear Lake

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Introduction

In 1982, Big Bear Municipal Water District (BBMWD) and the California Department of Fish and Wildlife (CDFW) dredged a basin on the eastern end of Big Bear Lake and created a culverted connection to the lake. The shoreline was planted, with the goal of creating a wildlife and waterfowl preserve. Stanfield Marsh is 145 acres and has supported a rich assemblage of birds, fish, amphibians, and mammals, some of which are rare. However, Stanfield Marsh has been mostly dry due to the prolonged drought.

As part of the Replenish Big Bear Program (Program), the Big Bear Area Regional Wastewater Agency (BBARWA) will discharge full advanced treated water (purified water) to the east end of Stanfield Marsh, which is hydrologically connected to Big Bear Lake through a set of culverts under the Stanfield Cutoff. The discharge to Shay Pond was not evaluated since this Program component will not be implemented in the near future.

GEI was retained by Tom Dodson and Associates to determine the projected effects of the discharge of purified water to aquatic life in Stanfield Marsh and Big Bear Lake. The memo evaluates the available water quality results and describes the data gaps that limit our understanding of how Program implementation will affect beneficial uses related to aquatic life and how these beneficial uses of Stanfield Marsh and Big Bear Lake will be protected through the implementation of the Program.

This memorandum summarizes and analyzes potential impacts to the water quality, aquatic life, and beneficial uses as a result of the Program's discharge to Stanfield Marsh and Big Bear Lake. The analysis uses modeled outputs specific to Big Bear Lake, and partial BBARWA advanced water purification facility pilot data for the Replenish Big Bear Pilot Study collected from June through September 2023, and the Antidegradation Analysis (WSC 2022) to anticipate potential impacts. The Memo also described the data gaps that limit our understanding of how the Stanfield Marsh/Big Bear Lake discharge will affect beneficial uses related to aquatic life and how these beneficial uses of Stanfield Marsh and Big Bear Lake will be protected through the implementation of the Program. Data gaps and sources of uncertainty are addressed as part of an adaptive management and monitoring plan.

Replenish Big Bear Program

BBARWA operates an existing regional wastewater treatment plant (WWTP) and related facilities in Big Bear Valley. BBARWA has partnered with Big Bear City Community Service District (BBCCSD), Big Bear Lake Department of Water and Power (BBLDWP), BBMWD, and Bear Valley Basin Groundwater Sustainability Agency (BVBGSA), collectively known as the Agency Team, to develop the Replenish Big Bear Program. The Replenish Big Bear Program is intended to help protect Big Bear Valley and the Santa Ana Watershed from the impacts of drought and variable precipitation by recovering a water resource currently discharged outside of the watershed. The Replenish Big Bear Program is comprised of three independent projects:

1) Discharge of the Program's purified water to Stanfield Marsh, which is a tributary to Big Bear Lake, and a separate discharge to Shay Pond, which will not be implemented in the near future;
2) Use Program water stored in Big Bear Lake for purposes such as landscape irrigation of the local golf course, dust control, and snowmaking; and
3) Use Program water stored in Big Bear Lake for groundwater recharge in Sand Canyon.

The discharge to Stanfield Marsh is the focus of this analysis. This discharge has been proposed to recover up to 2,200 acre-feet per year (AFY) of treated wastewater that is currently exported to Lucerne Valley. Treatment upgrades at the BBARWA WWTP would include tertiary filtration, nutrient removal, ultra filtration, reverse osmosis, and ultraviolet disinfection and advanced oxidation process for 100 percent of the effluent. The proposed location for discharge is the upstream end of Stanfield Marsh (WSC 2022). Impacts on Shay Pond were not evaluated since this discharge is not presently planned to be implemented in the near future.

Beneficial Uses of Stanfield Marsh and Big Bear Lake

Santa Ana River Basin Water Quality Control Plan

The Water Quality Control Plans contain descriptions of the legal, technical, and programmatic bases for water quality regulation. They describe the beneficial uses of major surface waters, their tributaries, and the corresponding water quality objectives (WQOs) put into effect to protect these beneficial uses. Water Quality Control Plans must be updated every three years in compliance with the Porter-Cologne Act. The Santa Ana Regional Water Quality Control Plan: Santa Ana River Basin Plan (Basin Plan) designates lakes and reservoirs and inland wetlands in the Program area along with their associated beneficial uses for each water body as summarized in **Table 1** (San Bernardino Mountain Hydrologic Area, Bear Valley Hydrologic Subarea, Hydrologic Unit #801.71). Designated beneficial uses for specific surface water and groundwater resources and the enforceable water quality objectives necessary to protect those beneficial uses are defined in the Basin Plan.

The Basin Plan includes numerical and narrative water quality objectives for microbiological, physical, and chemical water quality constituents. In the Santa Ana River Region, regional objectives are set for ocean waters, enclosed bays and estuaries, inland surface waters, and groundwaters. Since Stanfield Marsh and Big Bear Lake are identified as the discharge locations for the Program's purified water, regional objectives for lakes and reservoirs and inland wetlands as outlined in Chapter 4 of the Basin Plan are considered as there are several identified designated beneficial uses.

Table 1. Designated Beneficial Uses within Program Area.

Waterbody	Beneficial Uses									
	MUN	AGR	GWR	REC1	REC2	COMM	WARM	COLD	WILD	RARE
Lakes and Reservoirs – Upper Santa Ana River Basin[1]										
Big Bear Lake	X	X	X	X	X	X	X	X	X	X
Inland Wetlands[1]										
Stanfield Marsh[2]	X			X	X			X	X	X

[1] Basin Plan – Table 3-1
[2] This is a created wetland as defined in the wetland discussion of the Basin Plan
Source: Santa Ana River Basin Plan 2019

Beneficial uses as identified in **Table 1** are defined below. The focus of this memo will be evaluating the designated beneficial uses that may impact aquatic wildlife in Big Bear Lake and Stanfield Marsh, which are COMM, WARM, COLD, WILD, and RARE.

- **Municipal and Domestic Supply (MUN)** Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.
- **Agricultural Supply (AGR)** Uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.
- **Groundwater Recharge (GWR)** Uses of water for natural or artificial recharge of groundwater for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers.
- **Water Contact Recreation (REC-1)** Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white-water activities, fishing, or use of natural hot springs.
- **Non-Contact Water Recreation (REC-2)** Uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.
- **Commercial and Sport Fishing (COMM)** Uses of water for commercial or recreational collection of fish and shellfish, or other organisms including, but not limited to, uses involving organisms intended for human consumption or bait purposes.
- **Warm Freshwater Habitat (WARM)** Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
- **Cold Freshwater Habitat (COLD)** Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
- **Wildlife Habitat (WILD**) Uses of water that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

- **Rare, Threatened, or Endangered Species (RARE)** Uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened, or endangered.

Water Quality Objectives

Water quality objectives for all inland surface water, which includes streams, rivers, lakes, and wetlands within the region are discussed in Chapter 4 of the Basin Plan and summarized in **Table 2**. This would apply to the Program area, particularly where the Program's purified water will be discharged into Stanfield Marsh. Although Stanfield Marsh does not have numerical water quality objectives, the numerical water quality objectives for Big Bear Lake are applied to this discharge as the water quality objectives are more stringent, and Stanfield Marsh has been mostly dry since 2015.

Table 2. Basin Plan Water Quality Objectives for Inland Surface Waters.

Constituents	Basin Plan Water Quality Objective
Algae	Waste discharges shall not contribute to excessive algal growth in inland surface receiving waters.
Ammonia, Un-ionized	Un-ionized ammonia objectives for WARM and COLD designated waterbodies in the Region. Calculated numerical Un-ionized ammonia as N objectives as well as corresponding total ammonia nitrogen concentration for various pH and temperature conditions are shown in Tables 4-2 and 4-3 of the Basin Plan.
Boron	Controllable water quality factors shall not exceed 0.75 ppm.
Chemical Oxygen Demand	Waste discharges shall not result in increases in Chemical Oxygen Demand levels, which adversely affect beneficial uses.
Chloride	Water shall not exceed 10 ppm for Big Bear Lake as a result of controllable water quality factors.
Chlorine Residual	Wastewater discharged shall not exceed 0.1 ppm.
Color	Water shall be free of coloration that cause nuisance or adversely affect beneficial uses. The natural color of fish, shellfish, or other inland surface water resources used for human consumption shall not be impaired.
Dissolved Solids, Total	Controllable water quality factors shall not exceed 175 ppm for Big Bear Lake.
Floatables	Water shall not contain floating material, including solids, liquids, foam, and scum, in concentrations that cause nuisance or adversely affect beneficial uses.
Fluoride	Concentrations shall not exceed the annual average of maximum optimal fluoride ranging from 0.7 ppm to 1.2 ppm when daily air temperature is greater than 32.5 and below 12.0 °C respectively. See page 4-11 of Basin plan for more detail.
Hardness (as $CaCO_3$)	Water shall not exceed 125 ppm for Big Bear Lake as a result of controllable water quality factors. Hardness of receiving waters used for MUN shall not be increased as a result of waste dischargers to levels that adversely affect beneficial uses.
Methylene Blue-Activated Substances (MBAS)	Controllable water quality factors shall not exceed 0.05 ppm in designated MUN waters. Waste discharges shall not contain concentrations of surfactants resulting in foam in the course of flow or use of the receiving water.
Nitrate	Controllable water quality factors shall not exceed 10 ppm (as N) in designated MUN waters.
Total Inorganic Nitrogen	Controllable water quality factors shall not exceed 0.15 ppm for Big Bear Lake.
Oil and Grease	Waters shall not contain oils, greases, waxes, or other materials in concentrations that result in a visible film or coating on the surface of the water

Constituents	Basin Plan Water Quality Objective
	or on objects in the water that cause nuisance, or adversely affect beneficial uses.
Dissolved Oxygen	5.0 ppm minimum for WARM designated waters; 6 ppm for COLD designated waters. In addition, waste discharges shall not cause the median dissolved oxygen concentration to fall below 85 percent of saturation or the below 75 percent of saturation within a 30-day period.
Pathogen Indicator Bacteria	< 126 E. coli organisms/100 mL for REC1 and REC2 designated waters.
pH	Controllable water quality factors shall not be raised above 8.5 or depressed below 6.5.
Radioactivity	Shall not be present in concentrations which are deleterious to human, plant, or animal life. MUN designated waters shall meet Title 22 drinking water standards.
Sodium	Controllable water quality factors shall not exceed 20 ppm for Big Bear Lake.
Solids, Suspended and Settleable	Shall not contain suspended or settleable solids in amounts which cause a nuisance or adversely affect beneficial uses.
Sulfate	Controllable water quality factors shall not exceed 10 ppm for Big Bear Lake.
Sulfide	Shall not be increased as a result of controllable water quality factors.
Tastes and Odors	Waters shall not contain taste or odor producing substances in concentrations that impart undesirable tastes or odor to fish flesh or other edible products of aquatic origin, that cause nuisance, or adversely affect beneficial uses.
Temperature	Temperature of COLD designated waters shall not increase by more than 5°F. Temperature of WARM designated waters shall not be raised above 90°F June through October or above 78°F during the rest of the year. Lake temperatures shall not be raised more than 4°F above established normal values as a results of controllable water quality factors.
Toxic Substances	Shall not be discharged at levels that will bioaccumulate in aquatic resources to levels which are harmful to human health. Concentrations of contaminants in existing or potential sources of drinking water shall not occur at levels that are harmful to human health. Concentrations of toxic pollutants in the water column, sediments or biota shall not adversely affect beneficial uses.
Turbidity	Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. Increases from normal background light penetration or turbidity relatable to waste discharge shall not be greater than 10 percent in areas where natural turbidity is greater than 100 NTU or greater than 20 percent in areas where natural turbidity is 0 – 50 NTU.

Note: ppm = parts per million; NTU = nephelometric turbidity units
Source: Santa Ana River Basin Plan 2019. Chapter 4

Receiving Water Quality Evaluation

To understand potential water quality impacts to the receiving water bodies, Stanfield Marsh and Big Bear Lake, a treatment pilot study was conducted. The Program's pilot study goals are to: (1) demonstrate process performance for site-specific wastewater conditions to regulatory agencies, (2) confirm the proposed treatment process as a viable design approach to meet the target treatment levels, and (3) quantify the total system recovery for product water. During the pilot study, one set of samples was collected on July 20, 2023, from the effluent of the full advanced treatment pilot system (i.e., purified water) to evaluate the following constituents:

- The Santa Ana River Basin Plan (Basin Plan) Water Quality Objectives (WQOs) for Big Bear Lake;
- Priority pollutants from the California Toxic Rule (CTR) per Title 40 of Code of Federal Regulations (40 CFR) Part 131.38;
- The Maximum Contaminant Levels (MCLs) for Inorganic and Organic Chemicals as identified in Table 64431-A and Table 64444-A of the California Code of Regulation (CCR), Title 22, Chapter 15;
- Radionuclide chemicals in Tables 64442 and 64443 of the CCR, Title 22, Chapter 15;
- Disinfection byproducts in Table 64533-A of the CCR, Title 22, Chapter 15.5;
- Division of Drinking Water chemicals with notification levels (NLs);
- Lead and copper;
- Big Bear Lake Nutrient TMDL for Dry Hydrological Conditions;
- State Water Board's Water Quality Goals Online Database; and
- Regional Board and DDW specified chemicals.

In addition, BBARWA collected weekly samples after the wastewater received RO and UVAOP treatment from June through September 2023. The treated effluent results from the RO unit are shown in **Appendix A** and the results from the UVAOP unit in **Appendix B**. **Table 3** provides a summary of detected constituents from both the RO and UVAOP effluents. Both effluents are evaluated against the most stringent water quality standards used to protect the most sensitive designated beneficial uses for Big Bear Lake. As mentioned earlier, since Stanfield Marsh does not have numeric WQOs and has been predominately dry since 2015, the WQOs for Big Bear Lake are utilized. Available water quality data from Big Bear Lake are also included in **Table 3** to represent baseline conditions.

Three constituents exceed Big Bear Lake ambient levels or the most stringent WQO. Although boron does not exceed the most stringent WQO, the pilot study result is above Big Bear Lake ambient boron levels. This is based on a single result; therefore, boron is further discussed in the Data Gaps and Limitations Section. In addition, it is anticipated that boron will consume less than 10% of the assimilative capacity, as discussed in the Draft Environmental Impact Report. Similar to boron, ammonia pilot study results meet the most stringent WQO, however results are above ambient receiving water quality. For total inorganic nitrogen (TIN), the pilot study results exceed the ambient Big Bear Lake levels and the most stringent WQO. As a result of the pilot study results, treatment process optimization for ammonia and TIN are being explored to meet the ambient receiving water quality and the most stringent WQOs. Further discussion on ammonia and TIN is in the Nutrients Section.

Table 3. Summary of Preliminary Water Quality Results.

Parameter	Units	Replenish Big Bear Number of Samples	Replenish Big Bear[1]	Big Bear Lake[2]	Most Stringent WQO or Criterion
13C-2,3,7,8-TCDD	ppb	1	0.0014	n/a	$3x10^{-8}$
1,1,2-Trichloroethane	ppb	1	0.08	n/a	5
1,2,3-Trichloropropane	ppt	1	3.7	n/a	5
Alkalinity as $CaCO_3$	ppm	6	6.16	n/a	n/a

Parameter	Units	Replenish Big Bear Number of Samples	Replenish Big Bear[1]	Big Bear Lake[2]	Most Stringent WQO or Criterion
Ammonia[3, 4]	ppm	9	0.15	0.063	0.49
Boron	ppm	1	0.12	0.054	0.7
Calcium[3]	ppm	9	0.11	n/a	n/a
Chloride[3]	ppm	9	8.3	24 [8]	10
Chlorophyll-a	ppb	n/a	n/a	9.3 [6]	14
Di(2-ethylhexyl)adipate	ppb	1	0.082	n/a	400
Dissolved Organic Carbon	ppm	6	0.32	n/a	n/a
Dissolved Phosphorus[3]	ppm	8	0.2	n/a	n/a
E. coli	CFU/mL	1	Not detected	n/a	< 126
Fluoride	ppm	1	0.023	0.41	0.7
Formaldehyde	ppb	1	19	n/a	100
Gross Beta	pCi/L	1	1.07	n/a	50
Hexavalent Chromium	ppb	1	0.16	n/a	10
Hardness (as $CaCO_3$)[3, 5]	ppm	n/a	25	157	125
Magnesium[3]	ppm	9	0.02	n/a	n/a
Mercury, Total	ppb	1	0.00085	0.270	0.05
Nitrate as N[3]	ppm	9	0.05	n/a	10
Nitrite as N[3]	ppm	9	0.01	n/a	1
Nitrogen, Kjeldahl[3]	ppm	9	0.13	n/a	1
Nitrogen, Total[3]	ppm	8	0.16	0.948 [6]	1
N-Nitrosomorpholine (NMOR)	ppt	2	1.45	n/a	n/a
Phosphorus, Total[3]	ppm	9	0.011	0.037 [6]	0.035
Potassium[3]	ppm	7	0.65	n/a	n/a
Radium 226	pCi/L	1	0.0486	n/a	5 (combined)
Radium 228	pCi/L	1	0.369	n/a	
Silica[3]	ppm	8	0.43	n/a	n/a
Sodium	ppm	1	3.9	28 [8]	20
Specific Conductance[3]	µmhos/cm	9	65	391	700
Strontium[3]	ppb	9	1.71	n/a	4
Sulfate[3]	ppm	9	0.15	15 [8]	10
Total Dissolved Solids[5]	ppm	n/a	50	251[6]	175
Total Inorganic Nitrogen[3, 4]	ppm	9	0.21	0.049 [6]	0.15
Total Organic Carbon	ppm	5	0.28	n/a	n/a
Trichloroacetic acid	ppb	1	0.44	n/a	60 [7]
Turbidity[3]	NTU	9	0.14	n/a	5

Note: ppm = parts per million; ppb = parts per billion; ppt = parts per trillion; CFU/mL = colony forming units per mililiter; pCi/L = picocurries per liter; n/a = not applicable

[1] Results from AWPF-UVAOP-EFF (i.e., purified water without stabilization) sampling location sampled July 20, 2023 and weekly AWPF-UVAOP-EFF weekly samples. Average of results reported if multiple samples were collected. Results may change as the Pilot Study is finalized.

[2] Results were extracted from Table 7 of the Antidegradation Analysis (WSC 2022). Data is based on a simple sample taken on December 2, 2021, by BBMWD. For constituents monitored by the Nutrient TMDL, averages and for the Lake-wide results and were calculated using Nutrient TMDL 2009-2019 data.

[3] Sample collected from the AWPF-RO-EFF (i.e., Program water after RO treatment but before disinfection). Results may change as the Pilot Study is finalized

[4] Other nutrient treatment options to attain a higher removal efficiency are being explored to meet the most stringent TIN WQO of 0.15 ppm.

[5] The results of the pilot study are not provided since the concentrations will change after the purified water is stabilized. The purified water will be stabilized to prevent geochemical reactions such as mineral dissolution, oxidation, or desorption in Stanfield Marsh.

[6] TDS average was obtained from the Lake Analysis Table 19 baseline scenario and nutrients and chlorophyll-a averages from the Lake Analysis Table 22 baseline scenario (Anderson 2021).

[7] Part of the sum for five haloacetic acids, which has a drinking water MCL of 60 ppb.

[8] BBMWD collected an additional sample on July 27, 2023 at TMDL Station #9. Therefore, the results from this event and the sample collect in December 2021 were averaged.

Algae

It is possible that the rewetting of Stanfield Marsh will result in an increase in biologically available phosphorus (Surridge et al. 2012), which would increase algal growth in Stanfield Marsh, and in Big Bear Lake, if Stanfield Marsh spilled to the lake during rewetting. The increase in phosphorus depends on interstitial pore size, total organic carbon in soils (Gale et al. 1994), presence of aquatic vegetation, and the extent of the varial zone (Song et al. 2007). A small varial zone may help reduce the amount of phosphorus that is re-released into the aquatic environment. Other factors can include the seasonal timing of rewetting and the amount of uptake and storage by rooted and floating macrophytes – management strategies such as planting of rooted macrophytes can be employed during rewetting, to reduce the amount of phosphorus that remains in Stanfield Marsh and moved into the Big Bear Lake (e.g., Steffenhagen et al. 2012). Limiting the available nutrients in the water column would reduce the probability of nuisance algae blooms. Physical conditions in the rewetted Stanfield Marsh and projected levels of phosphorus in the Replenish Big Bear purified water should not contribute to increased levels of cyanobacteria. The rewetted Stanfield Marsh will be shallow and well-mixed (Anderson, personal communication 08/2023). Cyanobacteria benefit from stratified conditions because of their natural buoyancy but do not thrive in well-mixed water columns.

Temperature

The COLD beneficial use is discussed here because it is more stringent than the WARM beneficial use. Because Stanfield Marsh was mostly dry from 2015 through 2022, temperature modeling was required to estimate Program effects (Anderson 2022a). Dr. Anderson used his Big Bear Lake model to run a five-year simulation period, with minimum effluent temperatures of 12°C, a maximum temperature of 22°C, and a scenario of approximately 2,200 AFY of discharge.

Under the modeling scenario, water temperature excursions over 5°F/2.8°C in Stanfield Marsh only occurred during discrete periods when water levels were exceptionally low (≤ 1 meter). However, because of the frequency at which low water would occur, the number of excursions would be substantial. Results from Anderson 2022a highlighted some important general findings. Stanfield Marsh and Big Bear Lake are hydrologically connected through a set of culverts. For water flows to move from Stanfield Marsh into Big Bear Lake, Stanfield Marsh must first be filled before it starts flowing into the Big Bear Lake. Warm Program purified water discharged to the easternmost section of Stanfield Marsh will quickly lose heat through exchange with the atmosphere and will be diluted with existing water. Higher lake levels afford greater opportunity for heat loss and dilution such that temperature effects are more likely at low lake levels. As a result of the modeling, the addition of warm purified water to Stanfield Marsh does not alter the heat budget for Big Bear Lake and is not predicted to alter lake temperature, duration, or intensity of thermal stratification. Program-specific information about inflow temperatures is needed to conduct a more complete analysis.

Nutrients

Nutrient constituents are typically TIN, total nitrogen (TN), total phosphorus (TP), and chlorophyll-a. **Table 3** indicates the Program water concentrations for these nutrient constituents generally meet the most stringent WQOs to protect the designated beneficial uses of Stanfield Marsh and Big Bear Lake, except for TIN. In addition, the Antidegradation Analysis (WSC 2022) prepared for the Program, predicted long-term average concentrations of TIN, TN, TP, and chlorophyll-a, which were lower with the proposed Program water discharge at various rates as compared to the predicted baseline condition, except for TIN under the 2,210 AFY + TP Offset. It is unclear why the model predicted increased TIN under this scenario while all other scenarios showed significantly reduced TIN values relative to the modeled baseline; however, the modeled difference in TIN between the Baseline and 2,210 AFY + TP Offset scenarios is approximately 4 percent, which is within the range of model variance and is considered statistically insignificant. Although modeling shows the projected long-term average concentration of TIN is similar to the modeled baseline condition, the pilot study results indicated the average TIN exceeded the Basin Plan WQO. Treatment process optimization is being explored to attain a higher removal efficiency to meet the most stringent TIN WQO of 0.15 ppm, which will also help reduce ammonia concentrations. For the purposes of this analysis, it is assumed that treatment optimization will result in attainment of 0.15 ppm TIN. If additional treatment equipment is needed to meet this objective, or if regulatory mechanisms are pursued to allow discharge above the TIN WQO, consistency with the Replenish Big Bear Program CEQA documentation will be verified, and, if determined necessary to comply with CEQA, subsequent CEQA documentation will be conducted.

Data Gaps and Limitations

Although modeling and a pilot study has been conducted for this Program, there are still some data gaps to better understand the potential impacts to the designated beneficial uses for Stanfield Marsh and Big Bear Lake with respect to aquatic wildlife and plants. These data gaps would be best resolved when Program water is discharged to Stanfield Marsh. Constituents of interest with data gaps are boron, dissolved oxygen, pH, and temperature. These constituents are further explained below.

Boron

Boron is a naturally occurring element, and boron deposits are found in desert areas in California (State Water Board 2017). Anthropogenic sources of boron include industrial wastewater discharges, municipal wastewater discharges, and agricultural practices. As referenced in Schoderboeck et al. (2011), boron does not biodegrade in surface water or sediments in freshwater environments.

California's searchable database for water quality goals also lists an agricultural goal of 0.7 ppm based on tolerance of various crops to boron reported in Ayers and Westcott (1985); this concentration of 0.7 ppm is well above the effluent concentration of 0.12 ppm. Boron toxicity can affect most crops, but there is a wide range of tolerance (Ayers and Westcott 1985); the most sensitive crops are affected by boron concentrations approaching 0.5 ppm. Schoderboeck et al. (2011) also assessed toxicity data for aquatic environments through two approaches and review of extensive data; these two approaches resulted in predicted no effect concentrations in aquatic environments of 0.18 and 0.34 ppm. Boron is accumulated by rooted aquatic plants and algae; the extent to which this occurs is species-specific. Boron does not biomagnify or bioconcentrate in the food web or become concentrated in fish or invertebrates (CMME 2009).

While boron concentrations in the purified water are below receiving water limits as identified in the Basin Plan, only one pilot study boron result was available, and it exceeds the Big Bear Lake ambient boron levels. In addition, there is uncertainty as to how boron would be assimilated into Stanfield Marsh because there is no data that can be collected until the discharge is initiated. However, it appears that uptake by plants can be a significant source of sequestration of boron, suggesting that management of rooted macrophytes may provide a method of removing excess boron from Stanfield Marsh. To determine potential impacts on aquatic wildlife and plants in Stanfield Marsh and Big Bear Lake, it is recommended to conduct boron monitoring once Program water is discharged to Stanfield Marsh. Quarterly monitoring is recommended of the Program water effluent to observe the boron concentration prior to introduction into Stanfield Marsh and at the existing TMDL Sampling Station MWDL9. This location is already an established sampling station through the Big Bear Lake Nutrient TMDL and is representative of Stanfield Middle. If observed boron levels do not meet the Basin Plan WQO, mitigative actions may include but not be limited to the introduction of native plants to absorb boron in Stanfield Marsh.

Dissolved oxygen

Data is not currently available to predict dissolved oxygen levels in Stanfield Marsh, Big Bear Lake, or purified water. However, low dissolved oxygen levels could be ameliorated through aeration of effluent. Stanfield Marsh is shallow enough that stratification is unlikely to occur (Anderson, personal communication). In other words, the water column in Stanfield Marsh would be mixed through water movement and via wind mixing, which would facilitate roughly equal concentrations of dissolved oxygen throughout the water column. Also, it is possible to speculate on dissolved oxygen levels in the purified water, but there is considerable uncertainty surrounding what will happen when this purified water enters Stanfield Marsh. Low-nutrient water entering the marsh may also suppress dissolved oxygen levels by reducing algae and macrophyte production of dissolved oxygen (Anderson, personal communication). To determine potential impacts to aquatic wildlife, once purified water is discharged into Stanfield Marsh, dissolved oxygen should be monitored during and after re-wetting of Stanfield Marsh at the Program water effluent, in Stanfield Marsh (if permitted), and at existing TMDL Sampling Station MWDL9. If observed dissolved oxygen levels do not meet the Basin Plan WQO designated beneficial uses for COLD and WARM, mitigative actions may include but not be limited to the introduction of mechanical intervention to stabilize dissolved oxygen levels.

pH

The Basin Plan pH of inland surface waters water quality objective cannot have pH levels depressed below 6.5; pH values below this level also tend to be associated with lower fish and macrophyte productivity (Avault 1996). The volume of water entering Stanfield Marsh is significant (up to 2.2 MGD, or 3.4 cfs), so the entire volume of the marsh will likely turn over multiple times in a year. Pilot study results were non-detect due to the purified water not being stabilized yet. Based on modeling efforts, the Program's water hardness is estimated to be around 25 ppm after stabilization.

The low alkalinity and hardness values of the effluent suggest a low buffering capacity and susceptibility to a change in pH upon entering Stanfield Marsh. The buffering capacity of Stanfield Marsh itself is currently unknown because it has been mostly dry since 2015, but soil chemistry has a large effect on the pH of small bodies of water. Despite minor potential pH concerns in Stanfield Marsh, the low hardness of the effluent suggests that it would likely have a negligible effect on the pH of Big Bear Lake, given its large relative volume to the purified water and its higher hardness of 157 ppm.

Since the treatment process maintains a neutral pH between 7 and 8 upstream of the reverse osmosis process, and then become slightly acidic downstream of reverse osmosis, post-treatment chemical addition will be employed to adjust the pH to a neutral level such that the effluent is within the Basin Plan water quality numerical objectives for pH. To determine potential impacts to aquatic wildlife, once purified water is discharged into Stanfield Marsh, pH should be monitored during and after re-wetting of Stanfield Marsh at the Program water effluent and at existing TMDL Sampling Station MWDL9. If observed pH levels do not meet the Basin Plan WQO for inland surface waters, mitigative actions may include but not be limited to introduction of a chemical intervention to stabilize pH levels.

Temperature

Temperature modeling data show that excursions of the COLD standard occurred 44 percent of the time, during low water, when Stanfield Marsh might otherwise be dry. While it is suspected that maintenance of flows and the presence of water are preferable in dry years, even if the COLD standards are not met, this could be confirmed with an adaptive management plan. Additional uncertainty about predicted temperatures arise because no temperature data are available for the Program's purified water - theoretical temperature ranges were developed using data from a pilot Program near sea level and corrected for elevation. As indicated in earlier discussions on the temperature modeling data, additional monitoring is recommended once the Program's purified water is discharged into Stanfield Marsh. Temperature modeling is recommended to be conducted using an online analyzer to obtain continuous readings of the Program water effluent and in Stanfield Marsh. Similar to previous discussions on location of monitoring, the existing TMDL Sampling Station MWDL9 can be utilized. If observed temperature levels do not meet the Basin Plan WQO designated beneficial uses for COLD and WARM, mitigative actions may include but not be limited to introduction of a temperature cooling mechanism to lower the temperature of the Program water before it is introduced into Stanfield Marsh.

Reinvasion by Undesirable Species

Invasive plants and aquatic animals (vertebrate or otherwise) will be able to access Stanfield Marsh when it is rewetted. Because it is upstream of Big Bear Lake, it may be desirable to prevent contamination of the marsh by species such as Eurasian Watermilfoil (*Myriophyllum spicatum*) and Common Carp (*Cyprinus carpio*). Proliferation of Eurasian Watermilfoil can cause periodic depression in dissolved oxygen levels, and this species adversely affects all beneficial uses relating to the protection of aquatic life. It is recommended for monitoring to be conducted at least on a bi-yearly basis to observe the presence of invasive plants and aquatic animals within Stanfield Marsh and Big Bear Lake.

Programed Beneficial Impacts

Big Bear Lake is an important resource that provides extensive recreational, economic, ecological, and aesthetic benefits for the local community as well as the larger inland southern California region. The beneficial uses of Big Bear Lake and Stanfield Marsh are presented in **Table 1.**

Precipitation and snowmelt runoff are the only water sources for Stanfield Marsh and Big Bear Lake, which causes variable water levels on a seasonal and annual basis. When water levels are low, local populations of flora and fauna decrease dramatically through mortality, emigration from the site, or both. Stanfield Marsh has been mostly dry since 2015. Due to the recent rains in 2023, Stanfield Marsh is currently wet.

Beneficial Uses for Rare and Common Wildlife Species

Stanfield Marsh occupies the eastern edge of Big Bear Lake. Because much of the existing marshland in the Big Bear Valley was inundated after the construction of Bear Creek Dam, Stanfield Marsh is critical to replacing wetland habitat that was lost in the late 1800s. However, water levels in the marsh fluctuate widely in response to available snowmelt and precipitation. Although BBMWD and the Natural Heritage Foundation have put significant effort into enhancing 148 acres of wetland vegetation, low water levels have prevented the successful establishment of a lakeshore fringe habitat and/or a wetland plant and animal community (BBL 1999).

The Program's effluent would help support the RARE and WILD beneficial uses simply by re-wetting the area. **Figure 1** shows Big Bear Lake area was at a record low in 2018 and Stanfield Marsh was dry. Extensive modeling by Anderson (2022a) showed that the release of water into Big Bear Lake through Stanfield Marsh would result in large increases in lake water surface elevation and lake water surface area. **Figure 2** shows this increase in inundated area would extend into Stanfield Marsh. Even under a scenario of protracted drought, defined as the fifth percentile of flows entering Stanfield Marsh and Big Bear Lake, at least some water would remain in Stanfield Marsh. This is in stark contrast to existing conditions, wherein the Stanfield Marsh has been mostly dry for several years. Some potential benefits are outlined below.

- Availability of water will allow the establishment of riparian plants, macrophytes, and algae, as well as the invertebrate and vertebrate fauna that rely upon them.
- Some organisms have the ability to adapt to extremely variable environments. For example, highly mobile animals (e.g., waterfowl) will avoid or emigrate from dry areas, and drought-tolerant plants can survive in a wide variety of moisture regimes or can remain dormant for long periods of time. However, less mobile/more specialized species are excluded from highly unpredictable environments. Reducing the degree of disturbance (i.e., episodic drying) will allow more species to utilize the area.
- Maintaining water levels in Stanfield Marsh may also increase lakeshore fringe habitat, which is currently limited due to water level fluctuations. This habitat type is utilized by rare birds (American Bald Eagle *Haliaeetus leucocephalus*, Southwestern Willow Flycatcher *Empidonax trailii extimus*), rare mammals (San Bernardino Flying Squirrel *Glaucomys sarinus*), and rare plants (Slender-petaled Thelypodium *Thelypodium stenopetalum*). Other more common species would benefit from the presence of lakeshore fringe and open water habitat as well. These include amphibians, ducks/wading birds, and bats that forage over open water (BBL 1999).

Returning a reliable source of water to Stanfield Marsh would unequivocally benefit wildlife, particularly aquatic or semi-aquatic species. However, the water quality in Stanfield Marsh is unknown, because while it is simple to characterize purified water, it may change substantially once Stanfield Marsh is rewetted and biological processes become established.

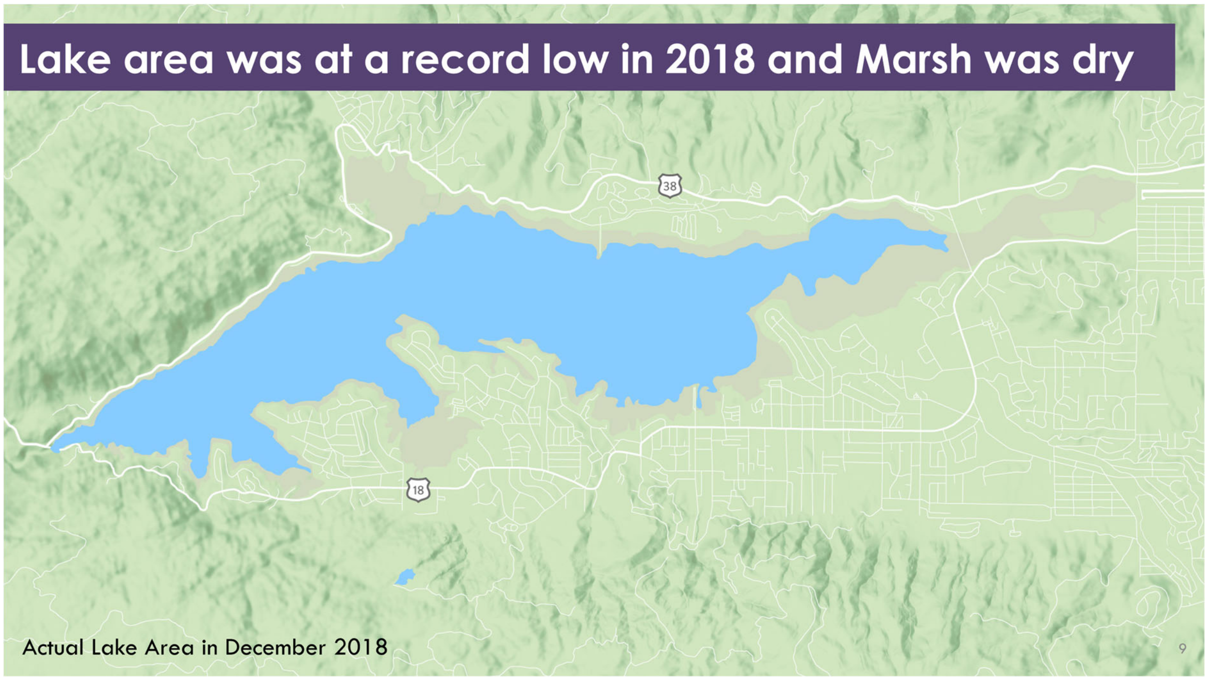

Figure 1. Big Bear Lake Area in December 2018.

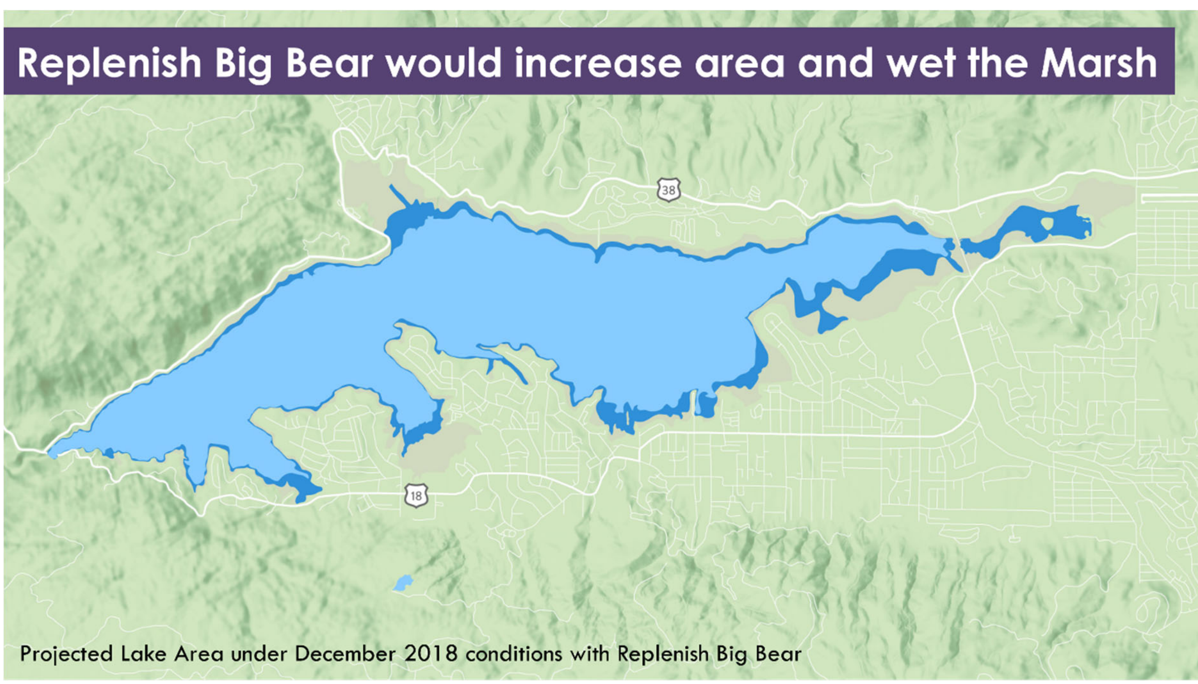

Figure 2. Projections under December 2018 Conditions with Replenish Big Bear Program.

The Lake Analysis (Anderson 2021) simulations for the 2009-2019 evaluation period demonstrated that the Replenish Big Bear Program Lake discharge would result in significant increases in predicted lake levels, volumes, and surface areas relative to baseline conditions. Long-term (2009 to 2050) simulations of the proposed Program water discharge under three different hydrologic scenarios indicate that the discharge would be especially beneficial under an "extended drought" scenario where the discharge is predicted to increase the median lake level by more than 10 feet and the median lake area by nearly 600 acres, which in turn would improve recreational access and provide additional Big Bear Lake habitat as compared to modeled baseline (no Program) conditions. The increased lake level and area benefits provided by the Program water discharge would be more modest under the "prolonged above average rainfall" scenario because higher natural inflows would result in higher lake levels. Error! Reference source not found. summarizes the projected impacts on Big Bear Lake level, area, and volume under three hydrologic conditions modeled in the 2021 Lake Analysis (Anderson 2021).

Table 4. Hydrologic Summary of Projected Impacts on Big Bear Lake.

Lake Physical Parameter (median values shown)	Scenario	Hydrologic Scenario		
		Extended Drought (5th Percentile)	Median Hydrologic Condition (50th Percentile)	Prolonged Above Average Rainfall (95th Percentile)
Lake Level (ft) (Lake max 6,743 ft)	Baseline	6,722	6,733	6,736
	+Program	6,732 (+10.5)	6,738 (+7.2)	6,740 (+5.2)
Volume (AF)	Baseline	23,400	47,536	54,724
	+Program	45,750 (+22,340)	59,664 (+12,128)	65,204 (+10,480)
Area (acres)	Baseline	1,720	2,328	2,474
	+Program	2,290 (+572)	2,568 (+240)	2,669 (+195)

Notes: Data taken from Table 24 of Lake Analysis report. Assumed a discharge rate of 1,920 AFY. Additional benefit is expected with a higher discharge rate.

Nutrients

As discussed in the Antidegradation Analysis (WSC 2022), TDS, TIN, TN, TP, and chlorophyll-a were evaluated using a two-dimensional (2D) hydrodynamic-water quality model (CE-QUAL-W2) developed for Big Bear Lake by Dr. Michael A. Anderson (Dr. Anderson), a limnologist who has in-depth knowledge of the lake. The model was used to predict the long-term average water quality of these constituents in Big Bear Lake under the average hydrologic conditions (50th percentile) and under increased and time-varying flows. The model simulation also assessed the impact of a TP offset program, which is being proposed to treat all the TP loads that will be added as a result of the discharge. For comparison, the model also simulated a no Program alternative to the predicted baseline condition. The predicted concentrations are presented in **Table 5**. Please note that this model run did not account for Program water extractions, which are discussed because extractions were predicted to improve the water quality of the Lake. Therefore, this analysis concludes that the projected long-term average concentration of TIN is similar to the modeled baseline condition.

Table 5. Predicted Long-term Average Lake Concentrations for TDS, TIN, TN, TP, and Chlorophyll-a Under Different Operational Scenarios

Operational Scenario (a) (All at 50th percentile hydrologic condition)	TDS (b) (mg/L)	TIN (b) (mg/L)	TP (b) (µg/L)	TN (b) (mg/L)	Chlorophyll-a (c) (µg/L)
WQO (TMDL target)	**175**	**0.15**	**0.15 (35.0)**	**n/a**	**(14.0)**
Baseline (No Program)	195	0.069	47.7	1.15	14.1
2,200 AFY (99% recovery)	179	0.045	42.3	1.04	13.1
2,000 AFY (90% recovery)	180	0.041	43.4	1.06	12.9
2,200 AFY + TP Offset	179	0.072	39.9	1.00	10.2
2,000 AFY + TP Offset	180	0.040	40.9	1.00	9.5

Notes:

a) The Baseline was evaluated in the 2021 Lake Analysis. The other operational scenarios were evaluated in the 2022 Lake Analysis Update and assume no discharge to Shay Pond. The TP Offset scenarios assume a TP Offset Program is implemented.

b) Expressed as annual average concentrations.

c) Chlorophyll-a shown as growing season average concentrations.

Conclusion

The Program's purified water effluent water quality was evaluated to assess the potential impacts to the water quality, aquatic life, and designated beneficial uses for Stanfield Marsh and Big Bear Lake. Available water quality from the Program's modeling study, BBARWA advanced water purification facility pilot data for the Replenish Big Bear Pilot Study, and antidegradation analyses conducted for this Program were utilized. Although multiple designated beneficial uses have been identified in the Basin Plan for Stanfield Marsh and Big Bear Lake, the designated beneficial uses applicable to aquatic life (COMM, WARM, COLD, WILD, and RARE) were evaluated here as the other beneficial uses have been previously evaluated in other studies.

Available water quality data were compared against the most stringent WQOs applicable to this Program. Based on the pilot study results, all constituents of concern related to this Program are within Big Bear Lake ambient water quality and meet the identified WQOs in Table 3 except for boron, ammonia, and TIN. Conducted modeling studies did not identify TIN as an exceedance but did note the Program needing to implement a TP Offset Program for the Program discharge to attain net zero TP loads to Big Bear Lake to be consistent with the assumptions of the Big Bear Lake Nutrient TMDL for Dry Hydrologic Conditions.

Data gaps were identified for boron, dissolved oxygen, pH, and temperature. To close the data gap, monitoring is recommended once the Program's discharge is introduced to Stanfield Marsh/Big Bear Lake. The Program's discharge effluent would be monitored along with utilizing the existing Nutrient TMDL Sampling Station MWDL9. In addition to the identified water quality constituents, at a minimum bi-yearly monitoring is recommended to observe the presence of invasive plants and aquatic animals within Stanfield Marsh and Big Bear Lake.

This Program is anticipated to provide beneficial impacts to the region. In addition to providing a sustainable water supply to the area and increasing lake levels, rewetting of Stanfield Marsh will be critical to replacing the wetland habitat that was lost in the late 1800s with the construction of the Bear Creek Dam. Thus, the Program would help support the WILD and RARE designated beneficial uses for Stanfield Marsh and Big Bear Lake. The introduction of a TP Offset Program will assist with meeting the Big Bear Lake Nutrient TMDLs.

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Steffenhagen, P., D. Zak, K. Shultz, T. Timmermann, and S. Zerbe. 2012. Biomass and nutrient stock of submersed and floating macrophytes in shallow lakes formed by rewetting of degraded fens. Hydrobiologia 692:99-109.

Surridge, B. W. J., A. L. Heathwaite, and A. J. Baird. 2012. Phosphorus mobilization and transport within a long-restored floodplain wetland. Ecological Engineering 44:348-359.

Water Systems Consulting and Larry Walker Associates (WSC). 2022. Antidegradation Analysis for Proposed Discharges to Stanfield Marsh/Big Bear Lake and Shay Pond. Prepared for Big Bear Area Regional Wastewater Agency.

Appendix A: Pilot Study RO Effluent

Client Sample ID	Collection Date	Analysis Method	CAS	Analyte	Result	Unit
AWPF-RO-EFF	6/22/2023	522	123-91-1	1,4-Dioxane	ND	ug/L
AWPF-RO-EFF	6/29/2023	522	123-91-1	1,4-Dioxane	ND	ug/L
AWPF-RO-EFF	7/7/2023	522	123-91-1	1,4-Dioxane	ND	ug/L
AWPF-RO-EFF	7/20/2023	522	123-91-1	1,4-Dioxane	ND	ug/L
AWPF-RO-EFF	7/27/2023	522	123-91-1	1,4-Dioxane	ND	ug/L
AWPF-RO-EFF	8/3/2023	522	123-91-1	1,4-Dioxane	ND	ug/L
AWPF-RO-EFF	8/10/2023	522	123-91-1	1,4-Dioxane	ND	ug/L
AWPF-RO-EFF	8/17/2023	522	123-91-1	1,4-Dioxane	ND	ug/L
AWPF-RO-EFF	8/24/2023	522	123-91-1	1,4-Dioxane	ND	ug/L
AWPF-RO-EFF	6/22/2023	350.1	7664-41-7	Ammonia	0.19	mg/L
AWPF-RO-EFF	6/29/2023	350.1	7664-41-7	Ammonia	0.12	mg/L
AWPF-RO-EFF	7/7/2023	350.1	7664-41-7	Ammonia	0.17	mg/L
AWPF-RO-EFF	7/20/2023	350.1	7664-41-7	Ammonia	0.13	mg/L
AWPF-RO-EFF	7/27/2023	350.1	7664-41-7	Ammonia	0.17	mg/L
AWPF-RO-EFF	8/3/2023	350.1	7664-41-7	Ammonia	0.14	mg/L
AWPF-RO-EFF	8/10/2023	350.1	7664-41-7	Ammonia	0.14	mg/L
AWPF-RO-EFF	8/17/2023	350.1	7664-41-7	Ammonia	0.071	mg/L
AWPF-RO-EFF	8/24/2023	350.1	7664-41-7	Ammonia	0.21	mg/L
AWPF-RO-EFF	7/20/2023	200.7 Rev 4.4	7440-42-8	Boron	0.14	mg/L
AWPF-RO-EFF	6/22/2023	200.7 Rev 4.4	7440-70-2	Calcium	0.075	mg/L
AWPF-RO-EFF	6/29/2023	200.7 Rev 4.4	7440-70-2	Calcium	0.093	mg/L
AWPF-RO-EFF	7/7/2023	200.7 Rev 4.4	7440-70-2	Calcium	ND	mg/L
AWPF-RO-EFF	7/20/2023	200.7 Rev 4.4	7440-70-2	Calcium	0.077	mg/L
AWPF-RO-EFF	7/27/2023	200.7 Rev 4.4	7440-70-2	Calcium	0.082	mg/L
AWPF-RO-EFF	8/3/2023	200.7 Rev 4.4	7440-70-2	Calcium	0.11	mg/L
AWPF-RO-EFF	8/10/2023	200.7 Rev 4.4	7440-70-2	Calcium	0.16	mg/L
AWPF-RO-EFF	8/17/2023	200.7 Rev 4.4	7440-70-2	Calcium	0.11	mg/L
AWPF-RO-EFF	8/24/2023	200.7 Rev 4.4	7440-70-2	Calcium	0.17	mg/L
AWPF-RO-EFF	6/22/2023	SM 2340B		Calcium hardness as CaCO3	ND	mg/L
AWPF-RO-EFF	6/29/2023	SM 2340B		Calcium hardness as CaCO3	ND	mg/L
AWPF-RO-EFF	7/7/2023	SM 2340B		Calcium hardness as CaCO3	ND	mg/L
AWPF-RO-EFF	7/20/2023	SM 2340B		Calcium hardness as CaCO3	ND	mg/L
AWPF-RO-EFF	7/27/2023	SM 2340B		Calcium hardness as CaCO3	ND	mg/L

Appendix A: Pilot Study RO Effluent

Client Sample ID	Collection Date	Analysis Method	CAS	Analyte	Result	Unit
AWPF-RO-EFF	8/3/2023	SM 2340B		Calcium hardness as CaCO3	ND	mg/L
AWPF-RO-EFF	8/10/2023	SM 2340B		Calcium hardness as CaCO3	ND	mg/L
AWPF-RO-EFF	8/17/2023	SM 2340B		Calcium hardness as CaCO3	ND	mg/L
AWPF-RO-EFF	8/24/2023	SM 2340B		Calcium hardness as CaCO3	ND	mg/L
AWPF-RO-EFF	7/27/2023	410.4		Chemical Oxygen Demand	ND	mg/L
AWPF-RO-EFF	6/22/2023	300	16887-00-6	Chloride	2.3	mg/L
AWPF-RO-EFF	6/29/2023	300	16887-00-6	Chloride	2.3	mg/L
AWPF-RO-EFF	7/7/2023	300	16887-00-6	Chloride	2.2	mg/L
AWPF-RO-EFF	7/20/2023	300	16887-00-6	Chloride	1.8	mg/L
AWPF-RO-EFF	7/27/2023	300	16887-00-6	Chloride	2.8	mg/L
AWPF-RO-EFF	8/3/2023	300	16887-00-6	Chloride	27	mg/L
AWPF-RO-EFF	8/10/2023	300	16887-00-6	Chloride	3	mg/L
AWPF-RO-EFF	8/17/2023	300	16887-00-6	Chloride	15	mg/L
AWPF-RO-EFF	8/24/2023	300	16887-00-6	Chloride	18	mg/L
AWPF-RO-EFF	7/20/2023	410.4		COD, Dissolved	ND	mg/L
AWPF-RO-EFF	7/27/2023	410.4		COD, Dissolved	ND	mg/L
AWPF-RO-EFF	6/22/2023	SM 5310C	7440-44-0	Dissolved Organic Carbon	0.34	mg/L
AWPF-RO-EFF	6/29/2023	SM 5310C	7440-44-0	Dissolved Organic Carbon	0.25	mg/L
AWPF-RO-EFF	7/7/2023	SM 5310C	7440-44-0	Dissolved Organic Carbon	0.25	mg/L
AWPF-RO-EFF	7/20/2023	SM 5310C	7440-44-0	Dissolved Organic Carbon	0.33	mg/L
AWPF-RO-EFF	7/27/2023	SM 5310C	7440-44-0	Dissolved Organic Carbon	0.36	mg/L
AWPF-RO-EFF	8/3/2023	SM 5310C	7440-44-0	Dissolved Organic Carbon	0.67	mg/L
AWPF-RO-EFF	8/10/2023	SM 5310C	7440-44-0	Dissolved Organic Carbon	0.34	mg/L
AWPF-RO-EFF	8/17/2023	SM 5310C	7440-44-0	Dissolved Organic Carbon	0.62	mg/L
AWPF-RO-EFF	8/24/2023	SM 5310C	7440-44-0	Dissolved Organic Carbon	0.56	mg/L
AWPF-RO-EFF	6/22/2023	SM 4500 P E	7723-14-0	Dissolved Phosphorus	ND	mg/L
AWPF-RO-EFF	7/7/2023	365.1	7723-14-0	Dissolved Phosphorus	ND	mg/L
AWPF-RO-EFF	7/20/2023	365.1	7723-14-0	Dissolved Phosphorus	ND	mg/L
AWPF-RO-EFF	7/27/2023	365.1	7723-14-0	Dissolved Phosphorus	0.047	mg/L
AWPF-RO-EFF	8/3/2023	365.1	7723-14-0	Dissolved Phosphorus	ND	mg/L
AWPF-RO-EFF	8/10/2023	365.1	7723-14-0	Dissolved Phosphorus	ND	mg/L
AWPF-RO-EFF	8/17/2023	365.1	7723-14-0	Dissolved Phosphorus	0.013	mg/L
AWPF-RO-EFF	8/24/2023	365.1	7723-14-0	Dissolved Phosphorus	ND	mg/L

Appendix A: Pilot Study RO Effluent

Client Sample ID	Collection Date	Analysis Method	CAS	Analyte	Result	Unit
AWPF-RO-EFF	6/22/2023	SM 2340B		Hardness (as CaCO3)	ND	mg/L
AWPF-RO-EFF	6/29/2023	SM 2340B		Hardness (as CaCO3)	ND	mg/L
AWPF-RO-EFF	7/7/2023	SM 2340B		Hardness (as CaCO3)	ND	mg/L
AWPF-RO-EFF	7/20/2023	SM 2340B		Hardness (as CaCO3)	ND	mg/L
AWPF-RO-EFF	7/27/2023	SM 2340B		Hardness (as CaCO3)	ND	mg/L
AWPF-RO-EFF	8/3/2023	SM 2340B		Hardness (as CaCO3)	ND	mg/L
AWPF-RO-EFF	8/10/2023	SM 2340B		Hardness (as CaCO3)	ND	mg/L
AWPF-RO-EFF	8/17/2023	SM 2340B		Hardness (as CaCO3)	ND	mg/L
AWPF-RO-EFF	8/24/2023	SM 2340B		Hardness (as CaCO3)	ND	mg/L
AWPF-RO-EFF	6/22/2023	200.7 Rev 4.4	7439-95-4	Magnesium	0.012	mg/L
AWPF-RO-EFF	6/29/2023	200.7 Rev 4.4	7439-95-4	Magnesium	0.019	mg/L
AWPF-RO-EFF	7/7/2023	200.7 Rev 4.4	7439-95-4	Magnesium	0.014	mg/L
AWPF-RO-EFF	7/20/2023	200.7 Rev 4.4	7439-95-4	Magnesium	0.015	mg/L
AWPF-RO-EFF	7/27/2023	200.7 Rev 4.4	7439-95-4	Magnesium	0.017	mg/L
AWPF-RO-EFF	8/3/2023	200.7 Rev 4.4	7439-95-4	Magnesium	0.034	mg/L
AWPF-RO-EFF	8/10/2023	200.7 Rev 4.4	7439-95-4	Magnesium	0.035	mg/L
AWPF-RO-EFF	8/17/2023	200.7 Rev 4.4	7439-95-4	Magnesium	0.028	mg/L
AWPF-RO-EFF	8/24/2023	200.7 Rev 4.4	7439-95-4	Magnesium	0.033	mg/L
AWPF-RO-EFF	6/22/2023	SM 2340B		Magnesium hardness as calcium carbonate	ND	mg/L
AWPF-RO-EFF	6/29/2023	SM 2340B		Magnesium hardness as calcium carbonate	ND	mg/L
AWPF-RO-EFF	7/7/2023	SM 2340B		Magnesium hardness as calcium carbonate	ND	mg/L
AWPF-RO-EFF	7/20/2023	SM 2340B		Magnesium hardness as calcium carbonate	ND	mg/L
AWPF-RO-EFF	7/27/2023	SM 2340B		Magnesium hardness as calcium carbonate	ND	mg/L
AWPF-RO-EFF	8/3/2023	SM 2340B		Magnesium hardness as calcium carbonate	ND	mg/L
AWPF-RO-EFF	8/10/2023	SM 2340B		Magnesium hardness as calcium carbonate	ND	mg/L
AWPF-RO-EFF	8/17/2023	SM 2340B		Magnesium hardness as calcium carbonate	ND	mg/L
AWPF-RO-EFF	8/24/2023	SM 2340B		Magnesium hardness as calcium carbonate	ND	mg/L
AWPF-RO-EFF	6/22/2023	Nitrate by calc	14797-55-8	Nitrate as N	0.23	mg/L
AWPF-RO-EFF	6/29/2023	Nitrate by calc	14797-55-8	Nitrate as N	ND	mg/L
AWPF-RO-EFF	7/7/2023	Nitrate by calc	14797-55-8	Nitrate as N	0.051	mg/L
AWPF-RO-EFF	7/20/2023	300	14797-55-8	Nitrate as N	0.0061	mg/L
AWPF-RO-EFF	7/27/2023	300	14797-55-8	Nitrate as N	0.013	mg/L
AWPF-RO-EFF	8/3/2023	300	14797-55-8	Nitrate as N	0.023	mg/L

Appendix A: Pilot Study RO Effluent

Client Sample ID	Collection Date	Analysis Method	CAS	Analyte	Result	Unit
AWPF-RO-EFF	8/10/2023	300	14797-55-8	Nitrate as N	0.068	mg/L
AWPF-RO-EFF	8/17/2023	300	14797-55-8	Nitrate as N	0.038	mg/L
AWPF-RO-EFF	8/24/2023	300	14797-55-8	Nitrate as N	0.027	mg/L
AWPF-RO-EFF	6/22/2023	353.2		Nitrate Nitrite as N	0.26	mg/L
AWPF-RO-EFF	6/29/2023	353.2		Nitrate Nitrite as N	0.053	mg/L
AWPF-RO-EFF	7/7/2023	353.2		Nitrate Nitrite as N	0.068	mg/L
AWPF-RO-EFF	6/22/2023	353.2	14797-65-0	Nitrite as N	0.029	mg/L
AWPF-RO-EFF	6/29/2023	353.2	14797-65-0	Nitrite as N	0.022	mg/L
AWPF-RO-EFF	7/7/2023	353.2	14797-65-0	Nitrite as N	0.017	mg/L
AWPF-RO-EFF	7/20/2023	300	14797-65-0	Nitrite as N	ND	mg/L
AWPF-RO-EFF	7/27/2023	300	14797-65-0	Nitrite as N	0.0045	mg/L
AWPF-RO-EFF	8/3/2023	300	14797-65-0	Nitrite as N	ND	mg/L
AWPF-RO-EFF	8/10/2023	300	14797-65-0	Nitrite as N	0.016	mg/L
AWPF-RO-EFF	8/17/2023	300	14797-65-0	Nitrite as N	ND	mg/L
AWPF-RO-EFF	8/24/2023	300	14797-65-0	Nitrite as N	ND	mg/L
AWPF-RO-EFF	6/22/2023	351.2		Nitrogen, Kjeldahl	0.21	mg/L
AWPF-RO-EFF	6/29/2023	351.2		Nitrogen, Kjeldahl	ND	mg/L
AWPF-RO-EFF	7/7/2023	351.2		Nitrogen, Kjeldahl	0.19	mg/L
AWPF-RO-EFF	7/20/2023	351.2		Nitrogen, Kjeldahl	ND	mg/L
AWPF-RO-EFF	7/27/2023	351.2		Nitrogen, Kjeldahl	ND	mg/L
AWPF-RO-EFF	8/3/2023	351.2		Nitrogen, Kjeldahl	0.13	mg/L
AWPF-RO-EFF	8/10/2023	351.2		Nitrogen, Kjeldahl	ND	mg/L
AWPF-RO-EFF	8/17/2023	351.2		Nitrogen, Kjeldahl	0.089	mg/L
AWPF-RO-EFF	8/24/2023	351.2		Nitrogen, Kjeldahl	0.22	mg/L
AWPF-RO-EFF	6/22/2023	Total Nitrogen		Nitrogen, Total	0.47	mg/L
AWPF-RO-EFF	6/29/2023	Total Nitrogen		Nitrogen, Total	0.053	mg/L
AWPF-RO-EFF	7/7/2023	Total Nitrogen		Nitrogen, Total	0.26	mg/L
AWPF-RO-EFF	7/20/2023	Total Nitrogen		Nitrogen, Total	ND	mg/L
AWPF-RO-EFF	7/27/2023	Total Nitrogen		Nitrogen, Total	ND	mg/L
AWPF-RO-EFF	8/10/2023	Total Nitrogen		Nitrogen, Total	0.084	mg/L
AWPF-RO-EFF	8/17/2023	Total Nitrogen		Nitrogen, Total	0.13	mg/L
AWPF-RO-EFF	8/24/2023	Total Nitrogen		Nitrogen, Total	0.22	mg/L
AWPF-RO-EFF	6/22/2023	SM 4500 P E		Orthophosphate as P	ND	mg/L

Appendix A: Pilot Study RO Effluent

Client Sample ID	Collection Date	Analysis Method	CAS	Analyte	Result	Unit
AWPF-RO-EFF	6/29/2023	SM 4500 P E		Orthophosphate as P	ND	mg/L
AWPF-RO-EFF	7/7/2023	SM 4500 P E		Orthophosphate as P	ND	mg/L
AWPF-RO-EFF	7/20/2023	SM 4500 P E		Orthophosphate as P	ND	mg/L
AWPF-RO-EFF	7/27/2023	SM 4500 P E		Orthophosphate as P	ND	mg/L
AWPF-RO-EFF	8/3/2023	SM 4500 P E		Orthophosphate as P	ND	mg/L
AWPF-RO-EFF	8/10/2023	SM 4500 P E		Orthophosphate as P	ND	mg/L
AWPF-RO-EFF	8/17/2023	SM 4500 P E		Orthophosphate as P	ND	mg/L
AWPF-RO-EFF	8/24/2023	SM 4500 P E		Orthophosphate as P	ND	mg/L
AWPF-RO-EFF	6/22/2023	SM 4500 P E		Orthophosphate as P, Dissolved	ND	mg/L
AWPF-RO-EFF	6/29/2023	SM 4500 P E		Orthophosphate as P, Dissolved	ND	mg/L
AWPF-RO-EFF	6/22/2023	SM 4500 P E	7723-14-0	Phosphorus, Total	ND	mg/L
AWPF-RO-EFF	6/22/2023	200.7 Rev 4.4	2023695	Potassium	0.58	mg/L
AWPF-RO-EFF	6/29/2023	200.7 Rev 4.4	2023695	Potassium	0.7	mg/L
AWPF-RO-EFF	7/20/2023	200.7 Rev 4.4	2023695	Potassium	0.5	mg/L
AWPF-RO-EFF	7/27/2023	200.7 Rev 4.4	2023695	Potassium	0.6	mg/L
AWPF-RO-EFF	8/3/2023	200.7 Rev 4.4	2023695	Potassium	1	mg/L
AWPF-RO-EFF	8/17/2023	200.7 Rev 4.4	2023695	Potassium	0.51	mg/L
AWPF-RO-EFF	8/24/2023	200.7 Rev 4.4	2023695	Potassium	0.67	mg/L
AWPF-RO-EFF	6/22/2023	200.7 Rev 4.4	7631-86-9	Silica	0.35	mg/L
AWPF-RO-EFF	6/29/2023	200.7 Rev 4.4	7631-86-9	Silica	0.32	mg/L
AWPF-RO-EFF	7/20/2023	200.7 Rev 4.4	7631-86-9	Silica	0.41	mg/L
AWPF-RO-EFF	7/27/2023	200.7 Rev 4.4	7631-86-9	Silica	0.42	mg/L
AWPF-RO-EFF	8/3/2023	200.7 Rev 4.4	7631-86-9	Silica	0.54	mg/L
AWPF-RO-EFF	8/10/2023	200.7 Rev 4.4	7631-86-9	Silica	0.45	mg/L
AWPF-RO-EFF	8/17/2023	200.7 Rev 4.4	7631-86-9	Silica	0.47	mg/L
AWPF-RO-EFF	8/24/2023	200.7 Rev 4.4	7631-86-9	Silica	0.44	mg/L
AWPF-RO-EFF	6/22/2023	200.7 Rev 4.4	7440-23-5	Sodium	3.7	mg/L
AWPF-RO-EFF	6/29/2023	200.7 Rev 4.4	7440-23-5	Sodium	3.8	mg/L
AWPF-RO-EFF	7/20/2023	200.7 Rev 4.4	7440-23-5	Sodium	3.7	mg/L
AWPF-RO-EFF	7/27/2023	200.7 Rev 4.4	7440-23-5	Sodium	4.2	mg/L
AWPF-RO-EFF	8/3/2023	200.7 Rev 4.4	7440-23-5	Sodium	27	mg/L
AWPF-RO-EFF	8/17/2023	200.7 Rev 4.4	7440-23-5	Sodium	26	mg/L
AWPF-RO-EFF	8/24/2023	200.7 Rev 4.4	7440-23-5	Sodium	33	mg/L

Appendix A: Pilot Study RO Effluent

Client Sample ID	Collection Date	Analysis Method	CAS	Analyte	Result	Unit
AWPF-RO-EFF	6/22/2023	SM 2510B		Specific Conductance	23	umhos/cm
AWPF-RO-EFF	6/29/2023	SM 2510B		Specific Conductance	24	umhos/cm
AWPF-RO-EFF	7/7/2023	SM 2510B		Specific Conductance	24	umhos/cm
AWPF-RO-EFF	7/20/2023	SM 2510B		Specific Conductance	23	umhos/cm
AWPF-RO-EFF	7/27/2023	SM 2510B		Specific Conductance	27	umhos/cm
AWPF-RO-EFF	8/3/2023	SM 2510B		Specific Conductance	140	umhos/cm
AWPF-RO-EFF	8/10/2023	SM 2510B		Specific Conductance	45	umhos/cm
AWPF-RO-EFF	8/17/2023	SM 2510B		Specific Conductance	120	umhos/cm
AWPF-RO-EFF	8/24/2023	SM 2510B		Specific Conductance	160	umhos/cm
AWPF-RO-EFF	6/22/2023	200.7 Rev 4.4	7440-24-6	Strontium	ND	ug/L
AWPF-RO-EFF	6/29/2023	200.7 Rev 4.4	7440-24-6	Strontium	ND	ug/L
AWPF-RO-EFF	7/7/2023	200.7 Rev 4.4	7440-24-6	Strontium	ND	ug/L
AWPF-RO-EFF	7/20/2023	200.7 Rev 4.4	7440-24-6	Strontium	3.4	ug/L
AWPF-RO-EFF	7/27/2023	200.7 Rev 4.4	7440-24-6	Strontium	ND	ug/L
AWPF-RO-EFF	8/3/2023	200.7 Rev 4.4	7440-24-6	Strontium	ND	ug/L
AWPF-RO-EFF	8/10/2023	200.7 Rev 4.4	7440-24-6	Strontium	ND	ug/L
AWPF-RO-EFF	8/17/2023	200.7 Rev 4.4	7440-24-6	Strontium	ND	ug/L
AWPF-RO-EFF	8/24/2023	200.7 Rev 4.4	7440-24-6	Strontium	ND	ug/L
AWPF-RO-EFF	6/22/2023	300	14808-79-8	Sulfate	ND	mg/L
AWPF-RO-EFF	6/29/2023	300	14808-79-8	Sulfate	ND	mg/L
AWPF-RO-EFF	7/7/2023	300	14808-79-8	Sulfate	0.032	mg/L
AWPF-RO-EFF	7/20/2023	300	14808-79-8	Sulfate	ND	mg/L
AWPF-RO-EFF	7/27/2023	300	14808-79-8	Sulfate	1	mg/L
AWPF-RO-EFF	8/3/2023	300	14808-79-8	Sulfate	0.11	mg/L
AWPF-RO-EFF	8/10/2023	300	14808-79-8	Sulfate	0.032	mg/L
AWPF-RO-EFF	8/17/2023	300	14808-79-8	Sulfate	0.062	mg/L
AWPF-RO-EFF	8/24/2023	300	14808-79-8	Sulfate	0.07	mg/L
AWPF-RO-EFF	6/22/2023	SM 2540C		Total Dissolved Solids	15	mg/L
AWPF-RO-EFF	6/29/2023	SM 2540C		Total Dissolved Solids	19	mg/L
AWPF-RO-EFF	7/7/2023	SM 2540C		Total Dissolved Solids	14	mg/L
AWPF-RO-EFF	7/20/2023	SM 2540C		Total Dissolved Solids	19	mg/L
AWPF-RO-EFF	7/27/2023	SM 2540C		Total Dissolved Solids	19	mg/L
AWPF-RO-EFF	8/3/2023	SM 2540C		Total Dissolved Solids	70	mg/L

Appendix A: Pilot Study RO Effluent

Client Sample ID	Collection Date	Analysis Method	CAS	Analyte	Result	Unit
AWPF-RO-EFF	8/10/2023	SM 2540C		Total Dissolved Solids	31	mg/L
AWPF-RO-EFF	8/17/2023	SM 2540C		Total Dissolved Solids	78	mg/L
AWPF-RO-EFF	8/24/2023	SM 2540C		Total Dissolved Solids	110	mg/L
AWPF-RO-EFF	6/22/2023	Inorganic N		Total Inorganic Nitrogen	0.45	mg/L
AWPF-RO-EFF	6/29/2023	Inorganic N		Total Inorganic Nitrogen	0.17	mg/L
AWPF-RO-EFF	7/7/2023	Inorganic N		Total Inorganic Nitrogen	0.24	mg/L
AWPF-RO-EFF	7/20/2023	Inorganic N		Total Inorganic Nitrogen	0.13	mg/L
AWPF-RO-EFF	7/27/2023	Inorganic N		Total Inorganic Nitrogen	0.17	mg/L
AWPF-RO-EFF	8/3/2023	Inorganic N		Total Inorganic Nitrogen	0.16	mg/L
AWPF-RO-EFF	8/10/2023	Inorganic N		Total Inorganic Nitrogen	0.22	mg/L
AWPF-RO-EFF	8/17/2023	Inorganic N		Total Inorganic Nitrogen	0.11	mg/L
AWPF-RO-EFF	8/24/2023	Inorganic N		Total Inorganic Nitrogen	0.24	mg/L
AWPF-RO-EFF	6/22/2023	SM 5310C	7440-44-0	Total Organic Carbon	0.24	mg/L
AWPF-RO-EFF	6/29/2023	SM 5310C	7440-44-0	Total Organic Carbon	0.73	mg/L
AWPF-RO-EFF	7/7/2023	SM 5310C	7440-44-0	Total Organic Carbon	0.25	mg/L
AWPF-RO-EFF	7/20/2023	SM 5310C	7440-44-0	Total Organic Carbon	0.3	mg/L
AWPF-RO-EFF	7/27/2023	SM 5310C	7440-44-0	Total Organic Carbon	0.42	mg/L
AWPF-RO-EFF	8/3/2023	SM 5310C	7440-44-0	Total Organic Carbon	0.25	mg/L
AWPF-RO-EFF	8/10/2023	SM 5310C	7440-44-0	Total Organic Carbon	0.34	mg/L
AWPF-RO-EFF	8/17/2023	SM 5310C	7440-44-0	Total Organic Carbon	0.42	mg/L
AWPF-RO-EFF	8/24/2023	SM 5310C	7440-44-0	Total Organic Carbon	0.5	mg/L
AWPF-RO-EFF	6/29/2023	365.1	7723-14-0	Total Phosphorus as P	0.011	mg/L
AWPF-RO-EFF	6/29/2023	365.1	7723-14-0	Total Phosphorus as P	ND	mg/L
AWPF-RO-EFF	7/7/2023	365.1	7723-14-0	Total Phosphorus as P	ND	mg/L
AWPF-RO-EFF	7/20/2023	365.1	7723-14-0	Total Phosphorus as P	ND	mg/L
AWPF-RO-EFF	7/27/2023	365.1	7723-14-0	Total Phosphorus as P	ND	mg/L
AWPF-RO-EFF	8/3/2023	365.1	7723-14-0	Total Phosphorus as P	ND	mg/L
AWPF-RO-EFF	8/10/2023	365.1	7723-14-0	Total Phosphorus as P	0.012	mg/L
AWPF-RO-EFF	8/17/2023	365.1	7723-14-0	Total Phosphorus as P	0.014	mg/L
AWPF-RO-EFF	8/24/2023	365.1	7723-14-0	Total Phosphorus as P	ND	mg/L
AWPF-RO-EFF	6/22/2023	180.1		Turbidity	0.1	NTU
AWPF-RO-EFF	6/29/2023	180.1		Turbidity	0.05	NTU
AWPF-RO-EFF	7/7/2023	180.1		Turbidity	0.05	NTU

Appendix A: Pilot Study RO Effluent

Client Sample ID	Collection Date	Analysis Method	CAS	Analyte	Result	Unit
AWPF-RO-EFF	7/20/2023	180.1		Turbidity	0.05	NTU
AWPF-RO-EFF	7/27/2023	180.1		Turbidity	0.05	NTU
AWPF-RO-EFF	8/3/2023	180.1		Turbidity	0.35	NTU
AWPF-RO-EFF	8/10/2023	180.1		Turbidity	0.15	NTU
AWPF-RO-EFF	8/17/2023	180.1		Turbidity	0.2	NTU
AWPF-RO-EFF	8/24/2023	180.1		Turbidity	0.25	NTU

Appendix B: UV/AOP Effluent

Client Sample ID	Collection Date	Analysis Method	CAS	Analyte	Result	Unit
AWPF-UVAOP-EFF	7/20/2023	524.2	79-00-5	1,1,2-Trichloroethane	0.08	ug/L
AWPF-UVAOP-EFF	7/20/2023	SRL 524M	96-18-4	1,2,3-Trichloropropane	0.0037	ug/L
AWPF-UVAOP-EFF	7/20/2023	1613B	76523-40-5	13C-2,3,7,8-TCDD	1400	pg/L
AWPF-UVAOP-EFF	8/10/2023	SM 2320B		Alkalinity as CaCO3	8	mg/L
AWPF-UVAOP-EFF	8/17/2023	SM 2320B		Alkalinity as CaCO3	7.4	mg/L
AWPF-UVAOP-EFF	8/3/2023	SM 2320B		Alkalinity as CaCO3	6.46	mg/L
AWPF-UVAOP-EFF	8/3/2023	SM 2320B		Alkalinity as CaCO3	6.4	mg/L
AWPF-UVAOP-EFF	8/24/2023	SM 2320B		Alkalinity as CaCO3	6	mg/L
AWPF-UVAOP-EFF	7/27/2023	SM 2320B		Alkalinity as CaCO3	2.7	mg/L
AWPF-UVAOP-EFF	8/10/2023	SM 2320B		Bicarbonate Alkalinity as CaCO3	8	mg/L
AWPF-UVAOP-EFF	8/17/2023	SM 2320B		Bicarbonate Alkalinity as CaCO3	7.4	mg/L
AWPF-UVAOP-EFF	8/3/2023	SM 2320B		Bicarbonate Alkalinity as CaCO3	6.46	mg/L
AWPF-UVAOP-EFF	8/3/2023	SM 2320B		Bicarbonate Alkalinity as CaCO3	6.4	mg/L
AWPF-UVAOP-EFF	8/24/2023	SM 2320B		Bicarbonate Alkalinity as CaCO3	6	mg/L
AWPF-UVAOP-EFF	7/27/2023	SM 2320B		Bicarbonate Alkalinity as CaCO3	2.7	mg/L
AWPF-UVAOP-EFF	7/20/2023	200.7 Rev 4.4	7440-42-8	Boron	0.12	mg/L
AWPF-UVAOP-EFF	7/20/2023	525.2	103-23-1	Di(2-ethylhexyl)adipate	0.082	ug/L
AWPF-UVAOP-EFF	7/20/2023	SM 5310C	7440-44-0	Dissolved Organic Carbon	0.57	mg/L
AWPF-UVAOP-EFF	8/17/2023	SM 5310C	7440-44-0	Dissolved Organic Carbon	0.35	mg/L
AWPF-UVAOP-EFF	8/3/2023	SM 5310C	7440-44-0	Dissolved Organic Carbon	0.28	mg/L
AWPF-UVAOP-EFF	7/27/2023	SM 5310C	7440-44-0	Dissolved Organic Carbon	0.24	mg/L
AWPF-UVAOP-EFF	8/10/2023	SM 5310C	7440-44-0	Dissolved Organic Carbon	0.24	mg/L
AWPF-UVAOP-EFF	8/24/2023	SM 5310C	7440-44-0	Dissolved Organic Carbon	0.24	mg/L
AWPF-UVAOP-EFF	7/20/2023	SM 4500 F C	16984-48-8	Fluoride	0.023	mg/L
AWPF-UVAOP-EFF	7/20/2023	556	50-00-0	Formaldehyde	19	ug/L
AWPF-UVAOP-EFF	7/20/2023	PPCP NEG	25812-30-0	Gemfibrozil	0.00063	ug/L
AWPF-UVAOP-EFF	7/20/2023	900	12587-46-1	Gross Alpha	-0.0307	pCi/L
AWPF-UVAOP-EFF	7/20/2023	900	12587-47-2	Gross Beta	1.07	pCi/L
AWPF-UVAOP-EFF	7/20/2023	218.6	18540-29-9	Hexavalent Chromium (CrVI)	0.16	ug/L
AWPF-UVAOP-EFF	7/20/2023	1631E	7439-97-6	Mercury	0.85	ng/L
AWPF-UVAOP-EFF	8/17/2023	521.1	59-89-2	N-Nitrosomorpholine (NMOR)	1.61	ng/L
AWPF-UVAOP-EFF	8/17/2023	521.1	59-89-2	N-Nitrosomorpholine (NMOR)	1.3	ng/L
AWPF-UVAOP-EFF	7/20/2023	903	13982-63-3	Radium-226	0.0486	pCi/L

Appendix B: UV/AOP Effluent

Client Sample ID	Collection Date	Analysis Method	CAS	Analyte	Result	Unit
AWPF-UVAOP-EFF	7/20/2023	904	15262-20-1	Radium-228	0.369	pCi/L
AWPF-UVAOP-EFF	7/20/2023	200.7 Rev 4.4	7440-23-5	Sodium	3.9	mg/L
AWPF-UVAOP-EFF	7/27/2023	SM 2510B		Specific Conductance	32	umhos/cm
AWPF-UVAOP-EFF	7/20/2023	905	10098-97-2	Strontium-90	-0.295	pCi/L
AWPF-UVAOP-EFF	8/3/2023	SM 2540C		Total Dissolved Solids	53	mg/L
AWPF-UVAOP-EFF	8/10/2023	SM 2540C		Total Dissolved Solids	27	mg/L
AWPF-UVAOP-EFF	8/17/2023	SM 2540C		Total Dissolved Solids	17	mg/L
AWPF-UVAOP-EFF	8/24/2023	SM 2540C		Total Dissolved Solids	10	mg/L
AWPF-UVAOP-EFF	7/27/2023	SM 5310C	7440-44-0	Total Organic Carbon	0.5	mg/L
AWPF-UVAOP-EFF	8/10/2023	SM 5310C	7440-44-0	Total Organic Carbon	0.36	mg/L
AWPF-UVAOP-EFF	8/17/2023	SM 5310C	7440-44-0	Total Organic Carbon	0.19	mg/L
AWPF-UVAOP-EFF	8/24/2023	SM 5310C	7440-44-0	Total Organic Carbon	0.18	mg/L
AWPF-UVAOP-EFF	8/3/2023	SM 5310C	7440-44-0	Total Organic Carbon	0.17	mg/L
AWPF-UVAOP-EFF	7/20/2023	6251B	76-03-9	Trichloroacetic acid	0.44	ug/L
AWPF-UVAOP-EFF	7/20/2023	906	10028-17-8	Tritium	-31.5	pCi/L
AWPF-UVAOP-EFF	7/20/2023	524.2	630-20-6	1,1,1,2-Tetrachloroethane	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	71-55-6	1,1,1-Trichloroethane	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	79-34-5	1,1,2,2-Tetrachloroethane	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	75-35-4	1,1-Dichlorethylene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	75-34-3	1,1-Dichloroethane	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	563-58-6	1,1-Dichloropropene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	87-61-6	1,2,3-Trichlorobenzene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	96-18-4	1,2,3-Trichloropropane	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	120-82-1	1,2,4-Trichlorobenzene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	95-63-6	1,2,4-Trimethylbenzene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	504.1	96-12-8	1,2-Dibromo-3-Chloropropane	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	504.1	106-93-4	1,2-Dibromoethane	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	107-06-2	1,2-Dichloroethane	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	78-87-5	1,2-Dichloropropane	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	108-67-8	1,3,5-Trimethylbenzene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	142-28-9	1,3-Dichloropropane	ND	ug/L
AWPF-UVAOP-EFF	7/27/2023	522	123-91-1	1,4-Dioxane	ND	ug/L
AWPF-UVAOP-EFF	8/3/2023	522	123-91-1	1,4-Dioxane	ND	ug/L

Appendix B: UV/AOP Effluent

Client Sample ID	Collection Date	Analysis Method	CAS	Analyte	Result	Unit
AWPF-UVAOP-EFF	8/10/2023	522	123-91-1	1,4-Dioxane	ND	ug/L
AWPF-UVAOP-EFF	8/17/2023	522	123-91-1	1,4-Dioxane	ND	ug/L
AWPF-UVAOP-EFF	8/24/2023	522	123-91-1	1,4-Dioxane	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	594-20-7	2,2-Dichloropropane	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	1613B	1746-01-6	2,3,7,8-TCDD	ND	pg/L
AWPF-UVAOP-EFF	7/20/2023	515.4	93-76-5	2,4,5-T	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	515.4	93-72-1	2,4,5-TP (Silvex)	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	515.4	94-75-7	2,4-D	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	515.4	94-82-6	2,4-DB	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	121-14-2	2,4-Dinitrotoluene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	78-93-3	2-Butanone (MEK)	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	624.1	110-75-8	2-Chloroethyl vinyl ether	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	591-78-6	2-Hexanone	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	515.4	51-36-5	3,5-Dichlorobenzoic acid	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	531.2	16655-82-6	3-Hydroxycarbofuran	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	208-96-8	Acenaphthylene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	515.4	50594-66-6	Acifluorfen	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	624.1	107-02-8	Acrolein	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	505	15972-60-8	Alachlor (Alanex)	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	15972-60-8	Alachlor (Alanex)	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	531.2	116-06-3	Aldicarb	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	531.2	1646-88-4	Aldicarb sulfone	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	531.2	1646-87-3	Aldicarb sulfoxide	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	505	309-00-2	Aldrin	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	5103-71-9	alpha-Chlordane	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	200.8	7429-90-5	Aluminum	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	120-12-7	Anthracene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	200.8	7440-36-0	Antimony	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	200.8	7440-38-2	Arsenic	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	1912-24-9	Atrazine	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	200.8	7440-39-3	Barium	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	531.2	114-26-1	Baygon	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	515.4	25057-89-0	Bentazon	ND	ug/L

Appendix B: UV/AOP Effluent

Client Sample ID	Collection Date	Analysis Method	CAS	Analyte	Result	Unit
AWPF-UVAOP-EFF	7/20/2023	525.2	56-55-3	Benz(a)anthracene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	71-43-2	Benzene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	50-32-8	Benzo[a]pyrene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	205-99-2	Benzo[b]fluoranthene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	191-24-2	Benzo[g,h,i]perylene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	207-08-9	Benzo[k]fluoranthene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	200.8	7440-41-7	Beryllium	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	117-81-7	Bis(2-ethylhexyl) phthalate	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	314-40-9	Bromacil	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	300.1	15541-45-4	Bromate	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	108-86-1	Bromobenzene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	6251B	5589-96-8	Bromochloroacetic acid	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	74-97-5	Bromochloromethane	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	75-27-4	Bromodichloromethane	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	74-96-4	Bromoethane	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	75-25-2	Bromoform	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	74-83-9	Bromomethane (Methyl Bromide)	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	23184-66-9	Butachlor	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	85-68-7	Butylbenzylphthalate	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	200.8	7440-43-9	Cadmium	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	58-08-2	Caffeine	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	531.2	63-25-2	Carbaryl	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	531.2	1563-66-2	Carbofuran	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	75-15-0	Carbon disulfide	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	56-23-5	Carbon tetrachloride	ND	ug/L
AWPF-UVAOP-EFF	7/27/2023	SM 2320B		Carbonate Alkalinity as CaCO3	ND	mg/L
AWPF-UVAOP-EFF	8/3/2023	SM 2320B		Carbonate Alkalinity as CaCO3	ND	mg/L
AWPF-UVAOP-EFF	8/3/2023	SM 2320B		Carbonate Alkalinity as CaCO3	ND	mg/L
AWPF-UVAOP-EFF	8/10/2023	SM 2320B		Carbonate Alkalinity as CaCO3	ND	mg/L
AWPF-UVAOP-EFF	8/17/2023	SM 2320B		Carbonate Alkalinity as CaCO3	ND	mg/L
AWPF-UVAOP-EFF	8/24/2023	SM 2320B		Carbonate Alkalinity as CaCO3	ND	mg/L
AWPF-UVAOP-EFF	7/20/2023	300.1	14866-68-3	Chlorate	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	505	57-74-9	Chlordane	ND	ug/L

Appendix B: UV/AOP Effluent

Client Sample ID	Collection Date	Analysis Method	CAS	Analyte	Result	Unit
AWPF-UVAOP-EFF	7/20/2023	300	14998-27-7	Chlorite	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	108-90-7	Chlorobenzene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	75-00-3	Chloroethane	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	67-66-3	Chloroform (Trichloromethane)	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	74-87-3	Chloromethane (methyl chloride)	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	200.8	7440-47-3	Chromium	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	218-01-9	Chrysene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	156-59-2	cis-1,2-Dichloroethylene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	10061-01-5	cis-1,3-Dichloropropene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	9223B		Coliform, Total	ND	MPN/100mL
AWPF-UVAOP-EFF	7/20/2023	200.8	7440-50-8	Copper	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	218.6 CR3	16065-83-1	Cr (III)	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	335.4	57-12-5	Cyanide, Total	ND	mg/L
AWPF-UVAOP-EFF	7/20/2023	515.4	75-99-0	Dalapon	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	333-41-5	Diazinon (Qualitative)	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	53-70-3	Dibenz(a,h)anthracene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	6251B	631-64-1	Dibromoacetic acid	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	124-48-1	Dibromochloromethane	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	74-95-3	Dibromomethane	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	515.4	1918-00-9	Dicamba	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	6251B	79-43-6	Dichloroacetic acid	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	75-71-8	Dichlorodifluoromethane	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	75-09-2	Dichloromethane	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	515.4	120-36-5	Dichlorprop	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	505	60-57-1	Dieldrin	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	60-57-1	Dieldrin	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	84-66-2	Diethylphthalate	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	108-20-3	Diisopropyl ether	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	60-51-5	Dimethoate	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	131-11-3	Dimethylphthalate	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	84-74-2	Di-n-butyl phthalate	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	515.4	88-85-7	Dinoseb	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	549.2	2764-72-9	Diquat	ND	ug/L

Appendix B: UV/AOP Effluent

Client Sample ID	Collection Date	Analysis Method	CAS	Analyte	Result	Unit
AWPF-UVAOP-EFF	7/20/2023	548.1	145-73-3	Endothall	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	505	72-20-8	Endrin	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	72-20-8	Endrin	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	9223B	68583-22-2	Escherichia coli	ND	MPN/100mL
AWPF-UVAOP-EFF	7/20/2023	524.2	100-41-4	Ethylbenzene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	8015C	107-21-1	Ethylene glycol	ND	mg/L
AWPF-UVAOP-EFF	7/20/2023	525.2	206-44-0	Fluoranthene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	86-73-7	Fluorene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	5103-74-2	gamma-Chlordane	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	547	1071-83-6	Glyphosate	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	505	76-44-8	Heptachlor	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	76-44-8	Heptachlor	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	505	1024-57-3	Heptachlor epoxide (isomer B)	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	1024-57-3	Heptachlor epoxide (isomer B)	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	118-74-1	Hexachlorobenzene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	87-68-3	Hexachlorobutadiene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	77-47-4	Hexachlorocyclopentadiene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	8321B	2691-41-0	HMX	ND	ug/L
AWPF-UVAOP-EFF	7/27/2023	SM 2320B		Hydroxide Alkalinity as CaCO3	ND	mg/L
AWPF-UVAOP-EFF	8/3/2023	SM 2320B		Hydroxide Alkalinity as CaCO3	ND	mg/L
AWPF-UVAOP-EFF	8/3/2023	SM 2320B		Hydroxide Alkalinity as CaCO3	ND	mg/L
AWPF-UVAOP-EFF	8/10/2023	SM 2320B		Hydroxide Alkalinity as CaCO3	ND	mg/L
AWPF-UVAOP-EFF	8/17/2023	SM 2320B		Hydroxide Alkalinity as CaCO3	ND	mg/L
AWPF-UVAOP-EFF	8/24/2023	SM 2320B		Hydroxide Alkalinity as CaCO3	ND	mg/L
AWPF-UVAOP-EFF	7/20/2023	525.2	193-39-5	Indeno[1,2,3-cd]pyrene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	PPCP NEG	66108-95-0	Iohexol	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	200.7 Rev 4.4	7439-89-6	Iron	ND	mg/L
AWPF-UVAOP-EFF	7/20/2023	525.2	78-59-1	Isophorone	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	98-82-8	Isopropylbenzene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	200.8	7439-92-1	Lead	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	505	58-89-9	Lindane	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	58-89-9	Lindane	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	179601-23-1	m,p-Xylenes	ND	ug/L

Appendix B: UV/AOP Effluent

Client Sample ID	Collection Date	Analysis Method	CAS	Analyte	Result	Unit
AWPF-UVAOP-EFF	7/20/2023	200.8	7439-96-5	Manganese	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	541-73-1	m-Dichlorobenzene (1,3-DCB)	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	531.2	2032-65-7	Methiocarb	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	531.2	16752-77-5	Methomyl	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	505	72-43-5	Methoxychlor	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	72-43-5	Methoxychlor	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	SM 5540C		Methylene Blue Active Substances	ND	mg/L
AWPF-UVAOP-EFF	7/20/2023	524.2	1634-04-4	Methyl-tert-butyl Ether (MTBE)	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	51218-45-2	Metolachlor	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	21087-64-9	Metribuzin	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	2212-67-1	Molinate	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	6251B	79-08-3	Monobromoacetic acid	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	6251B	79-11-8	Monochloroacetic acid	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	91-20-3	Naphthalene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	104-51-8	n-Butylbenzene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	200.8	7440-02-0	Nickel	ND	ug/L
AWPF-UVAOP-EFF	8/17/2023	521.1	62-75-9	N-Nitrosodimethylamine (NDMA)	ND	ng/L
AWPF-UVAOP-EFF	8/17/2023	521.1	62-75-9	N-Nitrosodimethylamine (NDMA)	ND	ng/L
AWPF-UVAOP-EFF	7/20/2023	524.2	103-65-1	N-Propylbenzene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	95-49-8	o-Chlorotoluene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	95-50-1	o-Dichlorobenzene (1,2-DCB)	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	531.2	23135-22-0	Oxamyl	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	95-47-6	o-Xylene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	549.2	4685-14-7	Paraquat	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	505	12674-11-2	PCB-1016	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	505	11104-28-2	PCB-1221	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	505	11141-16-5	PCB-1232	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	505	53469-21-9	PCB-1242	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	505	12672-29-6	PCB-1248	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	505	11097-69-1	PCB-1254	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	505	11096-82-5	PCB-1260	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	106-43-4	p-Chlorotoluene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	106-46-7	p-Dichlorobenzene (1,4-DCB)	ND	ug/L

Appendix B: UV/AOP Effluent

Client Sample ID	Collection Date	Analysis Method	CAS	Analyte	Result	Unit
AWPF-UVAOP-EFF	7/20/2023	515.4	87-86-5	Pentachlorophenol	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	314	14797-73-0	Perchlorate	ND	ug/L
AWPF-UVAOP-EFF	8/17/2023	533	1763-23-1	Perfluorooctanesulfonic acid (PFOS)	ND	ng/L
AWPF-UVAOP-EFF	8/17/2023	533	335-67-1	Perfluorooctanoic acid (PFOA)	ND	ng/L
AWPF-UVAOP-EFF	7/20/2023	525.2	85-01-8	Phenanthrene	ND	ug/L
AWPF-UVAOP-EFF	7/27/2023	SM 2320B		Phenolphthalein Alkalinity	ND	mg/L
AWPF-UVAOP-EFF	8/3/2023	SM 2320B		Phenolphthalein Alkalinity	ND	mg/L
AWPF-UVAOP-EFF	8/3/2023	SM 2320B		Phenolphthalein Alkalinity	ND	mg/L
AWPF-UVAOP-EFF	8/10/2023	SM 2320B		Phenolphthalein Alkalinity	ND	mg/L
AWPF-UVAOP-EFF	8/17/2023	SM 2320B		Phenolphthalein Alkalinity	ND	mg/L
AWPF-UVAOP-EFF	8/24/2023	SM 2320B		Phenolphthalein Alkalinity	ND	mg/L
AWPF-UVAOP-EFF	7/20/2023	515.4	2/1/1918	Picloram	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	99-87-6	p-Isopropyltoluene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	505	1336-36-3	Polychlorinated biphenyls, Total	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	1918-16-7	Propachlor	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	129-00-0	Pyrene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	8321B	121-82-4	RDX	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	135-98-8	sec-Butylbenzene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	200.8	7782-49-2	Selenium	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	200.8	7440-22-4	Silver	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	122-34-9	Simazine	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	100-42-5	Styrene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	994-05-8	Tert-amyl methyl ether	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	637-92-3	Tert-butyl ethyl ether	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	98-06-6	tert-Butylbenzene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	127-18-4	Tetrachloroethene (PCE)	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	200.8	7440-28-0	Thallium	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	28249-77-6	Thiobencarb	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	8321B	118-96-7	TNT	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	108-88-3	Toluene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	505	8001-35-2	Toxaphene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	156-60-5	trans-1,2-Dichloroethylene	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	10061-02-6	trans-1,3-Dichloropropene	ND	ug/L

Appendix B: UV/AOP Effluent

Client Sample ID	Collection Date	Analysis Method	CAS	Analyte	Result	Unit
AWPF-UVAOP-EFF	7/20/2023	525.2	39765-80-5	trans-Nonachlor	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	79-01-6	Trichloroethylene (TCE)	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	75-69-4	Trichlorofluoromethane (Freon 11)	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	76-13-1	Trichlorotrifluoroethane	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	525.2	1582-09-8	Trifluralin	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	200.8	7440-61-1	Uranium	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	200.8	7440-61-1	Uranium	ND	pCi/L
AWPF-UVAOP-EFF	7/20/2023	200.8	7440-62-2	Vanadium	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	524.2	75-01-4	Vinyl Chloride (VC)	ND	ug/L
AWPF-UVAOP-EFF	7/20/2023	200.8	7440-66-6	Zinc	ND	ug/L