



**Water and Power Authority  
St. Croix, USVI**

**Lead in Drinking Water  
Sequential Sampling Study Report**



December 2023

# Contents

<b>EXECUTIVE SUMMARY</b> .....	2
<b>BACKGROUND</b> .....	3
Lead and Copper Rule .....	4
Iron .....	5
<b>SEQUENTIAL SAMPLING</b> .....	5
Sequential Sampling Procedure .....	6
<b>RESULTS</b> .....	7
Sample Site #1 .....	7
Sample Site #2 .....	8
Sample Site #3 .....	8
Sample Site #4 .....	9
Sample Site #5 .....	10
Sample Site #6 .....	10
Sample Site #7 .....	11
Sample Site #8 .....	12
Sample Site #9 .....	12
Sample Site #10 .....	13
Sample Site #11 .....	14
<b>CONCLUSIONS</b> .....	15
Source of Lead .....	15
Sequential Sampling Results Interpretation .....	15
<b>RECOMMENDATIONS</b> .....	16
For Residents .....	16
For WAPA and DPNR .....	18
<b>APPENDICES</b> .....	19
Appendix A: Sequential sampling QAPP, protocol and residential outreach flyer.	
Appendix B: Data report for sequential sampling study.	

## EXECUTIVE SUMMARY

In September 2023, the US Virgin Islands Water and Power Authority (WAPA), led an effort to sample drinking water at distribution meters in St. Croix, USVI in coordination with the US Virgin Islands Department of Planning and Natural Resources (DPNR), the University of the Virgin Islands (UVI) and the Environmental Protection Agency Region 2 (EPA), to investigate complaints of increased incidents of red and brown water. While sampling at distribution meters is not consistent with the Safe Drinking Water Act (SDWA) Lead and Copper Rule (LCR) compliance sampling methods, and the sampling approach was not designed to target lead or copper, the distribution meter sampling identified very elevated levels of lead and copper that could potentially impact public health. Out of an abundance of caution, EPA recommended that residents not consume water from the WAPA distribution system until an investigation could be conducted to collect drinking water samples from household taps, and identify the likely source(s) of lead and ways to mitigate it.

In November 2023, EPA led an investigative sequential sampling effort in coordination with WAPA, DPNR and UVI, to collect water samples from household taps at a subset of the homes served by the distribution meters sampled in September 2023 where elevated lead and copper levels were detected, and that regularly use WAPA water. The sequential sampling data indicates that there are sources of lead in the premise plumbing and around the water distribution meters, including brass connections. Actions should be taken to address the lead to prevent exposure. However, the high levels of lead found during the distribution meter sampling are likely not reaching household taps.

Based on EPA's review of water quality data provided by the Seven Seas facility, WAPA and DPNR, the finished drinking water from WAPA's Richmond storage tank<sup>1</sup> is not a source of elevated lead and/or copper levels prior to entering the distribution system. However, the finished water is corrosive per the chloride, sulfate, conductivity and pH data, and EPA has concluded that the corrosivity of the finished drinking water from the WAPA Richmond storage tank is causing lead to leach from lead-containing plumbing components. Longer periods of water stagnation (i.e., more than 6 hours), and the high levels of iron in the water system can contribute to increased levels of lead in the water. Low water pressure and unoptimized corrosion control treatment are also contributing factors.

It is important to note that while there is no safe level of lead exposure, lead contamination of drinking water can result from corrosion of the leaded plumbing materials. As a result, EPA established a treatment technique-based action level of 15 ppb for lead under the Lead and Copper Rule (LCR) rather than a maximum contaminant level (MCL). The lead action level is a measure of the effectiveness of the corrosion control treatment in the water system. The action level is not a health-based standard for establishing a safe level of lead in a home.

EPA recommends that before the "do not drink" recommendation is lifted for WAPA customers, that WAPA develop and implement an outreach/education campaign so that customers know how to take steps to protect themselves from lead exposure (e.g., cleaning aerators, flushing water at the tap, and replacing internal household plumbing fixtures). WAPA, and DPNR as the SDWA primacy agency, should concurrently take other actions including, but not limited to,

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<sup>1</sup> The Seven Seas facility pumps seawater treated via reverse osmosis to the WAPA Richmond storage tank where chlorine and corrosion control treatment are added, prior to the water being pumped into the WAPA distribution system.

- 1) assessing and optimizing corrosion control treatment and designating optimal water quality parameters;
- 2) returning to standard monitoring under the LCR (e.g., conducting broader and more frequent sampling);
- 3) replacing lead-containing plumbing components and connections owned by WAPA; and
- 4) developing and implementing a low-flow flushing program to flush water mains.

These recommendations are consistent with recommendations for other water systems in similar situations nationwide.

## BACKGROUND

The WAPA public water system on St. Croix treats up to 3 million gallons of potable water per day. Since 2012, WAPA has been under a long-term agreement with Seven Seas Water Corporation to produce drinking water using reverse osmosis. The Seven Seas facility treats seawater by reverse osmosis and then pumps the water to the WAPA Richmond storage tank where chlorine and corrosion control treatment, a poly/ortho-phosphate blend, are added prior to the finished water entering the distribution system. The distribution is primarily gravity-fed, flowing east to west.

WAPA supplies drinking water to approximately 35-40% of the population on the island of St. Croix. WAPA's distribution system on St. Croix consists of 170 miles of interconnected piping of varying age, size, and materials. A large portion of the distribution system is over 60 years old and has deteriorating infrastructure, the majority of which consists of ductile iron pipe. In August 2023, WAPA's potable water was impacted by sargassum, odors and increased discoloration of red and brown tints resulting from water being shut off and on for rehabilitation projects and a reduced flushing schedule due to drought conditions.

WAPA developed a sampling plan to determine the source and chemistry of red and brown water in September 2023, following complaints from customers about the discolored water. WAPA, DPNR and UVI, along with EPA's support, conducted sampling on September 28-29, 2023. Two sampling teams collected samples at 66 locations across St. Croix, primarily at distribution meters, with a focus on areas where red and brown water complaints originated. To collect the water samples, the subsurface meter box was opened, the WAPA shut-off valves were closed, the meters were removed and brass fittings and a brass hose bib type faucet (sample collection apparatus) were attached to the threaded connection where the meter was located. After the hose bib faucet was installed, the WAPA valve was opened and two samples were collected. The first was either a first draw or a sample collected after a one-minute flush. The second was a 3- to 5-minute flush sample. The WAPA valve was then closed, the sampling collection apparatus was removed, the distribution meter was reattached and the valves were re-opened. The difference in when and how the first and second samples were collected was the result of inconsistent practices between the two separate sampling teams.

UVI conducted the microbiological analysis (total coliform, *E. coli*) of the samples. WAPA conducted microbiological analysis (coliform and *E. coli*) as well as field analysis of secondary drinking water analytes (pH, conductivity, turbidity, chlorine residual, phosphate and iron). The EPA Region 2 laboratory in Edison, NJ conducted the primary drinking water metals analysis (lead, copper, antimony, arsenic, barium, beryllium, cadmium, chromium, mercury and selenium).

The sample results from WAPA confirmed high levels of iron, which is the primary cause of the red and brown water. The sample results from EPA's laboratory indicated very elevated levels of lead and copper in samples collected at 36 of the 66 locations. Lead concentrations in the "first" samples at these 36 locations exceeded EPA's 15 ppb lead action level, with results ranging between 16 ppb to over 20,000 ppb. Fifteen (15) of the first samples also exceeded EPA's copper action level of 1,300 ppb, with results ranging between 1,320 and 137,000 ppb. Lead concentrations fell below EPA's 15 ppb action level in all but two of the "second" samples (i.e., after a 3 to 5-minute flush). There were no copper concentrations above the action level in any of the flush samples.

EPA received the final laboratory metals analysis of samples indicating elevated lead and copper levels on October 12, 2023. EPA notified WAPA and DPNR on October 13, 2023 of the exceedances. Per the Water Infrastructure Improvements for the Nation (WIIN) Act requirements under Section 1414 (c) of the SDWA, EPA, primacy agencies and public water systems are required to notify and provide information to homes and communities once EPA receives drinking water data that indicates a household has drinking water levels above EPA's lead action level. WAPA issued a broad notification to its customers on October 14, 2023, and reported to EPA that they had notified specific affected residents the following week.

WAPA began flushing their distribution system in the neighborhoods where elevated lead and copper levels were detected. After revising their September sampling protocol to specify first draw and 10 to 15-minute flush samples be collected following flushing and a stagnation period of 8 to 18 hours, WAPA and DPNR, with EPA oversight, resampled for lead and copper at 37 distribution meters on October 21, 2023. All 37 first draw samples from the October 21<sup>st</sup> sampling had lead concentrations above the lead action level, ranging between 18 ppb and 1,600 ppb. Six (6) first draw samples had copper concentrations above the copper action level, ranging between 1,400 ppb and 6,000 ppb. None of the flush samples had concentrations above the lead or copper action levels.

While sampling at distribution meters is not consistent with SDWA LCR compliance sampling methods, and the initial purpose of the sampling was not designed to target lead or copper, the distribution meter sampling identified very elevated levels of lead and copper that could potentially impact public health. Out of an abundance of caution, EPA recommended that residents not consume water from the WAPA distribution system until an investigation could be conducted to collect drinking water samples from household taps, and identify the potential source(s) of lead and ways to mitigate it.

## Lead and Copper Rule

The LCR establishes a treatment technique-based action level (AL) for lead at 0.015 mg/L (15 ug/L or 15 ppb), and an action level for copper at 1.3 mg/L (1,300 ug/L or 1,300 ppb). The LCR requires systems to monitor drinking water at customer taps; the number of monitoring sites depends on the size of the system (i.e., number of people served). If lead and/or copper concentrations exceed their action level in more than 10% of customer taps sampled, the system must undertake additional actions to control corrosion. If the action level for lead is exceeded, the system must also inform the public about steps they should take to protect their health and may have to replace lead service lines under their control.

WAPA is subject to the LCR and must submit a report confirming compliance to DPNR. WAPA collects 30 compliance samples on a reduced monitoring (triennial) schedule for the LCR. WAPA did not exceed the LCR action level for the most recent round of sampling conducted in September 2023.

Prior to 2012, WAPA used desalination to treat seawater. WAPA did not re-assess their corrosion control treatment or designate optimal water quality parameters when they transitioned from desalination to reverse osmosis.

There are no known lead service lines in the WAPA distribution system, though a lead service line inventory has not been conducted yet. There are, however, lead-containing plumbing components such as brass valves, curb stops, fixtures and other components (e.g., connecting service lines to mains and to distribution meters).

## Iron

EPA established National Secondary Drinking Water Regulations (NSDWRs) that set non-mandatory water quality standards for 15 contaminants, including iron. EPA does not enforce these "secondary maximum contaminant levels" (SMCLs), nor are these contaminants considered to present a risk to human health at the SMCL. SMCLs are set to give public water systems guidance on removing these chemicals to levels that are below what most people will find to be noticeable and to assist public water systems in managing their drinking water for aesthetic considerations, such as taste, color, and odor. If these contaminants are present in drinking water at levels above their SMCLs, the contaminants may cause the water to appear cloudy or colored, or to taste or smell bad. This may cause people to stop using water from their public water system even though the water is safe to drink. The SMCL for iron is 300 ppb.

Water that is corrosive to iron can cause damage to water system equipment, including but not limited to distribution system pipes which can corrode to the point of failure (either by a broken pipe or restricted water flow). The presence of excess iron in the drinking water can also cause reduced effectiveness of treatment for other contaminants.<sup>2</sup>

## SEQUENTIAL SAMPLING

Sequential sampling, also referred to as profile sampling, is an investigative and comprehensive water sampling protocol which uses successive water samples of established volumes to apportion lead sources in water. Sequential sampling is based on the relationship between a water "sample" of a specific volume and the volume of water associated with the "distance" of the plumbing, depending on the pipe diameter (internal volume). The samples together create a lead profile of the plumbing from the sampled faucet all the way to the water main. The intent of sequential sampling is to identify and compare the relative lead contribution of different plumbing materials which may be sources of lead in water, including brass fixtures.

To determine the source(s) of lead in the WAPA distribution system, EPA identified private homes as potential candidates for sequential sampling that 1) were one of the 36<sup>3</sup> homes where elevated lead levels were detected at the distribution meters during the October 21, 2023 sampling event; and 2) regularly used WAPA water a minimum of two out of the most recent 4 months (between June/July and

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<sup>2</sup> <https://www.epa.gov/sdwa/secondary-drinking-water-standards-guidance-nuisance-chemicals>

<sup>3</sup> Although 37 distribution meters were sampled on October 21, 2023, WAPA reported to EPA that they excavated the service line of the location with the highest lead and copper levels on November 3, 2023 and replaced lead-containing components. As a result, only 36 homes were potential sequential sample site locations.

October) based on WAPA water consumption records. Using these criteria, 13 of the 36 homes were identified as potential sequential sampling locations.

USVI began outreach to residents in the 13 homes beginning on October 30, 2023, to collect preliminary information about their water use (e.g., confirm use of WAPA water from the distribution system) and infrastructure, and gauge their interest in participating in the sequential sampling study. On November 1- 4, 2023, EPA, WAPA and DPNR visited each of the homes to conduct a linear pipe measurement survey to estimate the length and diameter of the service line and interior plumbing to determine the water volume needed to perform sequential sampling. WAPA and DPNR representatives led the team to each of the homes, located the water distribution meter, and confirmed the location of the water main.

A walk-through of the water line started from the water main to the water distribution meter, followed by the plumbing to the home, then to the kitchen faucet. Observations were made of the material of the water distribution meter, the inlet and the outlet of the meter, and the diameter of the service connection. Measurements were taken of the distance between the water main and the water distribution meter, the meter and the home, and the home<sup>4</sup> and the kitchen faucet. If the homeowner was not present, the distance from the home to the kitchen faucet was estimated.

During the survey, EPA also communicated with the residents to confirm their contact information (e.g., names, phone numbers). The residents were given a flyer with contact names and numbers to schedule their sequential sampling appointment, and instructions about how to prepare for a sequential sampling event. If a resident was absent, the flyer was left at their home.

Eleven (11) of the 13 homes were found to be eligible and agreed to participate in the sequential sampling study.

## Sequential Sampling Procedure

Sequential sampling occurred between November 7-9, 2023. EPA led the single-sampling team, which included participants from WAPA and DPNR. The targeted sample volume for each home was determined based on the measurements collected during the linear pipe measurement survey conducted November 1-4, 2023. The 11 homes participating in the sequential sampling study were instructed to stagnate their water for a minimum of 6 hours prior to their sampling visit.

Certified High-Density Polyethylene (HDPE) bottles were pre-labeled and numbered using standardized nomenclature (FRB- Field Reagent Blank, Sample "SS01" first, Sample "SS02" second, etc.) prior to entry into a home. A field reagent blank sample was collected each day. The first two samples in each home were 125 milliliters (mL) to isolate the contributions from the faucet and different short sections of household, or premise, plumbing. The remaining samples were each 1 liter (L). A 1 L sample corresponds to approximately 20 feet of pipe. Larger samples are often collected because as the plumbing moves away from the faucet it typically becomes more uniform, depending on the location.

Prior to sample collection, water usage within a home and the stagnation period were confirmed with the resident. The condition of the kitchen faucet and underlying fixtures and components were documented. Residents advised the sampling team on the direction of hot/cold handles to ensure cold

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<sup>4</sup> "Home" refers to the home's external service line entry point (actual or approximate, depending on the location).



water was sampled. Sample bottles (two 125-ml, and the 1-L bottles) were placed near the kitchen faucet in sequential order (e.g., SS01, SS02, SS03.... SS08, etc.). The “SS01” bottle was placed under the kitchen faucet, opening the cold water slowly to fill the first two 125-ml sample bottles. While the first bottle was being filled, the next bottle (SS02) was moved under the faucet quickly. Samples were collected without shutting off the water in between bottles and minimizing spillage between samples. Once the first two samples were collected, the flow was increased (maximum flow) to collect the 1-L bottle “SS03” and continued for the following 1-L sample bottles. The sample date and time were recorded on the EPA Chain-of-Custody Form. Electrical tape was wrapped around the sample lids to the sample bottles to prevent the lid from coming loose during shipment. The samples were placed inside the cooler with double bags and sealed. The cooler was wrapped with strapping tape and shipped via United Parcel Services (UPS) to the U.S. EPA Region 2 Laboratory in Edison, New Jersey for analysis.

It should be noted that EPA’s Office of Research and Development (ORD) attended the sequential sampling event to collect particle samples from 10 of the 11 homes’ faucet aerators. Once all the sequential sampling bottles were collected at a home ORD would remove the faucet aerator and collect any particles present. The results of that study will be shared in a separate report.

## RESULTS

Of the 119 sequential samples collected at the 11 homes, three samples at three different homes<sup>5</sup> had lead concentrations above the EPA’s 15 ppb lead action level. Two of those samples were from the first draw close to the household tap (28.8 ppb and 18.4 ppb lead); the third was from water closer to the distribution meter (23.2 ppb lead). The two first-draw results of water closest to the tap indicate the lead is likely from the plumbing within the faucet or aerator. The third result from water closer to the distribution meter indicates the lead is likely from the plumbing components around the distribution meter.

### Sample Site #1

The first of 11 homes was sampled on November 7, 2023 after a 12.5 hour stagnation period. During the linear pipe measurement survey, brass piping was observed connecting the main to the meter, and PVC piping was observed from the meter to the home and the home to the household tap. Samples were collected from the kitchen faucet of the home. A total of 9 samples were collected, along with a field reagent blank since this was the first sampling location on the first day of sampling. The first two samples were collected in 250 mL bottles (but were only 125 mL in volume) per the QAPP addendum in the Appendix of this report. No lead or copper concentrations above the action levels were detected at this location. The highest lead concentration was observed in the very first sample (13.9 ppb), indicating the faucet and plumbing immediately around the faucet are likely contributing lead to drinking water. The iron SMCL was exceeded in the third sample (469 ppb).

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<sup>5</sup> WAPA notified the 3 homes with elevated lead levels by mail per the WIIN Act requirements.



**Table 1: Sample Site #1 Lead, Copper and Iron Results (ug/L or ppb)**

Sample ID/Lab ID	Sample Volume (mL)	Lead (Pb)	Copper (Cu)	Iron (Fe)
SS01-Grab/2311021-02	125	13.9	135	269
SS02-Grab/2311021-03	125	5.76	41.5	132
SS03-Grab/2311021-04	1000	10.9	89.4	<b>469</b>
SS04-Grab/2311021-05	1000	4.56	56.3	183
SS05-Grab/2311021-06	1000	2.44	28.5	149
SS06-Grab/2311021-07	1000	1.83	23.9	126
SS07-Grab/2311021-08	1000	1.71	16.3	121
SS08-Grab/2311021-09	1000	1.34	14.5	120
SS09-Grab/2311021-10	1000	2.88	28.3	108

### Sample Site #2

The second of 11 homes was also sampled on November 7, 2023 after a 22 hour stagnation period. During the linear pipe measurement survey, brass piping was observed connecting the main to the meter, and PVC piping was observed from the meter to the home and the home to the household tap. Corrosion was observed on the brass pipe connection under the kitchen sink. Samples were collected from the kitchen faucet of the home. A total of 10 samples were collected. The first two samples were collected in 250 mL bottles (but were only 125 mL in volume) per the QAPP addendum in the Appendix of this report. No lead or copper concentrations above the action levels were detected at this location.

**Table 2: Sample Site #2 Lead, Copper and Iron Results (ug/L or ppb)**

Sample ID/Lab ID	Sample Volume (mL)	Lead (Pb)*	Copper (Cu)	Iron (Fe)
SS01-Grab/2311021-11	125	4.55	21.4	180
SS02-Grab/2311021-12	125	1 U	4.11	80.6
SS03-Grab/2311021-13	1000	1 U	4.28	107
SS04-Grab/2311021-14	1000	1 U	5.58	141
SS05-Grab/2311021-15	1000	1 U	3.98	101
SS06-Grab/2311021-16	1000	1 U	3.51	85.4
SS07-Grab/2311021-17	1000	1 U	3.41	74.2
SS08-Grab/2311021-18	1000	1.07	3.37	54
SS09-Grab/2311021-19	1000	1 U	3.95	72.4
SS10-Grab/2311021-20	1000	1 U	4.27	99

\* U indicates the analyte was not detected at or above the Laboratory Reporting Limit. Number to the left of the "U" is the Laboratory Reporting Limit for that analyte.

### Sample Site #3

The third of 11 homes was the final sample site on November 7, 2023. At this sample site, the resident stated that they used WAPA water to wash their hands prior to the sampling team's arrival. As a result,

this sample site was potentially compromised. The data (i.e., the low copper concentrations in the first 7-8 samples), appear to support that the sample site was compromised.

During the linear pipe measurement survey, piping from the main to the meter was submerged under water, and PVC piping was observed from the meter to the home and the home to the household tap. Corrosion was observed from kitchen sink pipe. Samples were collected from the kitchen faucet of the home. A total of 10 samples were collected. The first two samples were collected in 250 mL bottles (but were only 125 mL in volume) per the QAPP addendum in the Appendix of this report. No lead or copper concentrations above the action levels were detected at this location.

**Table 3: Sample Site #3 Lead, Copper and Iron Results (ug/L or ppb)**

Sample ID/Lab ID	Sample Volume (mL)	Lead (Pb)*	Copper (Cu)	Iron (Fe)*
SS01-Grab/2311021-21	125	1 U	1 U	50 U
SS02-Grab/2311021-22	125	1 U	1 U	50 U
SS03-Grab/2311021-23	1000	1 U	1.08	50 U
SS04-Grab/2311021-24	1000	1 U	1.04	50 U
SS05-Grab/2311021-25	1000	1 U	1 U	50 U
SS06-Grab/2311021-26	1000	1 U	1.01	50 U
SS07-Grab/2311021-27	1000	1.6	2.71	50 U
SS08-Grab/2311021-28	1000	1 U	1.72	50 U
SS09-Grab/2311021-29	1000	1.15	3.89	51
SS10-Grab/2311021-30	1000	1 U	2.5	66.6

\* U indicates the analyte was not detected at or above the Laboratory Reporting Limit. Number to the left of the "U" is the Laboratory Reporting Limit for that analyte.

### Sample Site #4

The fourth of 11 homes was sampled on November 8, 2023 after a 6.5 hour stagnation period. During the linear pipe measurement survey, copper piping was observed connecting the main to the meter, and PVC piping was observed from the meter to the home and the home to the household tap. Samples were collected from the kitchen faucet of the home. Leaking was observed from the base of the kitchen sink, and the water was tinted brown. Water pressure dropped during sampling.

A total of 9 samples were collected, along with a field reagent blank since this was the first sampling location on the second day of sampling. The first two samples were collected in 250 mL bottles (but were only 125 mL in volume) per the QAPP addendum in the Appendix of this report. A lead concentration above the action level was detected in the first sample (28.8 ppb), indicating that the faucet and plumbing immediately around the faucet are likely contributing lead to drinking water. No copper concentration above the action level was detected at this location. The iron SMCL was exceeded in all 9 samples.

It is important to note that this sample site had an in-line sediment filter on the exterior of the home between the WAPA water line and the household tap that could not be removed. A leak (a small, persistent drip) was observed at a pipe connection immediately downstream of the filter.

**Table 4: Sample Site #4 Lead, Copper and Iron Results (ug/L or ppb)**

Sample ID/Lab ID	Sample Volume (mL)	Lead (Pb)*	Copper (Cu)	Iron (Fe)
SS01-Grab/2311021-32	125	<b>28.8</b>	147	<b>2710</b>
SS02-Grab/2311021-33	125	1 U	4.65	<b>425</b>
SS03-Grab/2311021-34	1000	1.39	8.09	<b>755</b>
SS04-Grab/2311021-35	1000	4.33	31.8	<b>1170</b>
SS05-Grab/2311021-36	1000	1 U	3.36	<b>508</b>
SS06-Grab/2311021-37	1000	1 U	3.87	<b>322</b>
SS07-Grab/2311021-38	1000	1 U	3.19	<b>537</b>
SS08-Grab/2311021-39	1000	1 U	2.59	<b>484</b>
SS09-Grab/2311021-40	1000	1 U	2.38	<b>443</b>

\* U indicates the analyte was not detected at or above the Laboratory Reporting Limit. Number to the left of the "U" is the Laboratory Reporting Limit for that analyte.

### Sample Site #5

The fifth of 11 homes was also sampled on November 8, 2023 after an 8 hour stagnation period. During the linear pipe measurement survey, brass piping was observed connecting the main to the meter, and PVC piping was observed from the meter to the home and the home to the household tap. Samples were collected from the kitchen faucet of the home. A total of 7 samples were collected. The first two samples were collected in 250 mL bottles (but were only 125 mL in volume) per the QAPP addendum in the Appendix of this report. No lead or copper concentrations above the action levels were detected at this location.

**Table 5: Sample Site #5 Lead, Copper and Iron Results (ug/L or ppb)**

Sample ID/Lab ID	Sample Volume (mL)	Lead (Pb)	Copper (Cu)	Iron (Fe)
SS01-Grab/2311021-41	125	2.26	9.21	52.4
SS02-Grab/2311021-42	125	1.56	5.68	63.6
SS03-Grab/2311021-43	1000	1.92	6.21	61.3
SS04-Grab/2311021-44	1000	1.53	5.73	63.8
SS05-Grab/2311021-45	1000	1.57	6.62	61.2
SS06-Grab/2311021-46	1000	1.88	8.35	62
SS07-Grab/2311021-47	1000	1.66	7.75	62.1

### Sample Site #6

The sixth of 11 homes was also sampled on November 8, 2023 after a stagnation period of approximately 12 hours. During the linear pipe measurement survey, brass piping was observed connecting the main to the meter, and PVC piping was observed from the meter to the home and the home to the household tap. Samples were collected from the kitchen faucet of the home. A total of 13 samples were collected. The first two samples were collected in 250 mL bottles (but were only 125 mL in volume) per the QAPP addendum in the Appendix of this report. No lead or copper concentrations

above the action levels were detected at this location. However, the iron SMCL was exceeded in the 7<sup>th</sup>, 11<sup>th</sup> and 12<sup>th</sup> samples (316 ppb, 326 ppb and 343 ppb, respectively).

**Table 6: Sample Site #6 Lead, Copper and Iron Results (ug/L or ppb)**

Sample ID/Lab ID	Sample Volume (mL)	Lead (Pb)*	Copper (Cu)	Iron (Fe)
SS01-Grab/2311021-48	125	1 U	7.31	260
SS02-Grab/2311021-49	125	1 U	5.12	260
SS03-Grab/2311021-51	1000	1 U	7.14	243
SS04-Grab/2311021-52	1000	1.9	8.11	268
SS05-Grab/2311021-53	1000	1 U	6.04	280
SS06-Grab/2311021-54	1000	1 U	5.45	295
SS07-Grab/2311021-55	1000	1 U	5.21	<b>316</b>
SS08-Grab/2311021-56	1000	1 U	8.04	289
SS09-Grab/2311021-57	1000	1.45	19.8	268
SS10-Grab/2311021-58	1000	1.04	12.2	290
SS11-Grab/2311021-59	1000	1 U	7.03	<b>326</b>
SS12-Grab/2311021-60	1000	1 U	6.83	<b>343</b>
SS13-Grab/2311021-61	1000	1.77	24.2	293

\* U indicates the analyte was not detected at or above the Laboratory Reporting Limit. Number to the left of the "U" is the Laboratory Reporting Limit for that analyte.

### Sample Site #7

The seventh of 11 homes was the final sample site on November 8, 2023 after a stagnation period of 11 hours. During the linear pipe measurement survey, brass piping was observed connecting the main to the meter, and PVC piping was observed from the meter to the home and the home to the household tap. Samples were collected from the kitchen faucet of the home. A total of 8 samples were collected. The first two samples were collected in 250 mL bottles (but were only 125 mL in volume) per the QAPP addendum in the Appendix of this report. A lead concentration above the action level was detected in the first sample (18.4 ppb), indicating that the faucet and plumbing immediately around the faucet are likely contributing lead to drinking water. There is also a slight increase in lead concentration in the last sample (9.64 ppb), potentially indicating the presence of leaded brass components around the water meter. No copper concentrations above the action level were detected at this location.

**Table 7: Sample Site #7 Lead, Copper and Iron Results (ug/L or ppb)**

Sample ID/Lab ID	Sample Volume (mL)	Lead (Pb)*	Copper (Cu)	Iron (Fe)
SS01-Grab/2311021-62	125	<b>18.4</b>	77.1	96.7
SS02-Grab/2311021-63	125	6.73	107	110
SS03-Grab/2311021-64	1000	8.02	50.5	155
SS04-Grab/2311021-65	1000	5.03	36.9	235
SS05-Grab/2311021-66	1000	5.02	29.8	181
SS06-Grab/2311021-67	1000	3.14	24.4	147
SS07-Grab/2311021-68	1000	2.88	23.4	154

SS08-Grab/2311021-69	1000	9.64	23.8	148
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### Sample Site #8

The eighth of 11 homes was sampled on November 9, 2023 after a stagnation period of about 12 hours. During the linear pipe measurement survey, brass piping was observed connecting the main to the meter, and PVC piping was observed from the meter to the home and the home to the household tap. Samples were collected from the kitchen faucet of the home. Corrosion was observed on the valve of the kitchen sink. A total of 9 samples were collected, along with a field reagent blank since this was the first sampling location on the third day of sampling. The first two samples were collected in 250 mL bottles (but were only 125 mL in volume) per the QAPP addendum in the Appendix of this report. No lead or copper concentrations above the action levels were detected at this location.

**Table 8: Sample Site #8 Lead, Copper and Iron Results (ug/L or ppb)**

Sample ID/Lab ID	Sample Volume (mL)	Lead (Pb)*	Copper (Cu)	Iron (Fe)*
SS01-Grab/2311039-02	125	3.4	87.9	50 U
SS02-Grab/2311039-03	125	1.37	179	50 U
SS03-Grab/2311039-04	1000	1.7	240	50 U
SS04-Grab/2311039-05	1000	1.32	420	50 U
SS05-Grab/2311039-06	1000	1 U	465	50 U
SS06-Grab/2311039-07	1000	1 U	793	50 U
SS07-Grab/2311039-08	1000	1 U	637	50 U
SS08-Grab/2311039-09	1000	1 U	993	50 U
SS09-Grab/2311039-10	1000	1 U	60.3	50 U

\* U indicates the analyte was not detected at or above the Laboratory Reporting Limit. Number to the left of the "U" is the Laboratory Reporting Limit for that analyte.

### Sample Site #9

The ninth of 11 homes was also sampled on November 9, 2023 after a stagnation period of approximately 4 days (96 hours). During the linear pipe measurement survey, brass piping was observed connecting the main to the meter, and PVC piping was observed from the meter to the home and the home to the household tap. Samples were collected from the kitchen faucet of the home. Periods of brown water were observed. A total of 16 samples were collected. The first two samples were collected in 250 mL bottles (but were only 125 mL in volume) per the QAPP addendum in the Appendix of this report. A lead concentration above the action level was observed in the 14th sample (23.2 ppb). The elevated lead concentrations between the 13<sup>th</sup> and 15<sup>th</sup> sample (12.6, 23.2, and 7.28 ppb) may be indicative of lead leaching from brass fixtures/fittings around the meter location. No copper concentrations above the action level were detected at this location. The iron SMCL was exceeded in the 13<sup>th</sup>-16<sup>th</sup> samples (2,620 ppb, 5,750 ppb, 1,510 ppb and 466 ppb, respectively).

It is important to note that the resident was confused with the direction of the hot and cold-water handle. The sampling team reported that water samples felt warm to the touch and hot water was likely sampled (home had a tankless hot water heater).

**Table 9: Sample Site #9 Lead, Copper and Iron Results (ug/L or ppb)**

Sample ID/Lab ID	Sample Volume (mL)	Lead (Pb)*	Copper (Cu)	Iron (Fe)*
SS01-Grab/2311039-11	125	1.04	124	50 U
SS02-Grab/2311039-12	125	2.34	51	58.6
SS03-Grab/2311039-13	1000	1 U	98.5	51.6
SS04-Grab/2311039-14	1000	2.96	315	110
SS05-Grab/2311039-15	1000	4.35	185	117
SS06-Grab/2311039-16	1000	2.53	113	105
SS07-Grab/2311039-17	1000	1.64	103	70.5
SS08-Grab/2311039-18	1000	1.74	115	79.7
SS09-Grab/2311039-19	1000	1.8	128	125
SS10-Grab/2311039-20	1000	1.53	86.8	141
SS11-Grab/2311039-21	1000	1.16	64.7	96.5
SS12-Grab/2311039-22	1000	1.11	69.2	81.4
SS13-Grab/2311039-23	1000	12.6	432	<b>2620</b>
SS14-Grab/2311039-24	1000	<b>23.2</b>	950	<b>5750</b>
SS15-Grab/2311039-25	1000	7.28	251	<b>1510</b>
SS16-Grab/2311039-26	1000	2.49	107	<b>466</b>

\* U indicates the analyte was not detected at or above the Laboratory Reporting Limit. Number to the left of the "U" is the Laboratory Reporting Limit for that analyte.

### Sample Site #10

The tenth of 11 homes was also sampled on November 9, 2023 after a 14 hour stagnation period. During the linear pipe measurement survey, brass piping was observed connecting the main to the meter, and PVC piping was observed from the meter to the home and the home to the household tap. Samples were collected from the kitchen faucet of the home. Water was observed to be lightly brown. A total of 13 samples were collected. The first two samples were collected in 250 mL bottles (but were only 125 mL in volume) per the QAPP addendum in the Appendix of this report. No lead or copper concentrations above the action levels were detected at this location. However, the iron SMCL was exceeded in all but the 9th sample.

**Table 10: Sample Site #10 Lead, Copper and Iron Results (ug/L or ppb)**

Sample ID/Lab ID	Sample Volume (mL)	Lead (Pb)*	Copper (Cu)	Iron (Fe)
SS01-Grab/2311039-27	125	2.89	3.64	<b>301</b>
SS02-Grab/2311039-28	125	1.57	3.37	<b>310</b>
SS03-Grab/2311039-29	1000	1.54	3.6	<b>431</b>
SS04-Grab/2311039-30	1000	1 U	2.88	<b>339</b>
SS05-Grab/2311039-31	1000	1 U	2.62	<b>315</b>
SS06-Grab/2311039-32	1000	1 U	2.77	<b>327</b>
SS07-Grab/2311039-33	1000	1 U	3.03	<b>386</b>
SS08-Grab/2311039-34	1000	1 U	2.74	<b>321</b>
SS09-Grab/2311039-35	1000	1 U	2.51	287

SS10-Grab/2311039-36	1000	1 U	2.48	<b>314</b>
SS11-Grab/2311039-37	1000	1 U	2.19	<b>325</b>
SS12-Grab/2311039-38	1000	1 U	2.6	<b>424</b>
SS13-Grab/2311039-39	1000	1 U	2.67	<b>398</b>

\* U indicates the analyte was not detected at or above the Laboratory Reporting Limit. Number to the left of the "U" is the Laboratory Reporting Limit for that analyte.

### Sample Site #11

The eleventh and final home was also sampled on November 9, 2023 after a 9 hour stagnation period. During the linear pipe measurement survey, brass piping was observed connecting the main to the meter, and PVC piping was observed from the meter to the home and the home to the household tap. Samples were collected from the kitchen faucet of the home. Brown water was observed. A total of 15 samples were collected. The first two samples were collected in 250 mL bottles (but were only 125 mL in volume) per the QAPP addendum in the Appendix of this report. No lead or copper concentrations above the action levels were detected at this location. However, the iron SMCL was exceeded in all but the second sample.

**Table 11: Sample Site #11 Lead, Copper and Iron Results (ug/L or ppb)**

Sample ID/Lab ID	Sample Volume (mL)	Lead (Pb)	Copper (Cu)	Iron (Fe)
SS01-Grab/2311039-40	125	3.35	26.9	<b>327</b>
SS02-Grab/2311039-41	125	1.28	8.36	283
SS03-Grab/2311039-42	1000	1.76	12.6	<b>381</b>
SS04-Grab/2311039-43	1000	2.11	14.5	<b>478</b>
SS05-Grab/2311039-44	1000	2.56	20.9	<b>627</b>
SS06-Grab/2311039-45	1000	2.42	21.9	<b>577</b>
SS07-Grab/2311039-46	1000	2.26	19	<b>533</b>
SS08-Grab/2311039-47	1000	2.47	21.9	<b>709</b>
SS09-Grab/2311039-48	1000	2.06	18.8	<b>528</b>
SS10-Grab/2311039-49	1000	2.11	19.7	<b>657</b>
SS11-Grab/2311039-50	1000	2.24	22.8	<b>889</b>
SS12-Grab/2311039-51	1000	2.16	21.7	<b>742</b>
SS13-Grab/2311039-52	1000	2.47	23.1	<b>923</b>
SS14-Grab/2311039-53	1000	3.81	30.7	<b>1090</b>
SS15-Grab/2311039-54	1000	4.87	26.9	<b>782</b>



## CONCLUSIONS

### Source of Lead

EPA has analyzed i) the sequential sampling data; ii) WAPA water quality data (both for the Richmond storage tank finished water and from the September and October sampling events); and iii) service line inventory information collected by WAPA after excavating service lines following the September and October sampling events. EPA has also discussed WAPA's treatment process and distribution system in detail with WAPA and DPNR. Based on our understanding of this information, EPA concludes that the primary source of lead in the WAPA distribution system are the various lead-containing brass plumbing components.

The corrosivity of the finished water from WAPA's Richmond storage tank (e.g., high pH, low alkalinity, high chloride and low sulfate), the lack of optimized corrosion control treatment and the unique circumstances WAPA has, and is currently facing, are causing lead to leach from these brass components, particularly when the water is stagnant for more than approximately 6 hours.

The unique circumstances WAPA is facing refers primarily to conditions that result in the water being stagnant for extended periods of time (i.e., more than approximately 6 hours). Water is an expensive commodity on St. Croix, and the recent drought conditions have reduced the frequency of WAPA flushing its distribution system. Some areas of the island served by WAPA regularly experience low water pressure, which may be a result of uncovered storage tanks.

Finally, most homes in St. Croix have a household rainwater catchment system and cistern. While several homes also have a connection to WAPA water, the homes may utilize their cistern water, versus the more expensive WAPA water, when feasible. As a result, WAPA water may sit stagnant for as long as several months before a resident uses it. These issues can increase the contact time between the WAPA water and brass components, leading to more lead leaching into the water.

These issues are aggravated by the high levels of iron found in the distribution system, the source of which is aging iron ductile water mains. The corrosive water causes the leaching of iron from the plumbing materials (i.e., ductile iron pipe) that then impacts water quality. High levels of iron in the water and on the pipe walls can react with phosphate, which could otherwise react with lead. Iron can also sorb lead, particularly after a long stagnation, as well as react with chlorine. Low phosphate levels, and low chlorine residual, were observed by EPA and DPNR in areas of the distribution system downstream of the treatment facilities.

### Sequential Sampling Results Interpretation

The results of the sequential sampling study demonstrate that there are sources of lead in the premise plumbing and around the WAPA distribution meters. The two first draw samples with lead concentrations above the action level at Sample Sites #4 and #7 of 28.8 ppb and 18.4 ppb, respectively, indicate the source of the lead is primarily the household plumbing, faucet and/or aerator. The iron SMCL was exceeded in all samples at Sample Site #4, and none of the samples at Sample Site #7.

The third lead concentration above the action level at Sample Site #9 occurred in the 14<sup>th</sup> sample (23.2 ppb), around the water distribution meter and its associated brass plumbing components. This home had a stagnation period of approximately 4 days, and elevated levels of iron in almost all samples. These results indicate that if water is left stagnant for more than approximately 6 hours, the lead leaching from the brass plumbing components around the WAPA distribution meter may result in elevated lead levels at a household tap.

The data from the sequential sampling study also indicates that the levels of lead reaching household taps are not as high as the very elevated levels of lead observed during the September and October sampling events at distribution meters. Collecting drinking water samples at distribution meters is not typical, but the data from the sequential sampling study was needed to ensure public health protection.

Since sequential sampling was only conducted at homes where distribution meters were previously sampled, and the distribution meter sampling caused a disturbance to the homes' service lines, the lead levels observed in these 11 homes may be higher than homes where distribution meters were not sampled. Disturbance to service lines can cause lead-containing plumbing components and materials (e.g., scale inside pipes) to become unstable and thus increase lead levels in the water for a period of time. Since specific data demonstrating potentially lower lead levels is not available, and only 11 homes were sampled out of many more active WAPA customers<sup>6</sup> (i.e., the sample size was small), the WAPA customer-specific recommendations provided in the next section of this report should apply to the entire island to best protect public health.

## RECOMMENDATIONS

Based on the information provided in this report, the lead sources would need to be addressed through one or more mitigative measures, to reduce risk of exposure to lead in drinking water at the tap. Many of these recommendations would also be effective in reducing iron levels.

EPA recommends that before the "do not drink" recommendation is lifted for WAPA customers, that WAPA develop and implement an outreach/education campaign so that customers know how to take steps to protect themselves from lead exposure. WAPA, and DPNR as the SDWA primacy agency, should concurrently take other actions as described below.

### For Residents

1. Clean faucet aerators.

Many kitchen and bathroom taps have an aerator as part of the faucet assembly. Aerators serve to introduce air into the water flow and help with water conservation. Aerators are not intended to remove inorganic contaminants; however, screens that are part of the aerator may trap particulate matter or debris within the faucet. These particulates can include lead-bearing particulate matter that can accumulate from the physical corrosion of lead-containing materials in household pipes or following a disturbance in the piping such as replacement of premise plumbing. Aerators should be regularly cleaned to remove particulate matter and prevent lead-bearing particulates from leaching lead into drinking water.

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<sup>6</sup> The sequential sampling study was not designed to be a statistically representative study.

## 2. Flush your water at tap prior to consuming water.

Before drinking, flush your home's pipes by running water at the tap. Flushing involves opening taps and letting the water run to remove water that has stagnated in pipes, faucets and/or fixtures. Flush a minimum volume of 250 mL for water that has been stagnant for approximately 6 hours. Flush until you reach water from the main when water that has been stagnant for more than approximately 6 hours. Residents can approximate 250 mL at their taps using a measuring cup or bottled-beverage container where a 250 mL (~8 oz) volume is indicated, by filling the container and dumping the water prior to consuming water from the tap.

The amount of time to flush water to the main will depend on the volume of water in the service line from the main to the tap. For a rough estimate of an appropriate flush volume, residents can measure the length of their service line from the water main to their kitchen faucet. The volume of water will depend on the diameter of the service line, typically 3/4-inch for a single-family home<sup>7</sup>. Calculate volume by multiplying the area of a cross-section of the pipe (i.e., the area of a circle) by the estimated length of the service line. Convert this number to gallons or liters and then use a container(s) of known size, (e.g., a milk gallon jug, a 1-liter soda bottle) and run the tap to fill the containers until the calculated flush volume is reached.

Flushing can also be used after disturbances caused by water main work, repairs and service line replacement activities. These disturbances can cause lead particulate release and scale disruption in pipes.

## 3. Filter your water to provide additional protection.

Point of use or pitcher water filters can be used, either alone or in combination with flushing, to reduce exposure in water used for drinking and cooking. Flushing your water prior to filtering can maximize the effectiveness of the filter and provide additional protection.

Research shows that properly operated NSF/ANSI- 53 filters certified to remove lead and NSF/ANSI-42 filters certified to remove particulate are very effective in reducing lead in drinking water. The particulate filters are also effective in reducing iron in water. Filters must be properly certified, installed, and operated and maintained to remove lead from drinking water.

## 4. Install lead-free premise plumbing.

Lead in drinking water may result from lead plumbing or a wide array of lead containing pipes, fittings and devices made of leaded brass/bronze alloys, like kitchen faucets or water fountains, water distribution meters, valves, elbows, or ferrules. Lead containing solder joining copper pipes can also contribute to lead in water. For example, older brass and solder that pre-date the 1986 Safe Drinking Water amendments that established requirements for "lead-free" plumbing materials, may contribute to lead exposure. As of 2011, the Safe Drinking Water Act (SDWA) established an updated definition for "lead free" as a weighted average of not more than 0.25 percent lead calculated across the wetted surfaces of a pipe, pipe fitting, plumbing fitting, and fixture and not containing more than 0.2 percent lead for solder and flux. When replacing your plumbing, ensure that the new plumbing materials comply with the current "lead free"<sup>8</sup> requirements and

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<sup>7</sup> Residents should contact WAPA for more specific information about the diameter of their service line, as well as the location of the water main relative to their home.

<sup>8</sup> <https://www.epa.gov/sdwa/use-lead-free-pipes-fittings-fixtures-solder-and-flux-drinking-water>

NSF/ANSI/CAN 61 certified plumbing components. This certification requires the products to comply with NSF/ANSI/CAN 372, the standard that incorporates the "lead free" requirement.

## For WAPA and DPNR

1. Develop and implement an outreach/education plan to inform WAPA customers about potential sources of lead in drinking water and how to mitigate exposure.

The plan should include outreach and education on how to flush effectively and on proper operations and maintenance of point of use filters. If WAPA provides filters, printed instructions should be provided to customers that receive a filter(s). The outreach/education plan can include print media, videos, flyers, television ads, etc.

2. Return to routine monitoring under the Lead and Copper Rule (LCR).

Return to routine monitoring and collect compliance samples from at least 60 sites for at least two 6-month periods in accordance with the LCR. As part of this effort, WAPA, with approval from DPNR, should conduct a review of the existing LCR compliance sample pool and update the sample site selections as needed.

3. Optimize corrosion control treatment in the water supply and designate optimal water quality parameters.

Conduct additional monitoring and/or studies to assess the current corrosion control treatment (CCT), adjust or update the existing CCT and designate optimal water quality parameters. Corrosion control treatment is added to water to prevent lead from leaching from plumbing components. Ensuring the corrosion control treatment is as effective as possible will help to reduce lead exposure. Returning to routine LCR compliance sampling will also help assess the effectiveness of the corrosion control treatment.

4. Develop and implement a low-flow flushing program to prevent long stagnation times in the water mains.

Develop a flushing program to remove stagnant water, reduce water age, and ensure that corrosion control treatment flows to all areas of the distribution system. The flushing program can focus on the whole distribution system or select areas of the system that have low water use, such as dead-end water mains. The flushing plan should be designed to achieve specific water quality goals. As this program is developed, flushing procedures and maps should be updated. WAPA customers should be informed about flushing activities.

Given that water stagnated for more than approximately 6 hours can contribute to increased levels of lead in the water (i.e., the water is in contact longer with plumbing components that may contain lead), developing a flushing program to keep water moving through mains should help reduce lead and iron levels.

5. Inspect and rehabilitate storage tanks.

Conduct internal inspections of storage tanks and rehabilitate all storage tanks as needed to improve pressure in the distribution system, remove sediment, and allow a more effective flushing program.

6. Continue to replace infrastructure with lead-free components.

Continue to implement infrastructure replacements including ductile iron distribution mains, brass corporation stops, curb stops, meters, and backflow devices from mains to residences. Ensure that all the replacement components meet the “lead free” definition. These infrastructure replacements will remove potential sources of lead and should reduce lead levels at the tap.

## APPENDICES

Appendix A: Sequential sampling QAPP, protocol and residential outreach flyer.

Appendix B: Data report for sequential sampling study.

Quality Assurance Project Plan (QAPP)  
For USEPA Region 2 LSASD

Sequential Drinking Water Sampling for Lead and Copper in the US Virgin Islands  
October 2023



Project Field Lead(s):	<b>THUAN TRAN</b> Digitally signed by THUAN TRAN Date: 2023.11.04 12:01:10 -04'00'	
	Thuan Tran, LSASD- MAB-MOS	Date
Project Manager:	<b>PHILIP COCUZZA</b> Digitally signed by PHILIP COCUZZA Date: 2023.11.04 03:40:01 -04'00'	
	Phil Cocuzza, Supervisor, LSASD-MAB-MOS	Date
QA Officer:	<b>CAROL LYNES</b> Digitally signed by CAROL LYNES Date: 2023.11.03 17:36:06 -04'00'	
	Carol Lynes, Branch Supervisor, LSASD-MAB	Date
Laboratory Manager:	<i>John Bourbon</i>	11/3/23
	John Bourbon, Director, LSASD-LB	Date
Drinking Water Program Office:	<i>Christine Ash</i>	11/3/23
	Christine Ash, Deputy Director WD	Date

Effective Date – last signature on page

## Table of Contents

3 Contact/Distribution List (A3)4.....	4
4 Project/Task Organization (A4).....	4
5 Program Definition/Background (A5) .....	5
5.1 Problem Definition.....	5
5.2 Background .....	6
6 Project/Task Description (A6) .....	6
7 Quality Objectives and Criteria for Measurement Data (A7) .....	7
7.1 Precision .....	7
7.2 Bias .....	7
7.3 Representativeness .....	7
7.4 Comparability.....	8
7.5 Completeness .....	8
7.6 Sensitivity .....	8
8 Special Training Needs/Certification (A8).....	8
9 Documents and Records (A9) .....	9
9.1 Document/Record Control .....	9
9.2 Document Storage .....	9
10 Sampling Process Design Requirements (B1) .....	9
10.1 Design of the sampling .....	9
10.2 Sampling locations and frequencies .....	10
11 Sampling Method (B2) .....	11
12 Sampling Handling & Custody (B3) .....	14
13 Analytical Methods (B4) .....	15
14 Analytical Quality Control (B5) .....	16
15 Testing, Inspection, Maintenance & Calibration Requirements .....	16
15.1 Instrument/Equipment Maintenance/Equipment Calibration and Frequency (B6, B6) .....	16
16 Data Management .....	16
16.1 Laboratory Data Management .....	16
16.2 Data Management Summary .....	16
17 Assessments & Response Actions (C1) .....	17
.....	
.....	



.....  
.....

18 Reports to Management (C2) .....	17
18.1 Sample Results .....	17
19 Data Review, Verification and Validation Methods (D1 and D2) .....	17

**Attachments**

Attachment 1 Chain of Custody

Attachment 2 USVI SEQUENTIAL SAMPLING RESIDENT QUESTIONNAIRE

Attachment 3 Sequential Sampling Flyer for Residents

Attachment 4 Faucet Aerator Particulate Collection After Sequential Water Sampling

**References**

1. Benton Harbor, MI - Filter Performance Screening and Assessment Study – Quality Assurance Project Plan. Revision Number: 0. November 5, 2021.
2. EPA Office of Research and Development - Center for Environmental Solutions and Emergency Response Water Infrastructure Division/Drinking Water Management Branch - Drinking Water Sampling Protocols for Benton Harbor Water Study. Version 2.5 12/10/21.

**Tables**

Table 1: Recipients of the Approved QAPP and Any Subsequent Revisions .....	4
Table 2: Project Timeframe .....	7
Table 3: Water Analysis Methods, Federal Maximum Contaminant Levels (MCLs) .....	16

**Figures**

Figure 1: Organizational Chart 6 .....	5
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### 3. Contact/Distribution List (A3)

The following reviewers will receive a copy of the QAPP and will be advised of and receive a copy of any subsequent revisions.

Table 1: Recipients of the approved QAPP and any subsequent revisions.

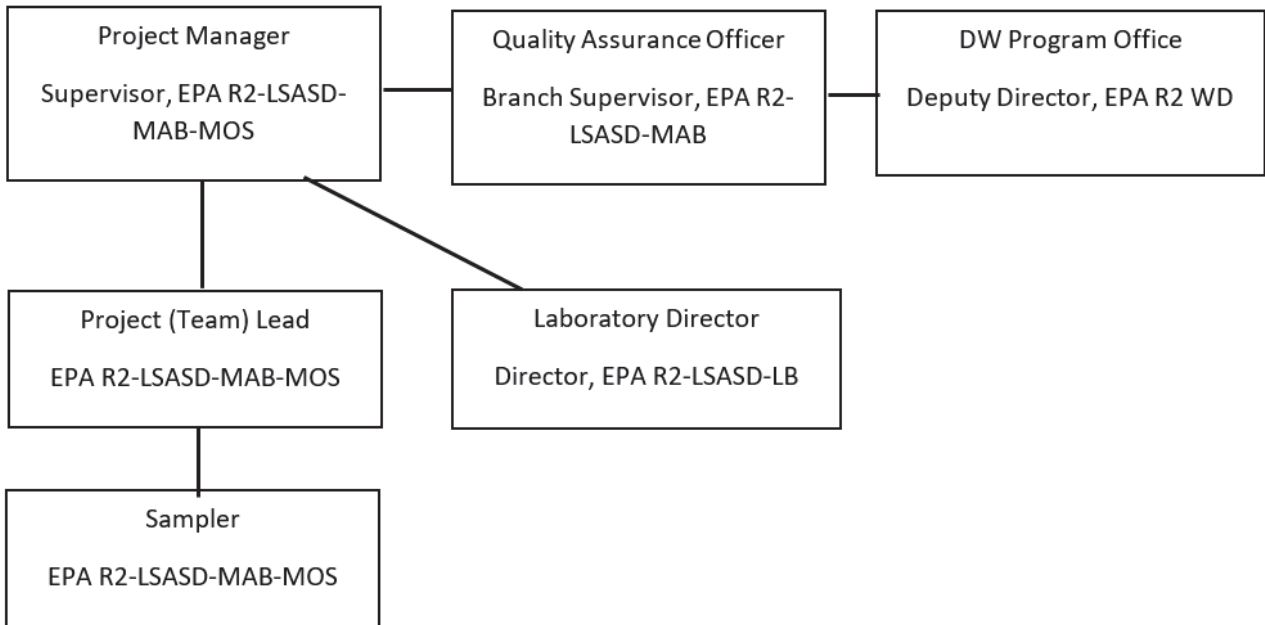
<u>Contact Name</u>	<u>Responsibility</u>	<u>Location</u>	<u>Phone</u>	<u>Email</u>
Thuan Tran	Project Lead	2890 Woodbridge Ave, Edison, NJ 08837	732-321-4455	Tran.Thuan@epa.gov
Phil Cocuzza	Project Manager	2890 Woodbridge Ave, Edison, NJ 08837	732-321-4478	<a href="mailto:cocuzza.phil@epa.gov">cocuzza.phil@epa.gov</a>
John Bourbon	R2 Laboratory Director	2890 Woodbridge Ave, Edison, NJ 08837	732-321-6706	<a href="mailto:bourbon.john@epa.gov">bourbon.john@epa.gov</a>
Carol Lynes	QA Officer	2890 Woodbridge Ave, Edison, NJ 08837	731-321-6760	<a href="mailto:lynes.carol@epa.gov">lynes.carol@epa.gov</a>
Christine Ash	DW Program Office	290 Broadway New York, NY 10007	212-637-4006	<a href="mailto:ash.christine@epa.gov">ash.christine@epa.gov</a>

### 4. Project/Task Organization (A4)

The duties of key individuals are as follows:

- **Project Leader(s) (PLs)** - Are responsible for the preparation and revisions to this Quality Assurance Project Plan (QAPP). The PL is responsible for project planning, procurement of supplies and equipment, oversight of sampling teams, documenting field activities, documenting deviations from the QAPP, Field Sampling Summary Report and Final Project Report.
- **Project Manager (PM)** - is responsible for general project coordination, oversight, and to maintain documents listed in the Reports to Management, Documentation, Records sections, under the Project Manager section.
- **R2 Laboratory Manager**- is responsible for supervising laboratory analyses to be performed in the USEPA Region 2 Laboratory (“Laboratory”). This includes oversight of all QA requirements in the Laboratory, including data review and qualification of the data. The Laboratory Manager is responsible for providing the analytical results, including the qualifiers in the Laboratory Data Report (“LDR”) for determining any limitations to the usability of the analytical data, and providing the LDR to the Project Manager.
- **The Quality Assurance Officer (QAO)** is responsible for reviewing and approving the QAPP and working with the project leaders to resolve any quality assurance issues that may arise during the project.
- **The Sampling Team staff** are responsible for ensuring that field activities are conducted in accordance with the QAPP and relevant SOPs or protocols (if any) and documenting any deviation from the QAPP, SOPs or Protocols.

Figure 1: Organizational Chart



## 5. Program Definition/Background (A5)

### 5.1 Problem Definition

This study is being undertaken to determine the extent and location of lead and copper contamination on the island of St. Croix within the VIWAPA distribution system, and any other contaminants of interest. Once the source or sources are determined, remediation options can be discussed for implementation. VIWAPA will be replacing its aging infrastructure with FEMA funding, but this may take decades to complete, an intermediate solution is being sought out. The resulting data will be shared with EPA experts, USVI territory and local governments, and VIWAPA. The maximum contaminant level goal (MCLG) for lead is 0 ppb. An action level (AL) of 0.015 mg/L for lead, and 1.3 mg/L for copper, based on 90<sup>th</sup> percentile level of tap water samples is in place under the federal Lead and Copper Rule. Exceeding these action levels requires a drinking water system take certain actions.

The initial round will be comprised of sequential sampling at the tap of up to 13 homes on St. Croix which were found to have elevated levels of lead and copper in the distribution line from previous conducted by VIWAPA and VIDPNR-DEP.

## 5.2 Background

The USVI territory has been dealing with “Red” drinking water on the islands of St. Thomas, St. John, and St. Croix. It is believed the main cause of this is aging infrastructure, which is predominantly comprised of ductile iron which has been rusting, resulting in secondary contamination. Previous sampling and studies have been done in St. Thomas, including an EPA report in 2017, resulting in remediation recommendations, some of which have been successful. In August and September of 2023, residents in St. Croix were actively protesting their Territorial Government regarding their drinking water quality. These protests prompted sampling by VIWAPA, with support from the University of the Virgin Islands (UVI), and overseen by the VIDPNR-DEP, in September of 2023. EPA R2 provided technical assistance to USVI agencies, and the R2 Laboratory analyzed the samples for metals. The samples collected to assess the red water were not collected for LCR compliance, nor did the sampling protocol follow LCR sampling requirements; however, the results of this analysis indicated levels of lead and copper, exceeding their respective action levels. The highest lead level reported was above 20,000 ppb, which lead to the initiation of this study.

Based on the information from the VIWAPA distribution line sampling, the high levels of lead detected were from first draw samples, but the lead concentrations decreased dramatically to below detectable levels after 3 to 5 minutes of flushing. However, even after flushing, some samples still contained elevated lead levels. The sampling locations with elevated lead after flushing are included in the sampling pool consisting of the 13 homes mentioned above. It is believed that the highest levels were due to stagnant water which has been in the distribution pipes when homes and businesses turn off their WAPA service line in-takes. Residents will do this because they may receive their water from an alternate source that can include private residential cisterns and local water delivery trucks. It is also suspected that the overall problem was exasperated by a drought, which decreased water levels throughout the system, and an influx of sargassum seaweed, which caused additional discoloration and a distinct odor. The distribution system on St. Croix begins with purchasing Reverse Osmosis (RO) water from “Seven Sea’s Water”. VIWAPA then chlorinates the water and injects a blended ortho- and polypoly-phosphate product called, “SeaQuest” for corrosion control.

## 6. Project/Task Description (A6)

As stated previously, this study will be comprised of sequential sampling in up to 13 homes. The selection is based on VIWAPA water consumption data. VIWAPA data indicated that water was used at these 13 homes during the last 2 to 4 months. The decision was made to ensure we collected samples representative of VIWAPA water actively being used in the home to accurately assess the potential sources of lead in the VIWAPA distribution system and service lines. These homes were also selected from the list of 35 homes with the highest levels of lead and copper contamination as determined from the results of the VIWAPA distribution line sampling at select meter locations. Any additional sampling, if necessary, will follow the same procedures found in this QAPP. This current EPA lead and copper sampling event will have 1 EPA team of 3, with the team lead by an experienced sampler. More teams will be sent if needed.

After sampling, the bottles will be placed in a cooler for storage, and shipped to the EPA R2 Laboratory in Edison, NJ for analysis at the end of each day of sampling. Details of sampling procedures and analysis can be found in Sections 10 and 11. The samples will not be required to be placed on ice and will be preserved at the Edison laboratory upon arrival.

Specialized training or equipment will not be necessary, only standard sampling methods and equipment described in Sections 10 and 11.

No secondary data will be used for this study.

This QAPP, and other sampling and laboratory analysis QA procedures will be strictly adhered to, from sampling, to final data reporting.

A study schedule can be found below in Table 2 for the initial round of sampling. Any other subsequent sampling will follow a similar schedule.

**Table 2: Project Schedule\***

<b>Activity</b>	<b>Time Frame</b>
<b>Write and approve QAPP</b>	October/November 2023 ~ 2 weeks
Confirm Site Sampling Locations	October/November 2023 ~ 1 week
Notify residents and give instructions	October/November 2023 ~ 1 week
Receive Sample Bottles	October 2023 ~ 1 weeks
Residential Sampling	November 2023 ~ 3 to 5 days
Ship Samples to the Lab	November 2023 <2 days
Lab Processing/Preservation/Analysis/Report	November 2023 ~ 3 weeks
Report writing with data reporting	December 2023 ~ 2 weeks
Potential Follow up	TBD

\* The schedule may be slightly altered due to logistical constraints and travel, prior to sampling, homeowner availability, shipping, laboratory staffing, etc.

## 7 Quality Objectives and Criteria for Measurement Data (A7)

The data quality objects for this study are based on standard sampling procedures of EPA R2 MAB-MOS, as well as with assistance from the EPA ORD-CESER Water Infrastructure Division.

### 7.1 Precision

The EPA laboratory will perform replicate analysis of known samples to assess method precision. The acceptance criterion for replicate analysis is a maximum of 20 percent (%) Relative Percent Difference, unless otherwise specified by standard operating procedures (SOP).

### 7.2 Bias

The EPA Region 2 laboratory will perform analysis of Laboratory Fortified Blanks to assess accuracy/bias. The acceptance criterion for accuracy for the results is to be within plus or minus 10% recovery of the known value, unless otherwise specified by EPA laboratory SOPs.

### 7.3 Representativeness

The selection of sample locations, analyses, and sample sizes is designed to identify potential sources of lead throughout the plumbing network at each of the 13 residences (if accessible), and to collect samples that are representative of concentrations of lead and copper. Additional metals analysis parameters will be reported out to CESER for the area of St. Croix which had highest concentrations of lead, based on the VIWAPA distribution line sampling results.

### 7.4 Comparability

The analytical methodology for this project will be the same standard analytical methodology used to assess the VIWAPA distribution lines sampling project for concentrations of lead and other water quality parameters. This is further described in Sections 13 and 14.

Sampling results for sampling activities in this QAPP are intended to identify the potential sources of lead in water from the distribution line just beyond the meter, the water meter, the home service line, under sink plumbing and the faucet with aerator or screen attached. The sampling results for these sampling activities are not intended to be used to assess compliance with the lead and copper action levels in EPA's Lead and Copper Rule.

### **7.5 Completeness**

Samples will be collected from the identified sampled housing community, with the goal that one hundred percent (100%) of samples will be analyzed and reported. However, some samples may not be valid due to unforeseen field sample collection issues, shipping delays, or laboratory issues. If any of these unforeseen incidents occur, those impacted sample results would be clearly identified.

### **7.6 Sensitivity**

EPA laboratory reporting limits (RL) for the determination of metals and water quality parameters meet the objectives of this study. See Section 13 for method reporting limits.

## **8. Training Needs/ Certification (A8)**

The sampling team leads are trained and experienced in the collection of drinking water samples as required by USEPA QA field activities procedure. In addition, the sampling personnel will be familiar with EPA approved drinking water and sequential sampling procedures. The experienced team leads have been peer to peer trained. When needed, additional training will be provided.

USEPA sampling personnel are required to have completed the 24-hour health and safety training per USEPA Order 1440.2 prior to engaging in field sampling. The sampling personnel listed in this QAPP have been trained in accordance with Order 1440.2 and OSHA 1910.120. Documentation is maintained in FedTalent.

Laboratory personnel designated to analyze the samples have successfully completed required demonstrations of capability for the methods used. The Laboratory is a NELAP Accredited Laboratory, accredited for drinking water for inorganic contaminants, including metals.

The Laboratory Manager(s) have responsibility for correction of all deficiencies in their laboratory program.

## **9. Documents and Records (A9)**

The final QAPP will be provided to the appropriate project personnel by email as detailed in the distribution list. As the plan is updated, each person on the distribution list will be sent an email with the most current document. The most current date of revision will be included in the document name and in the header of the document. The most current document will also be maintained on Microsoft Teams located in the project file folder.

The chain-of-custody (Attachment 1), and any other sampling-related forms shall be maintained in their original form by the authorized sample collector(s). Information from sampling personnel will be maintained in project folder. These documents and data storage databases are backed up on secure servers. Sampling personnel will submit all original forms to Water Divisions Drinking Water Program Office. Analytical results will be submitted by the USEPA Region 2 Laboratory by uploading results directly into USEPA LIMS. This database has a secure backup and ease of retrieval for data.

The format for all data recording will be consistent with the requirements and procedures used for data assessment, verification and validation described in this QAPP. Files generated according to applicable standard operating procedures (such as raw data, results of QC checks, problems encountered, etc.) will be documented and reported to the Project QA Officer and Laboratory Director.

All communications regarding study plan changes or refinements, such as changes to sites, staff, parameters, etc. will be filed in the Microsoft Teams or SharePoint site by the Program Manager.

### **9.1 Document/record control**

The recording media for the project will be a combination of paper and electronic means to document site conditions. Data gathered using paper will be recorded using pen, and changes to such data records will be made by drawing a single line through the error with an initial by the responsible person. Similar methods will be used for electronic data recording.

Agency management, Program Managers, and Quality Assurance Managers will approve updates to the QAPP, as needed. The Project Manager shall retain copies of all management reports, memoranda, and all correspondence between team members. Retention of records should emphasize any deviations from the signed QAPP, including the rationale for those changes.

### **9.2 – Document storage**

The Program Office Manager will maintain a central project directory, uploaded to the Microsoft Teams or SharePoint site, that will act as a repository for all data collected or generated as part of this project.

All files will be retained by USEPA according to the USEPA records retention policy.

## **10. Sampling Process Design Requirements (B1)**

General sampling design is described below. EPA will utilize the consumption of water data and sample results collected by VIWAPA to identify the 13 houses to sample. VIWAPA and VIDPNR-DEP will



provide the predetermined locations for sample collection and the University of the Virgin Islands (UVI) will coordinate with the residents to acquire their approval and provide instructions.

EPA's Region 2 lab in Edison, NJ will be used for analysis of samples.

### **10.1 – Design of the sampling**

EPA will be sampling a minimum, of 13 residential units (homes) based on the analytical results from the distribution line sampling performed by VIWAPA with VIDPNR. The homes selected for this sampling event were chosen as described above, due to their proximity and connections to the distribution line that provides WAPA water., and homeowner willingness to allow access and follow pre-sampling instructions.

EPA Region 2 in consultation with ORD will be using a sequential sampling protocol to attempt to capture more resolution of contamination. This design is based on the sampling volumes and numbers of samples collected to represent various segments of the distribution, service, interior plumbing, and faucet lines. Due to the unavailability of information on the plumbing (i.e. length and inside diameter of the service line piping in to the home) the volume of water in the pipe is estimated. A pre-sampling reconnaissance was performed to estimate the length and inside diameter of the service lines, but where it can't be confirmed, it will be estimated and noted. The number of samples collected at each home will vary due to the design of the sequential sampling procedure. Collected water samples will be preserved at the R2 Edison Laboratory using appropriate methods, as outlined in Table 3, Section 13.

### **10.2 – Sampling locations and frequencies**

Samples will be collected from up to 13 residential faucet taps. The purpose of sequential sampling is to collect samples at different locations in the piping from the faucet tap back to the main to determine potential sources of lead and copper. The residents will be notified and provided with instructions to prepare for the sampling in their homes. See Attachment #2. In addition, as part of an overall outreach effort, these homeowners and the general public will receive a flyer on how to protect themselves from lead in drinking water, and how to participate in the sampling effort (Attachment #3).

Note: After the sequential sampling is completed, the EPA Office of Research and Development (ORD), will be conducting their own study of collecting faucet aerator particulate (Attachment #4). This QAPP will not cover the protocols and QA procedures of that study.

### **Pre-Sampling Procedures**

- The University of the Virgin Islands will reach out to residents of the selected homes. A SEQUENTIAL SAMPLING RESIDENT QUESTIONNAIRE (Attachment #2) will contain questions regarding what their water source is, if they grant permission to enter their home and take samples, and instructions on what to do to prepare, such as not using their water for a period of 6 hours. The UVI will contact the homeowners to complete this questionnaire and attempt to set up preferred sample times at each residence. This information will be shared with EPA R2 via SharePoint so sample scheduling can begin.
  - The sample collectors are trained Region 2 Scientists or Engineers.

- If needed, the USEPA Region 2 representative will provide an explanation of the sampling to the resident and will answer any questions about sampling techniques.
- Scheduling Sampling: A proposed date/time of sampling must meet the following criteria:
  - Sufficient time allowed for the sampler to access the home and complete the sampling.
  - Coordination with the sampler, homeowner, or facility management.
  - Coordination with the laboratory so they can schedule analysis and indicate when results will be available.

Once the pre-sampling procedures have been completed, the PM will authorize samples to be taken and direct the sampler. The PM will authorize follow up sampling events if necessary. Any changes must be documented by the PM.

- Sampling Teams
  - **Two-person sampling teams will be utilized.** This distributes the workload to ensure attention to the QAPP and increases awareness to conditions and actions that can adversely affect the quality of the sampling effort. Team members should watch each other's movement and activities where possible and identify immediately if someone is observed not following protocol.
  - Distribute work for a two-person sample team.
  - Each Team will have an experienced "Team Lead" and a second sampler to assist.
  - It is recommended that the teams stay together while inside the homes, and not separate into different rooms.
- Shipping
  - The sample collectors/PL will schedule collection and shipping dates with a goal that samples are received by the laboratory within 48 hours of having been collected. This will be dependent on shipper schedules.
  - Upon arrival, the samples will be preserved by the laboratory using appropriate methods.

The samples do not need to be placed on ice upon completion of sample collection or during shipment to the laboratory.

## 11. Sampling Method (B2)

Each sampling team will be led by a qualified team lead. The team lead is responsible for ensuring sampling is conducted in a manner that is in accordance with this QAPP. In addition, the team lead is responsible for making any adjustments to sampling in the field. If applicable, any changes are to be documented in a field logbook.

All samples will be collected as sequential grab samples and according to the instructions within this document and as provided in the attached/referenced SOPs and methods.

This section presents a step-by-step description of the sample containers, sample volume, preservation requirements, and maximum holding time. New, certified clean wide-mouthed disposable sample containers will be used for sample collection, and preservations steps will be performed by the laboratory.

Sampling teams shall conduct all sampling activities in a manner to minimize potential contamination and cross-contamination of samples. The sampling team will thoroughly sanitize hands prior to wearing new nitrile gloves at each sampling point in order to avoid exposure to pollutants and other chemical, physical, and biological hazards, and to prevent cross-contamination of sampling team. The samplers will not touch the insides of bottles or lids and caps during sampling.

All chemical data, field data, and data analysis methods and procedures in this document follow those specified in EPA Method 200.8 and EPA 200.7.

### **Sequential Sampling Procedures**

Water will be sampled for lead, copper and other metals using sequential sampling to determine either lead sources in the home, and/or in the distribution system.

### **Instructions to be provided to residents by UVI prior to sequential sampling event:**

#### **Flushing**

1) At least 6 hours prior to scheduled sampling, go to the kitchen faucet and turn any faucet-mounted filter to bypass/off mode (**whole house filters or water softeners should not be bypassed**), then turn on the cold water (fully open, maximum flow) and let it run for 5 minutes, then turn it off.

If the home is connected to cistern, it must be shut off and bypassed so only WAPA water is being sampled.

2) Write down the date/time you turned the water off. If home has an accessible water meter, please write down the meter reading after the flushing is completed.

\*Flushing the system will allow the sequential sampling to provide representative information on the sources of lead for each specific volume of water that is sampled later.

#### **Stagnation**

Do not use ANY water from the home plumbing, after completing the 5-minute flushing, for the 6+ hours until the sampling visit. Specifically, do not shower, flush toilets, wash laundry, or use other water taps. Any automatic lawn sprinkler systems, ice makers, plumbed humidifiers etc. should also be turned off. It may help to tape a sign in the kitchen and bathrooms with a reminder not to use the water in case people forget. If water is accidentally used, please notify PM or another representative.

### **Procedure for Samplers:**

All bottles should be labeled and numbered using standardized nomenclature before entering the home, and it is very important to collect them in order (Sample “-SS01” first, Sample “-SS02” second, etc.).

Samples will be taken from the kitchen sink cold-water faucet. Ensure any point-of-use filters on the kitchen faucet are in bypass mode. Aerators, both on filter units and on taps without filters, are to remain, and should be unaltered, during sampling. Only cold water is to be sampled. The sampler will ensure that the hot/cold handles are not reversed.

Prior to entering the house, determine the targeted sample volume (provided by the PM, based on highest sequential sample) and pre-label sample bottles using standardized nomenclature.

- House identifier unique to the address (i.e., from a master list developed with a random number generator provided to sampling teams on sampling schedule). This allows protection of personal identification information in subsequent data analysis.
- Then “-SS” for sequential samples, and “-DS” for fully flushed samples (distribution system background water quality samples).
- After the sample type ID (-SS,, or -DS) numbers will be used to indicate unique samples in the order they are collected (e.g., 01, 02, 11).

### Labeling Examples:

#### BLANK



#### Sample ID: **00 BLANK**

Analysis: Lead (Pb) and Copper (Cu) in drinking water  
Sample Date: \_\_\_\_\_, 1L Plastic  
Preservation: Lab. to preserve w/ HNO<sub>3</sub> to pH<2

#### ADDRESS



#### Sample ID: **SS-01**

Analysis: Lead (Pb) and Copper (Cu) in drinking water  
Sample Date: \_\_\_\_\_, 125mL Plastic  
Preservation: Lab. to preserve w/ HNO<sub>3</sub> to pH<2

#### ADDRESS



#### Sample ID: **SS-03**

Analysis: Lead (Pb) and Copper (Cu) in drinking water  
Sample Date: \_\_\_\_\_, 1L Plastic  
Preservation: Lab. to preserve w/ HNO<sub>3</sub> to pH<2

### Drinking Water collection for sequential profile samples

1. The sampler shall record and pertinent information in a logbook. It is important to ensure no one has used the water since the flushing occurred and at least 6 hours have passed from when the flushing was completed.
2. Document the condition of the of the sample tap(s) and underlying fixtures and components noting any corrosion or damage.
3. Place the sample bottles (two 125 mL, and the 1 L bottles) near the kitchen faucet in order by sample number (e.g., -SS-01, -SS-02, -SS-03.... -SS-08, etc.) and ensure two samplers are ready to undertake the sampling.
4. Remove the caps from all bottles so that they are ready to fill.
5. Record the beginning sample date/time on the EPA Chain-of-Custody form.

6. Begin by placing the “-SS-01” bottle under the kitchen faucet and open the cold water slowly, to fill the first two smaller volume bottles. While one bottle is filling, grab the next bottle (-SS-02) so that you are ready to move it under the faucet quickly. Samples will be collected without shutting off the water in between bottles and try to not let any water spill in between samples.

7. Once the bottle is filled to the neck, quickly place the “-SS02” bottle under the faucet.

8. When you start filling the first 1L bottle “-SS03” increase the flow so that the faucet is fully open (maximum flow) and continue at that flow rate to collect the remaining “-SS” sample bottles allocated for the site. The “-SS##” bottles should only be filled to the neck of the bottles. To the extent that the maximum flow results in spilling or loss of water, the sampler will use a lower flow rate as necessary for maximum water collection.

o For example - as noted above faucet flow is increased and samples “SS-03”, “SS-04”, “SS-05”, “SS-06” are collected ( 1L each, totaling 4 L for a cumulative sequential volume of 4.25 L), then

9. One field blank will be collected each day of sampling.. The bottle is pre-labeled and filled with milli-Q water. Open the field blank bottle, remove lid then place back on and store in cooler with other samples. Record the field blank collection in the logbook.

10. Leave the faucet running and record the date and time when the final sequential sample was filled on the Chain of Custody form. Tightly place the caps back on all the filled sequential sample bottles.

11. After the final “SS” sample, collect the fully flushed “DS” sample as described above for background water quality. Add this to the Chain of Custody form and turn off the faucet.

## **12. Sampling Handling and Custody (B3)**

Sample handling and chain of custody procedures shall follow standard EPA Region 2 protocol. Any deviations from approved sampling procedures will be documented in the field notes. Sample containers shall be of QC class for the assessment of low-level analytes and be accompanied with a Certificate of Authentication (COA). Sample containers are for one time use only. Containers will be assigned with a unique number to each sample. Upon collection, each sample will be labeled and include project name, sample ID, date/time, sampler initials, preservative, and analysis requested.

### **Sample Nomenclature**

See procedures above.

### 13. Analytical Methods (B4)

Table 3: Water Analysis Methods, Federal Method Detection Limits (MDLs)

Parameter	Matrix	Reference Method/ Laboratory SOP	Laboratory Reporting Limit	MDL	Sample Container	Sample* Preservation	Holding Time
Lead	Water	USEPA 200.8 SOP C-112 Rev 4.0	1.0 µg/L	0.50 µg/L	125-ml polypropylene or HDPE 1-L polypropylene or HDPE	HNO <sub>3</sub> to pH<2	6 months (if acid-preserved within 14 days)
Copper	Water	USEPA 200.8 SOP C-112 Rev 4.0	1.0 µg/L	0.5 µg/L	125-ml polypropylene or HDPE 1-L polypropylene or HDPE	HNO <sub>3</sub> to pH<2	6 months (if acid-preserved within 14 days)
Al, As, Ba, Cd, Cr, Mn, Ni, Sb, V, Zn	Water	USEPA 200.8 SOP C-112 Rev 4.0	Al =20 ug/L; Cr, Zn =2 .0 ug/L; As, Ba, Cd, Mn, Ni, Sb, V = 1.0 ug/L	MDLs ½ of RLs	125-ml polypropylene or HDPE 1-L polypropylene or HDPE	HNO <sub>3</sub> to pH<2	6 months (if acid-preserved within 14 days)
Ca, Fe, K, Mg, Na and Sn	Water	USEPA 200.7 SOP C-110 Rev 3.7	Ca, K and Mg = 500 ug/L; Na = 1000 ug/L; Fe = 50 ug/L; and Sn = 10 ug/L	MDLs ½ of RLs	125-ml polypropylene or HDPE 1-L polypropylene or HDPE	HNO <sub>3</sub> to pH<2	6 months (if acid-preserved within 14 days)

## **14. Analytical Quality Control (B5)**

The EPA has established protocols for the analysis of Quality Control (QC) samples with each analytical batch of samples, generally defined as a maximum of twenty samples prepared within a 24-hour period. All QC results must be assessed and evaluated on an on-going basis and QC acceptance criteria must be used to determine the validity of the data.

For analytical testing for chemistry, the Laboratory includes positive control samples [Laboratory Control Sample (LCS)] to evaluate the total analytical system. Negative control samples (Method Blanks) are used to assess the preparation batch for possible contamination during the preparation and processing steps. Specific control samples (Matrix Spikes) are used to indicate the effect of the sample matrix and replicates (field replicate, matrix spike replicate, LCS replicate) are performed to assess the precision of the results generated.

Specific information regarding the frequency, composition, acceptance criteria and corrective actions are documented in the appropriate SOP for each analyte or analyte group.

## **15. Testing, Inspection, Maintenance & Calibration Requirements**

### **15.1 Instrument/Equipment Maintenance/Equipment Calibration and Frequency (B6, B7)**

#### **Laboratory**

All laboratory equipment is calibrated and maintained in accordance with existing SOPs approved by the Laboratory which covers requirements under the USEPA and State drinking water certification programs.

#### **Field**

There are no field instruments anticipated for this project.

## **16. Data Management (B10)**

Chain of Custodies (COC) will be checked for errors, verified, and cross checked with the field documentation by the team leads prior to delivery to the lab.

### **16.1 Laboratory Data Management**

The data will be maintained in an electronic format. The Laboratory will submit final LDR in electronic copy for each sampling event to the EPA Project Manager and EPA Project Lead. All material records will be maintained for the full duration of the project in accordance with the USEPA R2 Records Retention Schedule.

### **16.2 Data Management Summary**

The Project Manager will maintain the project file in a dedicated folder on the USEPA Region 2 Microsoft TEAMS or SharePoint site. Internal access will be granted to Regional program participants. The objective is to have a complete record of all decisions about modifications of data collection, assessment, verification, validation, or interpretation between the QAPP signoff and project report completion. Data received from the laboratory will be stored in USEPA's LIMS



The data will be collected with the following documents that will be completed for this project:

1. Chain of Custody Form: All pertinent sampling information will be recorded on a sampling form, including (but not limited to): residential address, sample ID, sample time, and any other pertinent observations. A digital copy of the Chain of Custody should be emailed to the Program Manager and Laboratory. The hard copy of the Chain of Custody will accompany the samples to the laboratory.
2. Laboratory reports
  - a. Laboratory reports will be sent to the PM

The documents may be converted into electronic versions. The PM will be responsible for maintaining the data from the COC and Lab reports.

EPA Region 2 will consult with VIDPNR-DEP and VIWAPA to analyze the data and make recommendations. The implementation of any recommendations is beyond the scope of this project.

### **17. Assessments and Response Actions (C1)**

No assessments will be performed on this project.

### **18. Project Assessment is not planned for this project. Reports to Management (C2)**

EPA staff shall brief the management team upon completion of the project or if any concerns arise while collecting samples with their immediate supervisor or the Project Manager. The Project Manager may draft a single report, including a summary of activities performed, and laboratory results. The report may also include a comprehensive QA section from both the laboratory and field, describing issues that impact the quality of the data.

#### **18.1 Sample Results**

The laboratory will report lead, copper, and other metals for use by ORD for interpretation of data resolution of the primary contaminant “lead”. Laboratory reports will be sent to the Project Manager the Deputy Director of EPA Region 2 Water Division. The Project Manager will notify the WD of the results, along with recommendations.

### **19. Data Review, Verification and Validation Methods (D1 and D2)**

The laboratories shall adhere to quality control measures as stated in Section 14.0 which includes the references for each applicable SOPs. Data review of all Laboratory generated data is performed by a second analyst not associated with the actual measurement operations for the given analytical batch, but knowledgeable in the analytical processes employed. It is the responsibility of the reviewer to ensure that all data generated are correct and of known and documented quality. Once the review is completed, the reviewer will sign and date the appropriate QA/QC checklist according to the Laboratory’s SOP. Any limitations on the use of data, e.g., data qualifiers, will be included in the final LDR.

Data usability is determined by the Region 2 Program Office (Water Division). Addendums will be made for site-specific situations. Any limitations on the use of data, e.g., data qualifiers, will be included in the final LDR.

US EPA REGION 2 LABORATORY  
**CHAIN OF CUSTODY/ FIELD DATA FORM**  
**Attachment 2 : COC Form**

SURVEY NAME & LOCALITY \_\_\_\_\_ PROJECT LEADER \_\_\_\_\_  
**PROGRAM:** SF  : SITE ID \_\_\_\_\_ OPERABLE UNIT \_\_\_\_\_ PROGRAM RESULTS CODE \_\_\_\_\_  
 Decision RCRA  RCRA ENF  NPDES  SDWA  AM  CAA  TSCA  OD  FIFRA  CRIMINAL ENF   
 Unit Code Y206 D210 D307 B304 C215 B224 A305 L306 B253

Permit #: LAB ID/ FIELD ID	# OF CONTAINERS	MATRIX	CHECK IF SPLIT SAMPLE	DESCRIPTION & INSTRUCTIONS INCLUDING LOCATION, ESTIMATED CONCENTRATIONS, SPECIAL REPORTING LIMITS,	Res CL Checked	Preservative (circle)	Collection Time (24hr clock) //////////		Collection Date mm/dd/yy
							Begin	End	
			<input type="checkbox"/>		<input type="checkbox"/>	0 1 2 3 4 5 6 7 8 9 10			
			<input type="checkbox"/>		<input type="checkbox"/>	0 1 2 3 4 5 6 7 8 9 10			
			<input type="checkbox"/>		<input type="checkbox"/>	0 1 2 3 4 5 6 7 8 9 10			
			<input type="checkbox"/>		<input type="checkbox"/>	0 1 2 3 4 5 6 7 8 9 10			
			<input type="checkbox"/>		<input type="checkbox"/>	0 1 2 3 4 5 6 7 8 9 10			
			<input type="checkbox"/>		<input type="checkbox"/>	0 1 2 3 4 5 6 7 8 9 10			
			<input type="checkbox"/>		<input type="checkbox"/>	0 1 2 3 4 5 6 7 8 9 10			
			<input type="checkbox"/>		<input type="checkbox"/>	0 1 2 3 4 5 6 7 8 9 10			
			<input type="checkbox"/>		<input type="checkbox"/>	0 1 2 3 4 5 6 7 8 9 10			
			<input type="checkbox"/>		<input type="checkbox"/>	0 1 2 3 4 5 6 7 8 9 10			
			<input type="checkbox"/>		<input type="checkbox"/>	0 1 2 3 4 5 6 7 8 9 10			
			<input type="checkbox"/>		<input type="checkbox"/>	0 1 2 3 4 5 6 7 8 9 10			

COMMENTS & SPECIAL REQUIREMENTS: \_\_\_\_\_

	<b>Preservative Added &amp; Checked</b> 0=ice 7=FAS 1=H2SO4 pH<2 8=ZnAc 2=HNO3 pH<2 9=NaOH pH>12 3=HCl pH<2 10=NH4Cl 4=Na2S2O3 5=NaOH pH>9 6=Ascorbic Acid
	Time      Date

<b>Matrix:</b> A=aqueous F=multiphasic B=aqueous (chlorinated) G=solvent C=soil H=biota D=sediment I=oil E=sludge J=other	Relinquished By: _____	Received By: _____		
	Relinquished By: _____	Received By: _____		
	Relinquished By: _____	Received By: _____		

Person Assuming Responsibility for Sample(s): \_\_\_\_\_

Survey Complete? Y  N

## USVI SEQUENTIAL SAMPLING RESIDENT QUESTIONNAIRE

Good day Mr./Ms. \_\_\_\_\_, this is Christina Chanes with the University of the Virgin Islands. I am working in partnership with the Virgin Islands Water and Power Authority (WAPA), the Department of Planning and Natural Resources (DPNR), and the US Environmental Protection Agency (EPA) to conduct follow-up sampling to investigate lead in drinking water.

Your WAPA distribution meter was recently sampled to investigate the cause of red/brown water and those samples showed elevated levels of lead and copper. We are asking to sample inside your home because it will help us track down where the lead and/or copper is coming from so it can be addressed. To make sure we get the most reliable data possible, I have some questions to help us figure out if your home should be sampled further. If you don't know the answers to some of these questions and are OK with EPA, WAPA, and DPNR visiting your home, we can come to your home to collect this information, likely later this week.

### **Water Source**

1. Do you use WAPA water?
  - If **yes**, continue to next question.
2. Do you A) fill your cistern with WAPA water or B) is WAPA water connected to your household plumbing?
  - If **B**, continue to next question.
3. Do you switch between using water from your cistern, if you have one, and WAPA water?
  - If **yes**, what water are you currently using?
    - If **WAPA water**,
      - When was the last time you switched between WAPA and your cistern?

### **Water Use**

4. Which faucet do you typically use for drinking water and cooking?
5. Are you using a point-of-use or inline filter on the faucet?
6. Are any faucets or toilets in your home leaking?

### **Water Infrastructure**

7. Do you know the approximate length of your water line (the pipe connecting your home to the WAPA water main)?
8. Where does your water line connect to your home? Note that your water line connection may be at the service line shut off.
9. Do you know approximate diameter of your service line (it may be visible where it connects to your home)?
10. Have you had any recent construction or repairs done to your home that may have impacted the water line?

### If the resident does not have this information:

- Are you comfortable with the WAPA/DPNR/EPA team visiting your property to evaluate the length of the water line and water connection if you are not there?

**Scheduling an Appointment**

11. Would you be willing to let EPA collect water samples from your home? We have some information/instructions to provide you with specific steps you'll need to follow prior to sampling, including a period of time (at least 6 hours) where you cannot use the water in your home.
  - If **yes**, continue to next questions.
12. Would you prefer the samplers come November 7<sup>th</sup>, 8<sup>th</sup> or 9<sup>th</sup>?
13. Do you have a specific time of day that works better for you (remember water will need to be stagnated – i.e., the water in your home cannot be used - for at least 6 hours)? It's OK if you don't know at this time – we will be reaching out again to schedule a specific sampling time.
14. What is the best way to contact you to schedule an appointment and coordinate with the sampling team?
15. Would you prefer that the samplers wear masks in your home?
16. Do you have a dog and/or fence on your property?
17. If you're comfortable with sharing, could you tell me the demographics of your household (e.g., age, race, ethnicity and gender)?



# Working with Residents to Get Cleaner Water to St. Croix

## What is EPA doing to protect me from lead in water?

EPA's highest priority is protecting people from exposure to lead in drinking water. A key step to learning more about St. Croix's drinking water is to conduct sequential sampling to determine if lead is present in your home, and if it is coming from the home's plumbing or water service line.

## If You Participate in the Sequential Sampling Study:

A sampling team from EPA, DPNR and WAPA will come to collect samples from your household faucet to test for lead and copper. Sampling should take about **one hour**.

If you are interested in participating in the sequential sampling study, please contact Christina Chanes at 340-344-6210.

## When will I receive my sampling results?

Your sampling results will take approximately two weeks to analyze by EPA's laboratory. Your results will be mailed to you as soon as possible.



## What to do before a scheduled sampling visit:

- 1. If you are using WAPA water for drinking or cooking:**
  - Do not use any water in the home for at least 6 hours before the scheduled visit. This includes flushing toilets and turning on any water faucet in the home.
- 2. If you are using cistern water for drinking or cooking:**
  - Change over to WAPA water, turn on all faucets and let the water run, or flush, for 10 minutes.
  - After flushing, do not use water for at least 6 hours before the scheduled visit. This includes flushing toilets and turning on any water faucet in the home.
- 3. Expect a call a day before the scheduled sampling to confirm the appointment.**

*\* If water is used 6 hours before the scheduled visit, please contact Zeno Bain at 571-289-9450 to reschedule.*

## **Faucet Aerator Particulate Collection After Sequential Water Sampling**

### **Study Objective:**

This study will evaluate the nature of particulate material trapped on residential faucet aerator screens (or else aerators). Aerators are small but visible mesh screens screwed at the end of faucets that are designed to shape the flow of water into multiple small and even streams. In the process, these mesh screens can also accumulate/trap particulate material including lead-containing particles. Most faucet models contain aerators, but not all. Data collected from this portion of the study can be used to corroborate results obtained from the sequential sampling portion of the study, to identify the likely source(s) of lead to residential drinking water (e.g., trace back to leaded brass or leaded solder) and be a significant lead source itself. As particulate release has been observed in the system, there is a chance that some particulate has accumulated in residential faucet aerators over time. Identification of the composition of any aerator particulate can be combined with other data from the field study to better understand the source(s) and potential mechanism for lead release. Please note that all sequential drinking water sampling shall be conducted with the faucet aerators on and undisturbed. Aerator removal for particle sampling should be the very last step, after everything else has been completed given that lead aerator particles can be an important lead source.

### **Faucet Aerator Particulate Sampling Procedure**

After all drinking water sampling has been conducted at the site:

- 1) Identify the presence or absence of a faucet aerator, note in sample location notes. Any faucet aerator mesh screen(s) should be visible as you closely investigate the faucet, at the faucet tip where water exits the faucet.
- 2) Gently remove outer corrosion deposits on the faucet aerator, if visible.
- 3) Remove aerator from faucet by manually unscrewing. If the aerator screen(s) will not come off, try removing more visible corrosion deposits before turning again. Can also try applying a small strip of leather/suede to the aerator and use channel lock pliers to provide additional leverage to unscrew. If, after all attempts, the aerator cannot be removed, make a note in the sample location notes.
- 4) Once aerator is off the faucet, identify the number of aerator screens that it contains (one or more). Take a picture of the aerator screen(s) in the direction of flow. That is, take a picture of the upflow side of the aerator that is otherwise not visible when the aerator is installed (maximize the aerator in the field of view while maintaining a focused picture). Associate the photo with the sample location ID.
- 5) Layer 3 Kimwipes on the counter (or another flat surface) and turn aerator upside down on the Kimwipes. Tap a few times to release any particulates trapped on the aerator onto the Kimwipe.
- 6) If there are still particles trapped on the aerator screen, fill a squeeze bottle with tap water from the sample location. Hold the aerator and Kimwipes over the sink while another sampler squirts water from the downflow side of the aerator towards the Kimwipe. This will flush/release any remaining particles from the aerator screen onto the Kimwipe.
- 7) Once all visible particles have been removed, do a final rinse of the aerator screen(s) with flowing tap water. Then wipe out the aerator with a Kimwipe and reinstall on the faucet (i.e., manually screw back). Cleaning the aerator screen of debris is good practice in general. It can

especially benefit the resident if lead-containing particulate had been previously trapped within the screen(s).

- 8) Take Kimwipe with the collected particles and fold over twice, then place the folded Kimwipe in a plastic Ziploc bag.
- 9) Label the plastic Ziploc bag with the sample location ID.

**Sample Handling and Custody Requirements:**

Aerator particulate samples will be placed wet into individual plastic Ziploc bags labeled with the sample location ID. All samples will be manually carried by ORD personnel to EPA's laboratory in Cincinnati, Ohio. On arrival in the laboratory the bags will be opened to allow the samples to dry.

**Analysis:**

Material trapped and collected from residential aerators will be analyzed in Cincinnati by EPA's Office of Research and Development (ORD) Advanced Materials and Solids Analysis Research Core (AMSARC). Analysts will identify the characteristics of the particulates present, categorize them, and select representative particles for scanning electron microscopy (SEM), energy dispersive spectroscopy (EDS), and other solids analysis approaches as warranted. Analysis will be per ORD's QAPP K-WID-0030257-QP-1-3, Morphological, Mineralogical, and Chemical Characterization of Pipe Scales, section B. Data Generation and Acquisition.



**PROJECT:** USEPA Region 2 LSASD  
Sequential Drinking Water Sampling for Lead and Copper in the US Virgin Islands  
**DATE:** November 7, 2023  
**REGARDING:** Deviation from the approved Quality Assurance Project Plan (QAPP)

Due to United Parcel Service shipping delays EPA Region 2 field samplers will now be utilizing a certified precleaned 250 mL sample bottles provided by Ocean Systems Laboratory vs. the 125 mL bottles that did not arrive in in time for the sampling event. Since our 125mL bottles are not available, water samples will be collected into the 250 mL bottles.

To ensure the appropriate volume is collected in the 250 mL bottle, the sampling team will calibrate the volume needed in the 250 mL bottle using a graduated cylinder.

Procedure:

1. The graduated cylinder will be filled with water to 125 mLs.
2. The water from the cylinder will be poured into a 250 mL container and capped.
3. With the 250 mL container sitting on a level surface the field team will mark the meniscus of the water line on the 250 mL bottle.
4. Using the marked bottle, the remaining 250 mL bottles will be marked with a water line for the purpose of collecting 125 mLs of water in each 250 mL bottle.

This document will serve as an addendum to the previously approved QAPP.

**CAROL LYNES** Digitally signed by CAROL LYNES  
Date: 2023.11.07 10:54:21 -05'00'



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**

**Region 2 Laboratory  
2890 Woodbridge Avenue  
Edison , New Jersey 08837  
732-906-6886 Phone  
732-906-6165 Fax**

November 20, 2023

Thuan Tran  
Monitoring & Assessment Branch  
US EPA/DESA/MAB  
Edison, NJ 08837

RE: US VI Drinking Water - 2311021

Enclosed are the results of analyses for samples received by the laboratory between 11/10/2023 and 11/15/2023. The signature below reflects the laboratory's approval of the reported results. If you have any questions concerning this report, please refer to Project Number 2311021 and contact the laboratory.

Sincerely,

A handwritten signature in black ink, appearing to read "John R. Bourbon".

John R. Bourbon  
Chief, LSASD/LB



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

**Project Narrative:**

The National Environmental Laboratory Accreditation Conference Institute (TNI) is a voluntary environmental laboratory accreditation association of State and Federal agencies. TNI established and promoted a National Environmental Laboratory Accreditation Program (NELAP) that provides a uniform set of standards for the generation of environmental data that are of known and defensible quality. The EPA Region 2 Laboratory is NELAP accredited. The Laboratory tests that are accredited have met all the requirements established under the TNI Standards.

**Condition Comments**

None

**Comment(s):**

The "Sample Analysis Date and Time" is included in the results section for any analyte with a prescribed holding time of 72 hours or less.

**Data Qualifier(s):**

- U- The analyte was not detected at or above the Reporting Limit.
- J- The identification of the analyte is acceptable; the reported value is an estimate.
- K- The identification of the analyte is acceptable; the reported value may be biased high.
- L- The identification of the analyte is acceptable; the reported value may be biased low.
- NJ- There is presumptive evidence that the analyte is present; the analyte is reported as a tentative identification. The reported value is an estimate.



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Reporting Limit(s):

The Laboratory was able to achieve the appropriate limit for each analyte requested.



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

**SUMMARY REPORT FOR SAMPLES**

Field ID	Laboratory ID	Matrix	Date Sampled	Date Received
	2311021-01	Aqueous	11/07/2023 10:36	11/10/2023 10:30
	2311021-02	Aqueous	11/07/2023 10:37	11/10/2023 10:30
	2311021-03	Aqueous	11/07/2023 10:37	11/10/2023 10:30
	2311021-04	Aqueous	11/07/2023 10:37	11/10/2023 10:30
	2311021-05	Aqueous	11/07/2023 10:37	11/10/2023 10:30
	2311021-06	Aqueous	11/07/2023 10:37	11/10/2023 10:30
	2311021-07	Aqueous	11/07/2023 10:37	11/10/2023 10:30
	2311021-08	Aqueous	11/07/2023 10:37	11/10/2023 10:30
	2311021-09	Aqueous	11/07/2023 10:38	11/10/2023 10:30
	2311021-10	Aqueous	11/07/2023 10:38	11/10/2023 10:30
	2311021-11	Aqueous	11/07/2023 11:18	11/10/2023 10:30
	2311021-12	Aqueous	11/07/2023 11:18	11/10/2023 10:30
	2311021-13	Aqueous	11/07/2023 11:19	11/10/2023 10:30
	2311021-14	Aqueous	11/07/2023 11:19	11/10/2023 10:30
	2311021-15	Aqueous	11/07/2023 11:19	11/10/2023 10:30
	2311021-16	Aqueous	11/07/2023 11:19	11/10/2023 10:30
	2311021-17	Aqueous	11/07/2023 11:19	11/10/2023 10:30
	2311021-18	Aqueous	11/07/2023 11:19	11/10/2023 10:30
	2311021-19	Aqueous	11/07/2023 11:20	11/10/2023 10:30
	2311021-20	Aqueous	11/07/2023 11:20	11/10/2023 10:30
	2311021-21	Aqueous	11/07/2023 17:58	11/10/2023 10:30
	2311021-22	Aqueous	11/07/2023 17:58	11/10/2023 10:30
	2311021-23	Aqueous	11/07/2023 17:58	11/10/2023 10:30
	2311021-24	Aqueous	11/07/2023 17:59	11/10/2023 10:30
	2311021-25	Aqueous	11/07/2023 17:59	11/10/2023 10:30
	2311021-26	Aqueous	11/07/2023 17:59	11/10/2023 10:30
	2311021-27	Aqueous	11/07/2023 17:59	11/10/2023 10:30
	2311021-28	Aqueous	11/07/2023 17:59	11/10/2023 10:30



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory

Final Report

Project: US VI Drinking Water - 2311021

Project Number: 2311021

SUMMARY REPORT FOR SAMPLES

Field ID	Laboratory ID	Matrix	Date Sampled	Date Received
	2311021-29	Aqueous	11/07/2023 17:59	11/10/2023 10:30
	2311021-30	Aqueous	11/07/2023 17:59	11/10/2023 10:30
	2311021-31	Aqueous	11/08/2023 06:11	11/10/2023 10:30
	2311021-32	Aqueous	11/08/2023 06:12	11/10/2023 10:30
	2311021-33	Aqueous	11/08/2023 06:12	11/10/2023 10:30
	2311021-34	Aqueous	11/08/2023 06:12	11/10/2023 10:30
	2311021-35	Aqueous	11/08/2023 06:12	11/10/2023 10:30
	2311021-36	Aqueous	11/08/2023 06:13	11/10/2023 10:30
	2311021-37	Aqueous	11/08/2023 06:13	11/10/2023 10:30
	2311021-38	Aqueous	11/08/2023 06:13	11/10/2023 10:30
	2311021-39	Aqueous	11/08/2023 06:15	11/10/2023 10:30
	2311021-40	Aqueous	11/08/2023 06:16	11/10/2023 10:30
	2311021-41	Aqueous	11/08/2023 10:04	11/10/2023 10:30
	2311021-42	Aqueous	11/08/2023 10:04	11/10/2023 10:30
	2311021-43	Aqueous	11/08/2023 10:04	11/10/2023 10:30
	2311021-44	Aqueous	11/08/2023 10:04	11/10/2023 10:30
	2311021-45	Aqueous	11/08/2023 10:04	11/10/2023 10:30
	2311021-46	Aqueous	11/08/2023 10:05	11/10/2023 10:30
	2311021-47	Aqueous	11/08/2023 10:05	11/10/2023 10:30
	2311021-48	Aqueous	11/08/2023 15:26	11/10/2023 10:30
	2311021-49	Aqueous	11/08/2023 15:26	11/10/2023 10:30
	2311021-51	Aqueous	11/08/2023 15:26	11/10/2023 10:30
	2311021-52	Aqueous	11/08/2023 15:26	11/10/2023 10:30
	2311021-53	Aqueous	11/08/2023 15:27	11/10/2023 10:30
	2311021-54	Aqueous	11/08/2023 15:27	11/10/2023 10:30
	2311021-55	Aqueous	11/08/2023 15:27	11/10/2023 10:30
	2311021-56	Aqueous	11/08/2023 15:27	11/10/2023 10:30
	2311021-57	Aqueous	11/08/2023 15:27	11/10/2023 10:30
	2311021-58	Aqueous	11/08/2023 15:28	11/10/2023 10:30



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory

Final Report

Project: US VI Drinking Water - 2311021

Project Number: 2311021

SUMMARY REPORT FOR SAMPLES

Field ID	Laboratory ID	Matrix	Date Sampled	Date Received
	2311021-59	Aqueous	11/08/2023 15:28	11/10/2023 10:30
	2311021-60	Aqueous	11/08/2023 15:28	11/10/2023 10:30
	2311021-61	Aqueous	11/08/2023 15:28	11/10/2023 10:30
	2311021-62	Aqueous	11/08/2023 16:34	11/10/2023 10:30
	2311021-63	Aqueous	11/08/2023 16:34	11/10/2023 10:30
	2311021-64	Aqueous	11/08/2023 16:34	11/10/2023 10:30
	2311021-65	Aqueous	11/08/2023 16:35	11/10/2023 10:30
	2311021-66	Aqueous	11/08/2023 16:35	11/10/2023 10:30
	2311021-67	Aqueous	11/08/2023 16:35	11/10/2023 10:30
	2311021-68	Aqueous	11/08/2023 16:35	11/10/2023 10:30
	2311021-69	Aqueous	11/08/2023 16:35	11/10/2023 10:30
	2311039-01	Aqueous	11/09/2023 08:27	11/15/2023 09:30
	2311039-02	Aqueous	11/09/2023 08:27	11/15/2023 09:30
	2311039-03	Aqueous	11/09/2023 08:27	11/15/2023 09:30
	2311039-04	Aqueous	11/09/2023 08:27	11/15/2023 09:30
	2311039-05	Aqueous	11/09/2023 08:27	11/15/2023 09:30
	2311039-06	Aqueous	11/09/2023 08:27	11/15/2023 09:30
	2311039-07	Aqueous	11/09/2023 08:28	11/15/2023 09:30
	2311039-08	Aqueous	11/09/2023 08:28	11/15/2023 09:30
	2311039-09	Aqueous	11/09/2023 08:28	11/15/2023 09:30
	2311039-10	Aqueous	11/09/2023 08:28	11/15/2023 09:30
	2311039-11	Aqueous	11/09/2023 13:24	11/15/2023 09:30
	2311039-12	Aqueous	11/09/2023 13:24	11/15/2023 09:30
	2311039-13	Aqueous	11/09/2023 13:24	11/15/2023 09:30
	2311039-14	Aqueous	11/09/2023 13:24	11/15/2023 09:30
	2311039-15	Aqueous	11/09/2023 13:24	11/15/2023 09:30
	2311039-16	Aqueous	11/09/2023 13:24	11/15/2023 09:30
	2311039-17	Aqueous	11/09/2023 13:24	11/15/2023 09:30



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory

Final Report

Project: US VI Drinking Water - 2311021

Project Number: 2311021

SUMMARY REPORT FOR SAMPLES

Field ID	Laboratory ID	Matrix	Date Sampled	Date Received
	2311039-18	Aqueous	11/09/2023 13:24	11/15/2023 09:30
	2311039-19	Aqueous	11/09/2023 13:24	11/15/2023 09:30
	2311039-20	Aqueous	11/09/2023 13:25	11/15/2023 09:30
	2311039-21	Aqueous	11/09/2023 13:25	11/15/2023 09:30
	2311039-22	Aqueous	11/09/2023 13:25	11/15/2023 09:30
	2311039-23	Aqueous	11/09/2023 13:25	11/15/2023 09:30
	2311039-24	Aqueous	11/09/2023 13:25	11/15/2023 09:30
	2311039-25	Aqueous	11/09/2023 13:26	11/15/2023 09:30
	2311039-26	Aqueous	11/09/2023 13:26	11/15/2023 09:30
	2311039-27	Aqueous	11/09/2023 14:07	11/15/2023 09:30
	2311039-28	Aqueous	11/09/2023 14:07	11/15/2023 09:30
	2311039-29	Aqueous	11/09/2023 14:07	11/15/2023 09:30
	2311039-30	Aqueous	11/09/2023 14:07	11/15/2023 09:30
	2311039-31	Aqueous	11/09/2023 14:07	11/15/2023 09:30
	2311039-32	Aqueous	11/09/2023 14:07	11/15/2023 09:30
	2311039-33	Aqueous	11/09/2023 14:07	11/15/2023 09:30
	2311039-34	Aqueous	11/09/2023 14:07	11/15/2023 09:30
	2311039-35	Aqueous	11/09/2023 14:07	11/15/2023 09:30
	2311039-36	Aqueous	11/09/2023 14:07	11/15/2023 09:30
	2311039-37	Aqueous	11/09/2023 14:08	11/15/2023 09:30
	2311039-38	Aqueous	11/09/2023 14:08	11/15/2023 09:30
	2311039-39	Aqueous	11/09/2023 14:09	11/15/2023 09:30
	2311039-40	Aqueous	11/09/2023 14:34	11/15/2023 09:30
	2311039-41	Aqueous	11/09/2023 14:34	11/15/2023 09:30
	2311039-42	Aqueous	11/09/2023 14:34	11/15/2023 09:30
	2311039-43	Aqueous	11/09/2023 14:34	11/15/2023 09:30
	2311039-44	Aqueous	11/09/2023 14:35	11/15/2023 09:30
	2311039-45	Aqueous	11/09/2023 14:35	11/15/2023 09:30
	2311039-46	Aqueous	11/09/2023 14:35	11/15/2023 09:30





**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

**SUMMARY REPORT FOR SAMPLES**

Field ID	Laboratory ID	Matrix	Date Sampled	Date Received
	2311039-47	Aqueous	11/09/2023 14:35	11/15/2023 09:30
	2311039-48	Aqueous	11/09/2023 14:35	11/15/2023 09:30
	2311039-49	Aqueous	11/09/2023 14:36	11/15/2023 09:30
	2311039-50	Aqueous	11/09/2023 14:36	11/15/2023 09:30
	2311039-51	Aqueous	11/09/2023 14:36	11/15/2023 09:30
	2311039-52	Aqueous	11/09/2023 14:36	11/15/2023 09:30
	2311039-53	Aqueous	11/09/2023 14:36	11/15/2023 09:30
	2311039-54	Aqueous	11/09/2023 14:37	11/15/2023 09:30



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

**SUMMARY REPORT FOR METHODS**

<b>Analysis</b>	<b>Method</b>	<b>Certification</b>	<b>Matrix</b>
Metals ICP TAL NPDES/DW	EPA 200.7 SOP C-109 Rev 3.7	NELAP	Aqueous
Metals ICPMS TAL NPDES/DW	EPA 200.8 SOP C-112 Rev 3.9	NELAP	Aqueous



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-01**

**Metals ICP**

Calcium	---	U	500	ug/L	B311077	
Iron	---	U	50.0	ug/L	B311077	
Magnesium	2910		500	ug/L	B311077	
Potassium	3180		500	ug/L	B311077	
Sodium	2570		1000	ug/L	B311077	
Tin	---	U	10.0	ug/L	B311077	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311081	
Antimony	---	U	1.00	ug/L	B311081	
Arsenic	---	U	1.00	ug/L	B311081	
Barium	---	U	1.00	ug/L	B311081	
Cadmium	---	U	1.00	ug/L	B311081	
Chromium	---	U	2.00	ug/L	B311081	
Copper	---	U	1.00	ug/L	B311081	
Lead	---	U	1.00	ug/L	B311081	
Manganese	---	U	1.00	ug/L	B311081	
Nickel	---	U	1.00	ug/L	B311081	
Vanadium	---	U	1.00	ug/L	B311081	
Zinc	---	U	2.00	ug/L	B311081	

**Field ID:** [REDACTED]

**Sample ID: 2311021-02**

**Metals ICP**

Calcium	6200		500	ug/L	B311077	
Iron	269		50.0	ug/L	B311077	
Magnesium	1060		500	ug/L	B311077	
Potassium	4460		500	ug/L	B311077	
Sodium	87500		1000	ug/L	B311077	
Tin	---	U	10.0	ug/L	B311077	

**Metals ICPMS**

Aluminum	287		20.0	ug/L	B311081	
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**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-02**

**Metals ICPMS**

Antimony	---	U	1.00	ug/L	B311081	
Arsenic	1.28		1.00	ug/L	B311081	
Barium	3.59		1.00	ug/L	B311081	
Cadmium	---	U	1.00	ug/L	B311081	
Chromium	---	U	2.00	ug/L	B311081	
Copper	135		1.00	ug/L	B311081	
Lead	13.9		1.00	ug/L	B311081	
Manganese	12.5		1.00	ug/L	B311081	
Nickel	9.47		1.00	ug/L	B311081	
Vanadium	1.17		1.00	ug/L	B311081	
Zinc	238		2.00	ug/L	B311081	

**Field ID:** [REDACTED]

**Sample ID: 2311021-03**

**Metals ICP**

Calcium	4650		500	ug/L	B311077	
Iron	132		50.0	ug/L	B311077	
Magnesium	1040		500	ug/L	B311077	
Potassium	4450		500	ug/L	B311077	
Sodium	87800		1000	ug/L	B311077	
Tin	---	U	10.0	ug/L	B311077	

**Metals ICPMS**

Aluminum	243		20.0	ug/L	B311081	
Antimony	---	U	1.00	ug/L	B311081	
Arsenic	1.28		1.00	ug/L	B311081	
Barium	2.64		1.00	ug/L	B311081	
Cadmium	---	U	1.00	ug/L	B311081	
Chromium	---	U	2.00	ug/L	B311081	
Copper	41.5		1.00	ug/L	B311081	
Lead	5.76		1.00	ug/L	B311081	
Manganese	3.24		1.00	ug/L	B311081	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-03**

**Metals ICPMS**

Nickel	1.72		1.00	ug/L	B311081	
Vanadium	---	U	1.00	ug/L	B311081	
Zinc	54.9		2.00	ug/L	B311081	

**Field ID:** [REDACTED]

**Sample ID: 2311021-04**

**Metals ICP**

Calcium	4410		500	ug/L	B311111	
Iron	469		50.0	ug/L	B311111	
Magnesium	1020		500	ug/L	B311111	
Potassium	4270		500	ug/L	B311111	
Sodium	85900		1000	ug/L	B311111	
Tin	---	U	10.0	ug/L	B311111	

**Metals ICPMS**

Aluminum	334		20.0	ug/L	B311105	
Antimony	---	U	1.00	ug/L	B311105	
Arsenic	---	U	1.00	ug/L	B311105	
Barium	2.64		1.00	ug/L	B311105	
Cadmium	---	U	1.00	ug/L	B311105	
Chromium	---	U	2.00	ug/L	B311105	
Copper	89.4		1.00	ug/L	B311105	
Lead	10.9		1.00	ug/L	B311105	
Manganese	7.95		1.00	ug/L	B311105	
Nickel	1.98		1.00	ug/L	B311105	
Vanadium	---	U	1.00	ug/L	B311105	
Zinc	94.8		2.00	ug/L	B311105	

**Field ID:** [REDACTED]

**Sample ID: 2311021-05**

**Metals ICP**

Calcium	3310		500	ug/L	B311077	
Iron	183		50.0	ug/L	B311077	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-05**

**Metals ICP**

Magnesium	1000		500	ug/L	B311077	
Potassium	4460		500	ug/L	B311077	
Sodium	88000		1000	ug/L	B311077	
Tin	---	U	10.0	ug/L	B311077	

**Metals ICPMS**

Aluminum	137		20.0	ug/L	B311081	
Antimony	---	U	1.00	ug/L	B311081	
Arsenic	---	U	1.00	ug/L	B311081	
Barium	1.51		1.00	ug/L	B311081	
Cadmium	---	U	1.00	ug/L	B311081	
Chromium	---	U	2.00	ug/L	B311081	
Copper	56.3		1.00	ug/L	B311081	
Lead	4.56		1.00	ug/L	B311081	
Manganese	3.02		1.00	ug/L	B311081	
Nickel	---	U	1.00	ug/L	B311081	
Vanadium	---	U	1.00	ug/L	B311081	
Zinc	40.1		2.00	ug/L	B311081	

**Field ID:** [REDACTED]

**Sample ID: 2311021-06**

**Metals ICP**

Calcium	2900		500	ug/L	B311077	
Iron	149		50.0	ug/L	B311077	
Magnesium	969		500	ug/L	B311077	
Potassium	4390		500	ug/L	B311077	
Sodium	86300		1000	ug/L	B311077	
Tin	---	U	10.0	ug/L	B311077	

**Metals ICPMS**

Aluminum	121		20.0	ug/L	B311081	
Antimony	---	U	1.00	ug/L	B311081	
Arsenic	---	U	1.00	ug/L	B311081	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-06**

**Metals ICPMS**

Barium	1.26		1.00	ug/L	B311081	
Cadmium	---	U	1.00	ug/L	B311081	
Chromium	---	U	2.00	ug/L	B311081	
Copper	28.5		1.00	ug/L	B311081	
Lead	2.44		1.00	ug/L	B311081	
Manganese	2.00		1.00	ug/L	B311081	
Nickel	---	U	1.00	ug/L	B311081	
Vanadium	---	U	1.00	ug/L	B311081	
Zinc	27.0		2.00	ug/L	B311081	

**Field ID:** [REDACTED]

**Sample ID: 2311021-07**

**Metals ICP**

Calcium	2710		500	ug/L	B311077	
Iron	126		50.0	ug/L	B311077	
Magnesium	947		500	ug/L	B311077	
Potassium	4280		500	ug/L	B311077	
Sodium	84200		1000	ug/L	B311077	
Tin	---	U	10.0	ug/L	B311077	

**Metals ICPMS**

Aluminum	97.1		20.0	ug/L	B311081	
Antimony	---	U	1.00	ug/L	B311081	
Arsenic	---	U	1.00	ug/L	B311081	
Barium	---	U	1.00	ug/L	B311081	
Cadmium	---	U	1.00	ug/L	B311081	
Chromium	---	U	2.00	ug/L	B311081	
Copper	23.9		1.00	ug/L	B311081	
Lead	1.83		1.00	ug/L	B311081	
Manganese	1.56		1.00	ug/L	B311081	
Nickel	---	U	1.00	ug/L	B311081	
Vanadium	---	U	1.00	ug/L	B311081	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-07**

**Metals ICPMS**

Zinc	23.8		2.00	ug/L	B311081	
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**Field ID:** [REDACTED]

**Sample ID: 2311021-08**

**Metals ICP**

Calcium	2680		500	ug/L	B311077	
Iron	121		50.0	ug/L	B311077	
Magnesium	976		500	ug/L	B311077	
Potassium	4380		500	ug/L	B311077	
Sodium	87000		1000	ug/L	B311077	
Tin	---	U	10.0	ug/L	B311077	

**Metals ICPMS**

Aluminum	69.6		20.0	ug/L	B311081	
Antimony	---	U	1.00	ug/L	B311081	
Arsenic	---	U	1.00	ug/L	B311081	
Barium	---	U	1.00	ug/L	B311081	
Cadmium	---	U	1.00	ug/L	B311081	
Chromium	---	U	2.00	ug/L	B311081	
Copper	16.3		1.00	ug/L	B311081	
Lead	1.71		1.00	ug/L	B311081	
Manganese	1.29		1.00	ug/L	B311081	
Nickel	---	U	1.00	ug/L	B311081	
Vanadium	---	U	1.00	ug/L	B311081	
Zinc	20.3		2.00	ug/L	B311081	

**Field ID:** [REDACTED]

**Sample ID: 2311021-09**

**Metals ICP**

Calcium	2620		500	ug/L	B311077	
Iron	120		50.0	ug/L	B311077	
Magnesium	955		500	ug/L	B311077	
Potassium	4340		500	ug/L	B311077	





**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-09**

**Metals ICP**

Sodium	85400		1000	ug/L	B311077	
Tin	---	U	10.0	ug/L	B311077	

**Metals ICPMS**

Aluminum	64.5		20.0	ug/L	B311081	
Antimony	---	U	1.00	ug/L	B311081	
Arsenic	---	U	1.00	ug/L	B311081	
Barium	---	U	1.00	ug/L	B311081	
Cadmium	---	U	1.00	ug/L	B311081	
Chromium	---	U	2.00	ug/L	B311081	
Copper	14.5		1.00	ug/L	B311081	
Lead	1.34		1.00	ug/L	B311081	
Manganese	1.25		1.00	ug/L	B311081	
Nickel	---	U	1.00	ug/L	B311081	
Vanadium	---	U	1.00	ug/L	B311081	
Zinc	23.1		2.00	ug/L	B311081	

**Field ID:** [REDACTED]

**Sample ID: 2311021-10**

**Metals ICP**

Calcium	2600		500	ug/L	B311077	
Iron	108		50.0	ug/L	B311077	
Magnesium	952		500	ug/L	B311077	
Potassium	4300		500	ug/L	B311077	
Sodium	84500		1000	ug/L	B311077	
Tin	---	U	10.0	ug/L	B311077	

**Metals ICPMS**

Aluminum	54.3		20.0	ug/L	B311081	
Antimony	---	U	1.00	ug/L	B311081	
Arsenic	---	U	1.00	ug/L	B311081	
Barium	---	U	1.00	ug/L	B311081	
Cadmium	---	U	1.00	ug/L	B311081	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-10**

**Metals ICPMS**

Chromium	---	U	2.00	ug/L	B311081	
Copper	28.3		1.00	ug/L	B311081	
Lead	2.88		1.00	ug/L	B311081	
Manganese	1.35		1.00	ug/L	B311081	
Nickel	1.43		1.00	ug/L	B311081	
Vanadium	---	U	1.00	ug/L	B311081	
Zinc	61.4		2.00	ug/L	B311081	

**Field ID:** [REDACTED]

**Sample ID: 2311021-11**

**Metals ICP**

Calcium	2930		500	ug/L	B311076	
Iron	180		50.0	ug/L	B311076	
Magnesium	1070		500	ug/L	B311076	
Potassium	4560		500	ug/L	B311076	
Sodium	91700		1000	ug/L	B311076	
Tin	---	U	10.0	ug/L	B311076	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311080	
Antimony	---	U	1.00	ug/L	B311080	
Arsenic	---	U	1.00	ug/L	B311080	
Barium	1.24		1.00	ug/L	B311080	
Cadmium	---	U	1.00	ug/L	B311080	
Chromium	19.4		2.00	ug/L	B311080	
Copper	21.4		1.00	ug/L	B311080	
Lead	4.55		1.00	ug/L	B311080	
Manganese	7.02		1.00	ug/L	B311080	
Nickel	94.7		1.00	ug/L	B311080	
Vanadium	---	U	1.00	ug/L	B311080	
Zinc	307		4.00	ug/L	B311080	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-12**

**Metals ICP**

Calcium	2850		500	ug/L	B311076	
Iron	80.6		50.0	ug/L	B311076	
Magnesium	1060		500	ug/L	B311076	
Potassium	4590		500	ug/L	B311076	
Sodium	91700		1000	ug/L	B311076	
Tin	---	U	10.0	ug/L	B311076	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311080	
Antimony	---	U	1.00	ug/L	B311080	
Arsenic	---	U	1.00	ug/L	B311080	
Barium	---	U	1.00	ug/L	B311080	
Cadmium	---	U	1.00	ug/L	B311080	
Chromium	---	U	2.00	ug/L	B311080	
Copper	4.11		1.00	ug/L	B311080	
Lead	---	U	1.00	ug/L	B311080	
Manganese	2.40		1.00	ug/L	B311080	
Nickel	1.82		1.00	ug/L	B311080	
Vanadium	---	U	1.00	ug/L	B311080	
Zinc	34.5		2.00	ug/L	B311080	

**Field ID:** [REDACTED]

**Sample ID: 2311021-13**

**Metals ICP**

Calcium	2850		500	ug/L	B311076	
Iron	107		50.0	ug/L	B311076	
Magnesium	1060		500	ug/L	B311076	
Potassium	4580		500	ug/L	B311076	
Sodium	91700		1000	ug/L	B311076	
Tin	---	U	10.0	ug/L	B311076	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311080	
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**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**  
**Project: US VI Drinking Water - 2311021**  
**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-13**

**Metals ICPMS**

Antimony	---	U	1.00	ug/L	B311080
Arsenic	---	U	1.00	ug/L	B311080
Barium	---	U	1.00	ug/L	B311080
Cadmium	---	U	1.00	ug/L	B311080
Chromium	---	U	2.00	ug/L	B311080
Copper	4.28		1.00	ug/L	B311080
Lead	---	U	1.00	ug/L	B311080
Manganese	3.04		1.00	ug/L	B311080
Nickel	---	U	1.00	ug/L	B311080
Vanadium	---	U	1.00	ug/L	B311080
Zinc	11.6		2.00	ug/L	B311080

**Field ID:** [REDACTED]

**Sample ID: 2311021-14**

**Metals ICP**

Calcium	2810		500	ug/L	B311076
Iron	141		50.0	ug/L	B311076
Magnesium	1070		500	ug/L	B311076
Potassium	4670		500	ug/L	B311076
Sodium	93900		1000	ug/L	B311076
Tin	---	U	10.0	ug/L	B311076

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311080
Antimony	---	U	1.00	ug/L	B311080
Arsenic	---	U	1.00	ug/L	B311080
Barium	---	U	1.00	ug/L	B311080
Cadmium	---	U	1.00	ug/L	B311080
Chromium	---	U	2.00	ug/L	B311080
Copper	5.58		1.00	ug/L	B311080
Lead	---	U	1.00	ug/L	B311080
Manganese	2.38		1.00	ug/L	B311080



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-14**

**Metals ICPMS**

Nickel	---	U	1.00	ug/L	B311080	
Vanadium	---	U	1.00	ug/L	B311080	
Zinc	11.5		2.00	ug/L	B311080	

**Field ID:** [REDACTED]

**Sample ID: 2311021-15**

**Metals ICP**

Calcium	2670		500	ug/L	B311076	
Iron	101		50.0	ug/L	B311076	
Magnesium	1030		500	ug/L	B311076	
Potassium	4620		500	ug/L	B311076	
Sodium	92300		1000	ug/L	B311076	
Tin	---	U	10.0	ug/L	B311076	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311080	
Antimony	---	U	1.00	ug/L	B311080	
Arsenic	---	U	1.00	ug/L	B311080	
Barium	---	U	1.00	ug/L	B311080	
Cadmium	---	U	1.00	ug/L	B311080	
Chromium	---	U	2.00	ug/L	B311080	
Copper	3.98		1.00	ug/L	B311080	
Lead	---	U	1.00	ug/L	B311080	
Manganese	1.86		1.00	ug/L	B311080	
Nickel	---	U	1.00	ug/L	B311080	
Vanadium	---	U	1.00	ug/L	B311080	
Zinc	8.83		2.00	ug/L	B311080	

**Field ID:** [REDACTED]

**Sample ID: 2311021-16**

**Metals ICP**

Calcium	2650		500	ug/L	B311076	
Iron	85.4		50.0	ug/L	B311076	
Magnesium	1010		500	ug/L	B311076	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-16**

**Metals ICP**

Potassium	4600		500	ug/L	B311076	
Sodium	92000		1000	ug/L	B311076	
Tin	---	U	10.0	ug/L	B311076	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311080	
Antimony	---	U	1.00	ug/L	B311080	
Arsenic	---	U	1.00	ug/L	B311080	
Barium	---	U	1.00	ug/L	B311080	
Cadmium	---	U	1.00	ug/L	B311080	
Chromium	---	U	2.00	ug/L	B311080	
Copper	3.51		1.00	ug/L	B311080	
Lead	---	U	1.00	ug/L	B311080	
Manganese	1.86		1.00	ug/L	B311080	
Nickel	---	U	1.00	ug/L	B311080	
Vanadium	---	U	1.00	ug/L	B311080	
Zinc	7.78		2.00	ug/L	B311080	

**Field ID:** [REDACTED]

**Sample ID: 2311021-17**

**Metals ICP**

Calcium	2640		500	ug/L	B311076	
Iron	74.2		50.0	ug/L	B311076	
Magnesium	1010		500	ug/L	B311076	
Potassium	4590		500	ug/L	B311076	
Sodium	91600		1000	ug/L	B311076	
Tin	---	U	10.0	ug/L	B311076	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311080	
Antimony	---	U	1.00	ug/L	B311080	
Arsenic	---	U	1.00	ug/L	B311080	
Barium	---	U	1.00	ug/L	B311080	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-17**

**Metals ICPMS**

Cadmium	---	U	1.00	ug/L	B311080	
Chromium	---	U	2.00	ug/L	B311080	
Copper	3.41		1.00	ug/L	B311080	
Lead	---	U	1.00	ug/L	B311080	
Manganese	1.85		1.00	ug/L	B311080	
Nickel	---	U	1.00	ug/L	B311080	
Vanadium	---	U	1.00	ug/L	B311080	
Zinc	10.3		2.00	ug/L	B311080	

**Field ID:** [REDACTED]

**Sample ID: 2311021-18**

**Metals ICP**

Calcium	2600		500	ug/L	B311076	
Iron	54.0		50.0	ug/L	B311076	
Magnesium	971		500	ug/L	B311076	
Potassium	4570		500	ug/L	B311076	
Sodium	91200		1000	ug/L	B311076	
Tin	---	U	10.0	ug/L	B311076	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311080	
Antimony	---	U	1.00	ug/L	B311080	
Arsenic	---	U	1.00	ug/L	B311080	
Barium	---	U	1.00	ug/L	B311080	
Cadmium	---	U	1.00	ug/L	B311080	
Chromium	---	U	2.00	ug/L	B311080	
Copper	3.37		1.00	ug/L	B311080	
Lead	1.07		1.00	ug/L	B311080	
Manganese	1.85		1.00	ug/L	B311080	
Nickel	---	U	1.00	ug/L	B311080	
Vanadium	---	U	1.00	ug/L	B311080	
Zinc	33.8		2.00	ug/L	B311080	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-19**

**Metals ICP**

Calcium	2650		500	ug/L	B311076	
Iron	72.4		50.0	ug/L	B311076	
Magnesium	998		500	ug/L	B311076	
Potassium	4570		500	ug/L	B311076	
Sodium	91600		1000	ug/L	B311076	
Tin	---	U	10.0	ug/L	B311076	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311080	
Antimony	---	U	1.00	ug/L	B311080	
Arsenic	---	U	1.00	ug/L	B311080	
Barium	---	U	1.00	ug/L	B311080	
Cadmium	---	U	1.00	ug/L	B311080	
Chromium	---	U	2.00	ug/L	B311080	
Copper	3.95		1.00	ug/L	B311080	
Lead	---	U	1.00	ug/L	B311080	
Manganese	2.46		1.00	ug/L	B311080	
Nickel	---	U	1.00	ug/L	B311080	
Vanadium	---	U	1.00	ug/L	B311080	
Zinc	14.7		2.00	ug/L	B311080	

**Field ID:** [REDACTED]

**Sample ID: 2311021-20**

**Metals ICP**

Calcium	2630		500	ug/L	B311076	
Iron	99.0		50.0	ug/L	B311076	
Magnesium	1010		500	ug/L	B311076	
Potassium	4510		500	ug/L	B311076	
Sodium	90600		1000	ug/L	B311076	
Tin	---	U	10.0	ug/L	B311076	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311080	
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**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-20**

**Metals ICPMS**

Antimony	---	U	1.00	ug/L	B311080
Arsenic	---	U	1.00	ug/L	B311080
Barium	---	U	1.00	ug/L	B311080
Cadmium	---	U	1.00	ug/L	B311080
Chromium	---	U	2.00	ug/L	B311080
Copper	4.27		1.00	ug/L	B311080
Lead	---	U	1.00	ug/L	B311080
Manganese	2.34		1.00	ug/L	B311080
Nickel	---	U	1.00	ug/L	B311080
Vanadium	---	U	1.00	ug/L	B311080
Zinc	8.32		2.00	ug/L	B311080

**Field ID:** [REDACTED]

**Sample ID: 2311021-21**

**Metals ICP**

Calcium	8770		500	ug/L	B311077
Iron	---	U	50.0	ug/L	B311077
Magnesium	515	J	500	ug/L	B311077
Potassium	4480		500	ug/L	B311077
Sodium	91100		1000	ug/L	B311077
Tin	---	U	10.0	ug/L	B311077

**Metals ICPMS**

Aluminum	87.5		20.0	ug/L	B311084
Antimony	---	U	1.00	ug/L	B311084
Arsenic	---	U	1.00	ug/L	B311084
Barium	6.09		1.00	ug/L	B311084
Cadmium	---	U	1.00	ug/L	B311084
Chromium	---	U	2.00	ug/L	B311084
Copper	---	U	1.00	ug/L	B311084
Lead	---	U	1.00	ug/L	B311084
Manganese	---	U	1.00	ug/L	B311084



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-21**

**Metals ICPMS**

Nickel	---	U	1.00	ug/L	B311084	
Vanadium	---	U	1.00	ug/L	B311084	
Zinc	36.7		2.00	ug/L	B311084	

**Field ID:** [REDACTED]

**Sample ID: 2311021-22**

**Metals ICP**

Calcium	8750		500	ug/L	B311077	
Iron	---	U	50.0	ug/L	B311077	
Magnesium	518		500	ug/L	B311077	
Potassium	4450		500	ug/L	B311077	
Sodium	90600		1000	ug/L	B311077	
Tin	---	U	10.0	ug/L	B311077	

**Metals ICPMS**

Aluminum	87.1		20.0	ug/L	B311084	
Antimony	---	U	1.00	ug/L	B311084	
Arsenic	---	U	1.00	ug/L	B311084	
Barium	5.95		1.00	ug/L	B311084	
Cadmium	---	U	1.00	ug/L	B311084	
Chromium	---	U	2.00	ug/L	B311084	
Copper	---	U	1.00	ug/L	B311084	
Lead	---	U	1.00	ug/L	B311084	
Manganese	---	U	1.00	ug/L	B311084	
Nickel	---	U	1.00	ug/L	B311084	
Vanadium	---	U	1.00	ug/L	B311084	
Zinc	8.16		2.00	ug/L	B311084	

**Field ID:** [REDACTED]

**Sample ID: 2311021-23**

**Metals ICP**

Calcium	8510		500	ug/L	B311077	
Iron	---	U	50.0	ug/L	B311077	
Magnesium	502		500	ug/L	B311077	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-23**

**Metals ICP**

Potassium	4390		500	ug/L	B311077	
Sodium	88500		1000	ug/L	B311077	
Tin	---	U	10.0	ug/L	B311077	

**Metals ICPMS**

Aluminum	83.6		20.0	ug/L	B311084	
Antimony	---	U	1.00	ug/L	B311084	
Arsenic	---	U	1.00	ug/L	B311084	
Barium	5.79		1.00	ug/L	B311084	
Cadmium	---	U	1.00	ug/L	B311084	
Chromium	---	U	2.00	ug/L	B311084	
Copper	1.08		1.00	ug/L	B311084	
Lead	---	U	1.00	ug/L	B311084	
Manganese	---	U	1.00	ug/L	B311084	
Nickel	---	U	1.00	ug/L	B311084	
Vanadium	---	U	1.00	ug/L	B311084	
Zinc	12.9		2.00	ug/L	B311084	

**Field ID:** [REDACTED]

**Sample ID: 2311021-24**

**Metals ICP**

Calcium	8560		500	ug/L	B311077	
Iron	---	U	50.0	ug/L	B311077	
Magnesium	---	U	500	ug/L	B311077	
Potassium	4380		500	ug/L	B311077	
Sodium	88200		1000	ug/L	B311077	
Tin	---	U	10.0	ug/L	B311077	

**Metals ICPMS**

Aluminum	93.1		20.0	ug/L	B311084	
Antimony	---	U	1.00	ug/L	B311084	
Arsenic	---	U	1.00	ug/L	B311084	
Barium	6.45		1.00	ug/L	B311084	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-24**

**Metals ICPMS**

Cadmium	---	U	1.00	ug/L	B311084	
Chromium	---	U	2.00	ug/L	B311084	
Copper	1.04		1.00	ug/L	B311084	
Lead	---	U	1.00	ug/L	B311084	
Manganese	---	U	1.00	ug/L	B311084	
Nickel	---	U	1.00	ug/L	B311084	
Vanadium	---	U	1.00	ug/L	B311084	
Zinc	11.4		2.00	ug/L	B311084	

**Field ID:** [REDACTED]

**Sample ID: 2311021-25**

**Metals ICP**

Calcium	8840		500	ug/L	B311077	
Iron	---	U	50.0	ug/L	B311077	
Magnesium	---	U	500	ug/L	B311077	
Potassium	4410		500	ug/L	B311077	
Sodium	89200		1000	ug/L	B311077	
Tin	---	U	10.0	ug/L	B311077	

**Metals ICPMS**

Aluminum	86.3		20.0	ug/L	B311084	
Antimony	---	U	1.00	ug/L	B311084	
Arsenic	---	U	1.00	ug/L	B311084	
Barium	6.06		1.00	ug/L	B311084	
Cadmium	---	U	1.00	ug/L	B311084	
Chromium	---	U	2.00	ug/L	B311084	
Copper	---	U	1.00	ug/L	B311084	
Lead	---	U	1.00	ug/L	B311084	
Manganese	---	U	1.00	ug/L	B311084	
Nickel	---	U	1.00	ug/L	B311084	
Vanadium	---	U	1.00	ug/L	B311084	
Zinc	9.34		2.00	ug/L	B311084	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-26**

**Metals ICP**

Calcium	8780		500	ug/L	B311077	
Iron	---	U	50.0	ug/L	B311077	
Magnesium	---	U	500	ug/L	B311077	
Potassium	4380		500	ug/L	B311077	
Sodium	88400		1000	ug/L	B311077	
Tin	---	U	10.0	ug/L	B311077	

**Metals ICPMS**

Aluminum	91.6		20.0	ug/L	B311084	
Antimony	---	U	1.00	ug/L	B311084	
Arsenic	---	U	1.00	ug/L	B311084	
Barium	6.45		1.00	ug/L	B311084	
Cadmium	---	U	1.00	ug/L	B311084	
Chromium	---	U	2.00	ug/L	B311084	
Copper	1.01		1.00	ug/L	B311084	
Lead	---	U	1.00	ug/L	B311084	
Manganese	---	U	1.00	ug/L	B311084	
Nickel	---	U	1.00	ug/L	B311084	
Vanadium	---	U	1.00	ug/L	B311084	
Zinc	11.6		2.00	ug/L	B311084	

**Field ID:** [REDACTED]

**Sample ID: 2311021-27**

**Metals ICP**

Calcium	8860		500	ug/L	B311077	
Iron	---	U	50.0	ug/L	B311077	
Magnesium	---	U	500	ug/L	B311077	
Potassium	4390		500	ug/L	B311077	
Sodium	89000		1000	ug/L	B311077	
Tin	---	U	10.0	ug/L	B311077	

**Metals ICPMS**

Aluminum	82.3		20.0	ug/L	B311084	
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**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**  
**Project: US VI Drinking Water - 2311021**  
**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-27**

**Metals ICPMS**

Antimony	---	U	1.00	ug/L	B311084
Arsenic	---	U	1.00	ug/L	B311084
Barium	6.10		1.00	ug/L	B311084
Cadmium	---	U	1.00	ug/L	B311084
Chromium	---	U	2.00	ug/L	B311084
Copper	2.71		1.00	ug/L	B311084
Lead	1.60		1.00	ug/L	B311084
Manganese	---	U	1.00	ug/L	B311084
Nickel	---	U	1.00	ug/L	B311084
Vanadium	---	U	1.00	ug/L	B311084
Zinc	34.8		2.00	ug/L	B311084

**Field ID:** [REDACTED]

**Sample ID: 2311021-28**

**Metals ICP**

Calcium	8950		500	ug/L	B311077
Iron	---	U	50.0	ug/L	B311077
Magnesium	---	U	500	ug/L	B311077
Potassium	4360		500	ug/L	B311077
Sodium	88100		1000	ug/L	B311077
Tin	---	U	10.0	ug/L	B311077

**Metals ICPMS**

Aluminum	82.3		20.0	ug/L	B311084
Antimony	---	U	1.00	ug/L	B311084
Arsenic	---	U	1.00	ug/L	B311084
Barium	6.10		1.00	ug/L	B311084
Cadmium	---	U	1.00	ug/L	B311084
Chromium	---	U	2.00	ug/L	B311084
Copper	1.72		1.00	ug/L	B311084
Lead	---	U	1.00	ug/L	B311084
Manganese	---	U	1.00	ug/L	B311084



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**  
**Project: US VI Drinking Water - 2311021**  
**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-28**

**Metals ICPMS**

Nickel	---	U	1.00	ug/L	B311084	
Vanadium	---	U	1.00	ug/L	B311084	
Zinc	35.3		2.00	ug/L	B311084	

**Field ID:** [REDACTED]

**Sample ID: 2311021-29**

**Metals ICP**

Calcium	9130		500	ug/L	B311077	
Iron	51.0		50.0	ug/L	B311077	
Magnesium	---	U	500	ug/L	B311077	
Potassium	4400		500	ug/L	B311077	
Sodium	89000		1000	ug/L	B311077	
Tin	---	U	10.0	ug/L	B311077	

**Metals ICPMS**

Aluminum	84.5		20.0	ug/L	B311084	
Antimony	---	U	1.00	ug/L	B311084	
Arsenic	---	U	1.00	ug/L	B311084	
Barium	6.16		1.00	ug/L	B311084	
Cadmium	---	U	1.00	ug/L	B311084	
Chromium	---	U	2.00	ug/L	B311084	
Copper	3.89		1.00	ug/L	B311084	
Lead	1.15		1.00	ug/L	B311084	
Manganese	---	U	1.00	ug/L	B311084	
Nickel	---	U	1.00	ug/L	B311084	
Vanadium	---	U	1.00	ug/L	B311084	
Zinc	128		2.00	ug/L	B311084	

**Field ID:** [REDACTED]

**Sample ID: 2311021-30**

**Metals ICP**

Calcium	8810		500	ug/L	B311077	
Iron	66.6		50.0	ug/L	B311077	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-30**

**Metals ICP**

Magnesium	---	U	500	ug/L	B311077	
Potassium	4420		500	ug/L	B311077	
Sodium	88600		1000	ug/L	B311077	
Tin	---	U	10.0	ug/L	B311077	

**Metals ICPMS**

Aluminum	86.9		20.0	ug/L	B311084	
Antimony	---	U	1.00	ug/L	B311084	
Arsenic	---	U	1.00	ug/L	B311084	
Barium	6.03		1.00	ug/L	B311084	
Cadmium	---	U	1.00	ug/L	B311084	
Chromium	---	U	2.00	ug/L	B311084	
Copper	2.50		1.00	ug/L	B311084	
Lead	---	U	1.00	ug/L	B311084	
Manganese	1.05		1.00	ug/L	B311084	
Nickel	---	U	1.00	ug/L	B311084	
Vanadium	---	U	1.00	ug/L	B311084	
Zinc	49.0		2.00	ug/L	B311084	

**Field ID:** [REDACTED]

**Sample ID: 2311021-31**

**Metals ICP**

Calcium	---	U	500	ug/L	B311077	
Iron	---	U	50.0	ug/L	B311077	
Magnesium	---	U	500	ug/L	B311077	
Potassium	---	U	500	ug/L	B311077	
Sodium	---	U	1000	ug/L	B311077	
Tin	---	U	10.0	ug/L	B311077	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311084	
Antimony	---	U	1.00	ug/L	B311084	
Arsenic	---	U	1.00	ug/L	B311084	





**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-31**

**Metals ICPMS**

Barium	---	U	1.00	ug/L	B311084	
Cadmium	---	U	1.00	ug/L	B311084	
Chromium	---	U	2.00	ug/L	B311084	
Copper	---	U	1.00	ug/L	B311084	
Lead	---	U	1.00	ug/L	B311084	
Manganese	---	U	1.00	ug/L	B311084	
Nickel	---	U	1.00	ug/L	B311084	
Vanadium	---	U	1.00	ug/L	B311084	
Zinc	---	U	2.00	ug/L	B311084	

**Field ID:** [REDACTED]

**Sample ID: 2311021-32**

**Metals ICP**

Calcium	3100		500	ug/L	B311077	
Iron	2710		50.0	ug/L	B311077	
Magnesium	948		500	ug/L	B311077	
Potassium	4400		500	ug/L	B311077	
Sodium	86800		1000	ug/L	B311077	
Tin	---	U	10.0	ug/L	B311077	

**Metals ICPMS**

Aluminum	32.3		20.0	ug/L	B311084	
Antimony	---	U	1.00	ug/L	B311084	
Arsenic	---	U	1.00	ug/L	B311084	
Barium	---	U	1.00	ug/L	B311084	
Cadmium	---	U	1.00	ug/L	B311084	
Chromium	---	U	2.00	ug/L	B311084	
Copper	147		1.00	ug/L	B311084	
Lead	28.8		1.00	ug/L	B311084	
Manganese	26.8		1.00	ug/L	B311084	
Nickel	2.02		1.00	ug/L	B311084	
Vanadium	---	U	1.00	ug/L	B311084	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-32**

**Metals ICPMS**

Zinc	856		10.0	ug/L	B311084
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**Field ID:** [REDACTED]

**Sample ID: 2311021-33**

**Metals ICP**

Calcium	2920		500	ug/L	B311077
Iron	425		50.0	ug/L	B311077
Magnesium	917		500	ug/L	B311077
Potassium	4370		500	ug/L	B311077
Sodium	86800		1000	ug/L	B311077
Tin	---	U	10.0	ug/L	B311077

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311084
Antimony	---	U	1.00	ug/L	B311084
Arsenic	---	U	1.00	ug/L	B311084
Barium	---	U	1.00	ug/L	B311084
Cadmium	---	U	1.00	ug/L	B311084
Chromium	---	U	2.00	ug/L	B311084
Copper	4.65		1.00	ug/L	B311084
Lead	---	U	1.00	ug/L	B311084
Manganese	4.39		1.00	ug/L	B311084
Nickel	---	U	1.00	ug/L	B311084
Vanadium	---	U	1.00	ug/L	B311084
Zinc	47.6		2.00	ug/L	B311084

**Field ID:** [REDACTED]

**Sample ID: 2311021-34**

**Metals ICP**

Calcium	3270		500	ug/L	B311077
Iron	755		50.0	ug/L	B311077
Magnesium	1060		500	ug/L	B311077
Potassium	4420		500	ug/L	B311077



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-34**

**Metals ICP**

Sodium	87600		1000	ug/L	B311077	
Tin	---	U	10.0	ug/L	B311077	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311084	
Antimony	---	U	1.00	ug/L	B311084	
Arsenic	---	U	1.00	ug/L	B311084	
Barium	---	U	1.00	ug/L	B311084	
Cadmium	---	U	1.00	ug/L	B311084	
Chromium	---	U	2.00	ug/L	B311084	
Copper	8.09		1.00	ug/L	B311084	
Lead	1.39		1.00	ug/L	B311084	
Manganese	5.74		1.00	ug/L	B311084	
Nickel	---	U	1.00	ug/L	B311084	
Vanadium	---	U	1.00	ug/L	B311084	
Zinc	32.3		2.00	ug/L	B311084	

**Field ID:** [REDACTED]

**Sample ID: 2311021-35**

**Metals ICP**

Calcium	3230		500	ug/L	B311077	
Iron	1170		50.0	ug/L	B311077	
Magnesium	1030		500	ug/L	B311077	
Potassium	4260		500	ug/L	B311077	
Sodium	84100		1000	ug/L	B311077	
Tin	---	U	10.0	ug/L	B311077	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311084	
Antimony	---	U	1.00	ug/L	B311084	
Arsenic	---	U	1.00	ug/L	B311084	
Barium	---	U	1.00	ug/L	B311084	
Cadmium	---	U	1.00	ug/L	B311084	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-35**

**Metals ICPMS**

Chromium	---	U	2.00	ug/L	B311084
Copper	31.8		1.00	ug/L	B311084
Lead	4.33		1.00	ug/L	B311084
Manganese	9.00		1.00	ug/L	B311084
Nickel	---	U	1.00	ug/L	B311084
Vanadium	---	U	1.00	ug/L	B311084
Zinc	46.9		2.00	ug/L	B311084

**Field ID:** [REDACTED]

**Sample ID: 2311021-36**

**Metals ICP**

Calcium	3370		500	ug/L	B311077
Iron	508		50.0	ug/L	B311077
Magnesium	1100		500	ug/L	B311077
Potassium	4440		500	ug/L	B311077
Sodium	88000		1000	ug/L	B311077
Tin	---	U	10.0	ug/L	B311077

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311084
Antimony	---	U	1.00	ug/L	B311084
Arsenic	---	U	1.00	ug/L	B311084
Barium	---	U	1.00	ug/L	B311084
Cadmium	---	U	1.00	ug/L	B311084
Chromium	---	U	2.00	ug/L	B311084
Copper	3.36		1.00	ug/L	B311084
Lead	---	U	1.00	ug/L	B311084
Manganese	3.62		1.00	ug/L	B311084
Nickel	---	U	1.00	ug/L	B311084
Vanadium	---	U	1.00	ug/L	B311084
Zinc	21.3		2.00	ug/L	B311084



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-37**

**Metals ICP**

Calcium	3440		500	ug/L	B311077	
Iron	322		50.0	ug/L	B311077	
Magnesium	1130		500	ug/L	B311077	
Potassium	4490		500	ug/L	B311077	
Sodium	89500		1000	ug/L	B311077	
Tin	---	U	10.0	ug/L	B311077	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311084	
Antimony	---	U	1.00	ug/L	B311084	
Arsenic	---	U	1.00	ug/L	B311084	
Barium	---	U	1.00	ug/L	B311084	
Cadmium	---	U	1.00	ug/L	B311084	
Chromium	---	U	2.00	ug/L	B311084	
Copper	3.87		1.00	ug/L	B311084	
Lead	---	U	1.00	ug/L	B311084	
Manganese	2.66		1.00	ug/L	B311084	
Nickel	---	U	1.00	ug/L	B311084	
Vanadium	---	U	1.00	ug/L	B311084	
Zinc	29.2		2.00	ug/L	B311084	

**Field ID:** [REDACTED]

**Sample ID: 2311021-38**

**Metals ICP**

Calcium	3340		500	ug/L	B311077	
Iron	537		50.0	ug/L	B311077	
Magnesium	1100		500	ug/L	B311077	
Potassium	4420		500	ug/L	B311077	
Sodium	87800		1000	ug/L	B311077	
Tin	---	U	10.0	ug/L	B311077	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311084	
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**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-38**

**Metals ICPMS**

Antimony	---	U	1.00	ug/L	B311084
Arsenic	---	U	1.00	ug/L	B311084
Barium	---	U	1.00	ug/L	B311084
Cadmium	---	U	1.00	ug/L	B311084
Chromium	---	U	2.00	ug/L	B311084
Copper	3.19		1.00	ug/L	B311084
Lead	---	U	1.00	ug/L	B311084
Manganese	4.70		1.00	ug/L	B311084
Nickel	---	U	1.00	ug/L	B311084
Vanadium	---	U	1.00	ug/L	B311084
Zinc	18.5		2.00	ug/L	B311084

**Field ID:** [REDACTED]

**Sample ID: 2311021-39**

**Metals ICP**

Calcium	3320		500	ug/L	B311077
Iron	484		50.0	ug/L	B311077
Magnesium	1080		500	ug/L	B311077
Potassium	4400		500	ug/L	B311077
Sodium	87500		1000	ug/L	B311077
Tin	---	U	10.0	ug/L	B311077

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311084
Antimony	---	U	1.00	ug/L	B311084
Arsenic	---	U	1.00	ug/L	B311084
Barium	---	U	1.00	ug/L	B311084
Cadmium	---	U	1.00	ug/L	B311084
Chromium	---	U	2.00	ug/L	B311084
Copper	2.59		1.00	ug/L	B311084
Lead	---	U	1.00	ug/L	B311084
Manganese	4.52		1.00	ug/L	B311084



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**  
**Project: US VI Drinking Water - 2311021**  
**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-39**

**Metals ICPMS**

Nickel	---	U	1.00	ug/L	B311084	
Vanadium	---	U	1.00	ug/L	B311084	
Zinc	14.9		2.00	ug/L	B311084	

**Field ID:** [REDACTED]

**Sample ID: 2311021-40**

**Metals ICP**

Calcium	3230		500	ug/L	B311077	
Iron	443		50.0	ug/L	B311077	
Magnesium	1050		500	ug/L	B311077	
Potassium	4320		500	ug/L	B311077	
Sodium	85300		1000	ug/L	B311077	
Tin	---	U	10.0	ug/L	B311077	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311084	
Antimony	---	U	1.00	ug/L	B311084	
Arsenic	---	U	1.00	ug/L	B311084	
Barium	---	U	1.00	ug/L	B311084	
Cadmium	---	U	1.00	ug/L	B311084	
Chromium	---	U	2.00	ug/L	B311084	
Copper	2.38		1.00	ug/L	B311084	
Lead	---	U	1.00	ug/L	B311084	
Manganese	4.30		1.00	ug/L	B311084	
Nickel	---	U	1.00	ug/L	B311084	
Vanadium	---	U	1.00	ug/L	B311084	
Zinc	13.9		2.00	ug/L	B311084	

**Field ID:** [REDACTED]

**Sample ID: 2311021-41**

**Metals ICP**

Calcium	2930		500	ug/L	B311076	
Iron	52.4		50.0	ug/L	B311076	
Magnesium	1030		500	ug/L	B311076	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-41**

**Metals ICP**

Potassium	4640		500	ug/L	B311076	
Sodium	92800		1000	ug/L	B311076	
Tin	---	U	10.0	ug/L	B311076	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311080	
Antimony	---	U	1.00	ug/L	B311080	
Arsenic	---	U	1.00	ug/L	B311080	
Barium	---	U	1.00	ug/L	B311080	
Cadmium	---	U	1.00	ug/L	B311080	
Chromium	---	U	2.00	ug/L	B311080	
Copper	9.21		1.00	ug/L	B311080	
Lead	2.26		1.00	ug/L	B311080	
Manganese	1.32		1.00	ug/L	B311080	
Nickel	2.23		1.00	ug/L	B311080	
Vanadium	---	U	1.00	ug/L	B311080	
Zinc	652		10.0	ug/L	B311080	

**Field ID:** [REDACTED]

**Sample ID: 2311021-42**

**Metals ICP**

Calcium	2920		500	ug/L	B311076	
Iron	63.6		50.0	ug/L	B311076	
Magnesium	1060		500	ug/L	B311076	
Potassium	4600		500	ug/L	B311076	
Sodium	92600		1000	ug/L	B311076	
Tin	---	U	10.0	ug/L	B311076	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311080	
Antimony	---	U	1.00	ug/L	B311080	
Arsenic	---	U	1.00	ug/L	B311080	
Barium	---	U	1.00	ug/L	B311080	





**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-42**

**Metals ICPMS**

Cadmium	---	U	1.00	ug/L	B311080	
Chromium	---	U	2.00	ug/L	B311080	
Copper	5.68		1.00	ug/L	B311080	
Lead	1.56		1.00	ug/L	B311080	
Manganese	1.62		1.00	ug/L	B311080	
Nickel	---	U	1.00	ug/L	B311080	
Vanadium	---	U	1.00	ug/L	B311080	
Zinc	46.2		2.00	ug/L	B311080	

**Field ID:** [REDACTED]

**Sample ID: 2311021-43**

**Metals ICP**

Calcium	2780		500	ug/L	B311076	
Iron	61.3		50.0	ug/L	B311076	
Magnesium	1000		500	ug/L	B311076	
Potassium	4470		500	ug/L	B311076	
Sodium	88900		1000	ug/L	B311076	
Tin	---	U	10.0	ug/L	B311076	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311080	
Antimony	---	U	1.00	ug/L	B311080	
Arsenic	---	U	1.00	ug/L	B311080	
Barium	---	U	1.00	ug/L	B311080	
Cadmium	---	U	1.00	ug/L	B311080	
Chromium	---	U	2.00	ug/L	B311080	
Copper	6.21		1.00	ug/L	B311080	
Lead	1.92		1.00	ug/L	B311080	
Manganese	1.60		1.00	ug/L	B311080	
Nickel	---	U	1.00	ug/L	B311080	
Vanadium	---	U	1.00	ug/L	B311080	
Zinc	87.6		2.00	ug/L	B311080	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-44**

**Metals ICP**

Calcium	2850		500	ug/L	B311076	
Iron	63.8		50.0	ug/L	B311076	
Magnesium	1040		500	ug/L	B311076	
Potassium	4600		500	ug/L	B311076	
Sodium	92000		1000	ug/L	B311076	
Tin	---	U	10.0	ug/L	B311076	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311080	
Antimony	---	U	1.00	ug/L	B311080	
Arsenic	---	U	1.00	ug/L	B311080	
Barium	---	U	1.00	ug/L	B311080	
Cadmium	---	U	1.00	ug/L	B311080	
Chromium	---	U	2.00	ug/L	B311080	
Copper	5.73		1.00	ug/L	B311080	
Lead	1.53		1.00	ug/L	B311080	
Manganese	1.78		1.00	ug/L	B311080	
Nickel	---	U	1.00	ug/L	B311080	
Vanadium	---	U	1.00	ug/L	B311080	
Zinc	23.1		2.00	ug/L	B311080	

**Field ID:** [REDACTED]

**Sample ID: 2311021-45**

**Metals ICP**

Calcium	2740		500	ug/L	B311076	
Iron	61.2		50.0	ug/L	B311076	
Magnesium	999		500	ug/L	B311076	
Potassium	4500		500	ug/L	B311076	
Sodium	89200		1000	ug/L	B311076	
Tin	---	U	10.0	ug/L	B311076	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311080	
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**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-45**

**Metals ICPMS**

Antimony	---	U	1.00	ug/L	B311080
Arsenic	---	U	1.00	ug/L	B311080
Barium	---	U	1.00	ug/L	B311080
Cadmium	---	U	1.00	ug/L	B311080
Chromium	---	U	2.00	ug/L	B311080
Copper	6.62		1.00	ug/L	B311080
Lead	1.57		1.00	ug/L	B311080
Manganese	1.70		1.00	ug/L	B311080
Nickel	---	U	1.00	ug/L	B311080
Vanadium	---	U	1.00	ug/L	B311080
Zinc	15.5		2.00	ug/L	B311080

**Field ID:** [REDACTED]

**Sample ID: 2311021-46**

**Metals ICP**

Calcium	2740		500	ug/L	B311076
Iron	62.0		50.0	ug/L	B311076
Magnesium	1000		500	ug/L	B311076
Potassium	4490		500	ug/L	B311076
Sodium	89300		1000	ug/L	B311076
Tin	---	U	10.0	ug/L	B311076

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311080
Antimony	---	U	1.00	ug/L	B311080
Arsenic	---	U	1.00	ug/L	B311080
Barium	---	U	1.00	ug/L	B311080
Cadmium	---	U	1.00	ug/L	B311080
Chromium	---	U	2.00	ug/L	B311080
Copper	8.35		1.00	ug/L	B311080
Lead	1.88		1.00	ug/L	B311080
Manganese	1.70		1.00	ug/L	B311080



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-46**

**Metals ICPMS**

Nickel	---	U	1.00	ug/L	B311080	
Vanadium	---	U	1.00	ug/L	B311080	
Zinc	14.2		2.00	ug/L	B311080	

**Field ID:** [REDACTED]

**Sample ID: 2311021-47**

**Metals ICP**

Calcium	2720		500	ug/L	B311076	
Iron	62.1		50.0	ug/L	B311076	
Magnesium	999		500	ug/L	B311076	
Potassium	4470		500	ug/L	B311076	
Sodium	89000		1000	ug/L	B311076	
Tin	---	U	10.0	ug/L	B311076	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311080	
Antimony	---	U	1.00	ug/L	B311080	
Arsenic	---	U	1.00	ug/L	B311080	
Barium	---	U	1.00	ug/L	B311080	
Cadmium	---	U	1.00	ug/L	B311080	
Chromium	---	U	2.00	ug/L	B311080	
Copper	7.75		1.00	ug/L	B311080	
Lead	1.66		1.00	ug/L	B311080	
Manganese	1.74		1.00	ug/L	B311080	
Nickel	---	U	1.00	ug/L	B311080	
Vanadium	---	U	1.00	ug/L	B311080	
Zinc	13.2		2.00	ug/L	B311080	

**Field ID:** [REDACTED]

**Sample ID: 2311021-48**

**Metals ICP**

Calcium	2860		500	ug/L	B311076	
Iron	260		50.0	ug/L	B311076	
Magnesium	1100	J	500	ug/L	B311076	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-48**

**Metals ICP**

Potassium	4570		500	ug/L	B311076	
Sodium	92300		1000	ug/L	B311076	
Tin	---	U J	10.0	ug/L	B311076	

**Metals ICPMS**

Aluminum	44.4		20.0	ug/L	B311080	
Antimony	---	U	1.00	ug/L	B311080	
Arsenic	---	U	1.00	ug/L	B311080	
Barium	1.32		1.00	ug/L	B311080	
Cadmium	---	U	1.00	ug/L	B311080	
Chromium	---	U	2.00	ug/L	B311080	
Copper	7.31		1.00	ug/L	B311080	
Lead	---	U	1.00	ug/L	B311080	
Manganese	4.30		1.00	ug/L	B311080	
Nickel	3.28		1.00	ug/L	B311080	
Vanadium	---	U	1.00	ug/L	B311080	
Zinc	26.8		2.00	ug/L	B311080	

**Field ID:** [REDACTED]

**Sample ID: 2311021-49**

**Metals ICP**

Calcium	2850		500	ug/L	B311076	
Iron	260		50.0	ug/L	B311076	
Magnesium	1110		500	ug/L	B311076	
Potassium	4610		500	ug/L	B311076	
Sodium	92800		1000	ug/L	B311076	
Tin	---	U	10.0	ug/L	B311076	

**Metals ICPMS**

Aluminum	44.4		20.0	ug/L	B311080	
Antimony	---	U	1.00	ug/L	B311080	
Arsenic	---	U	1.00	ug/L	B311080	
Barium	1.31		1.00	ug/L	B311080	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-49**

**Metals ICPMS**

Cadmium	---	U	1.00	ug/L	B311080	
Chromium	---	U	2.00	ug/L	B311080	
Copper	5.12		1.00	ug/L	B311080	
Lead	---	U	1.00	ug/L	B311080	
Manganese	4.32		1.00	ug/L	B311080	
Nickel	---	U	1.00	ug/L	B311080	
Vanadium	---	U	1.00	ug/L	B311080	
Zinc	6.58		2.00	ug/L	B311080	

**Field ID:** [REDACTED]

**Sample ID: 2311021-51**

**Metals ICP**

Calcium	2780		500	ug/L	B311076	
Iron	243		50.0	ug/L	B311076	
Magnesium	1070		500	ug/L	B311076	
Potassium	4550		500	ug/L	B311076	
Sodium	91200		1000	ug/L	B311076	
Tin	---	U	10.0	ug/L	B311076	

**Metals ICPMS**

Aluminum	44.9		20.0	ug/L	B311080	
Antimony	---	U	1.00	ug/L	B311080	
Arsenic	---	U	1.00	ug/L	B311080	
Barium	1.25		1.00	ug/L	B311080	
Cadmium	---	U	1.00	ug/L	B311080	
Chromium	---	U	2.00	ug/L	B311080	
Copper	7.14		1.00	ug/L	B311080	
Lead	---	U	1.00	ug/L	B311080	
Manganese	4.38		1.00	ug/L	B311080	
Nickel	---	U	1.00	ug/L	B311080	
Vanadium	---	U	1.00	ug/L	B311080	
Zinc	5.64		2.00	ug/L	B311080	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-52**

**Metals ICP**

Calcium	2790		500	ug/L	B311076	
Iron	268		50.0	ug/L	B311076	
Magnesium	1070		500	ug/L	B311076	
Potassium	4560		500	ug/L	B311076	
Sodium	91300		1000	ug/L	B311076	
Tin	---	U	10.0	ug/L	B311076	

**Metals ICPMS**

Aluminum	44.0		20.0	ug/L	B311080	
Antimony	---	U	1.00	ug/L	B311080	
Arsenic	---	U	1.00	ug/L	B311080	
Barium	1.28		1.00	ug/L	B311080	
Cadmium	---	U	1.00	ug/L	B311080	
Chromium	---	U	2.00	ug/L	B311080	
Copper	8.11		1.00	ug/L	B311080	
Lead	1.90		1.00	ug/L	B311080	
Manganese	4.66		1.00	ug/L	B311080	
Nickel	---	U	1.00	ug/L	B311080	
Vanadium	---	U	1.00	ug/L	B311080	
Zinc	32.2		2.00	ug/L	B311080	

**Field ID:** [REDACTED]

**Sample ID: 2311021-53**

**Metals ICP**

Calcium	2820		500	ug/L	B311076	
Iron	280		50.0	ug/L	B311076	
Magnesium	1090		500	ug/L	B311076	
Potassium	4580		500	ug/L	B311076	
Sodium	91900		1000	ug/L	B311076	
Tin	---	U	10.0	ug/L	B311076	

**Metals ICPMS**

Aluminum	44.5		20.0	ug/L	B311080	
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**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-53**

**Metals ICPMS**

Antimony	---	U	1.00	ug/L	B311080	
Arsenic	---	U	1.00	ug/L	B311080	
Barium	1.40		1.00	ug/L	B311080	
Cadmium	---	U	1.00	ug/L	B311080	
Chromium	---	U	2.00	ug/L	B311080	
Copper	6.04		1.00	ug/L	B311080	
Lead	---	U	1.00	ug/L	B311080	
Manganese	5.05		1.00	ug/L	B311080	
Nickel	---	U	1.00	ug/L	B311080	
Vanadium	---	U	1.00	ug/L	B311080	
Zinc	19.7		2.00	ug/L	B311080	

**Field ID:** [REDACTED]

**Sample ID: 2311021-54**

**Metals ICP**

Calcium	2790		500	ug/L	B311076	
Iron	295		50.0	ug/L	B311076	
Magnesium	1080		500	ug/L	B311076	
Potassium	4510		500	ug/L	B311076	
Sodium	91200		1000	ug/L	B311076	
Tin	---	U	10.0	ug/L	B311076	

**Metals ICPMS**

Aluminum	44.9		20.0	ug/L	B311080	
Antimony	---	U	1.00	ug/L	B311080	
Arsenic	---	U	1.00	ug/L	B311080	
Barium	1.28		1.00	ug/L	B311080	
Cadmium	---	U	1.00	ug/L	B311080	
Chromium	---	U	2.00	ug/L	B311080	
Copper	5.45		1.00	ug/L	B311080	
Lead	---	U	1.00	ug/L	B311080	
Manganese	5.23		1.00	ug/L	B311080	





**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**  
**Project: US VI Drinking Water - 2311021**  
**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-54**

**Metals ICPMS**

Nickel	---	U	1.00	ug/L	B311080	
Vanadium	---	U	1.00	ug/L	B311080	
Zinc	10.8		2.00	ug/L	B311080	

**Field ID:** [REDACTED]

**Sample ID: 2311021-55**

**Metals ICP**

Calcium	2820		500	ug/L	B311076	
Iron	316		50.0	ug/L	B311076	
Magnesium	1090		500	ug/L	B311076	
Potassium	4580		500	ug/L	B311076	
Sodium	91900		1000	ug/L	B311076	
Tin	---	U	10.0	ug/L	B311076	

**Metals ICPMS**

Aluminum	44.7		20.0	ug/L	B311080	
Antimony	---	U	1.00	ug/L	B311080	
Arsenic	---	U	1.00	ug/L	B311080	
Barium	1.25		1.00	ug/L	B311080	
Cadmium	---	U	1.00	ug/L	B311080	
Chromium	---	U	2.00	ug/L	B311080	
Copper	5.21		1.00	ug/L	B311080	
Lead	---	U	1.00	ug/L	B311080	
Manganese	5.41		1.00	ug/L	B311080	
Nickel	---	U	1.00	ug/L	B311080	
Vanadium	---	U	1.00	ug/L	B311080	
Zinc	8.39		2.00	ug/L	B311080	

**Field ID:** [REDACTED]

**Sample ID: 2311021-56**

**Metals ICP**

Calcium	2810		500	ug/L	B311076	
Iron	289		50.0	ug/L	B311076	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-56**

**Metals ICP**

Magnesium	1080		500	ug/L	B311076	
Potassium	4570		500	ug/L	B311076	
Sodium	91700		1000	ug/L	B311076	
Tin	---	U	10.0	ug/L	B311076	

**Metals ICPMS**

Aluminum	44.8		20.0	ug/L	B311080	
Antimony	---	U	1.00	ug/L	B311080	
Arsenic	---	U	1.00	ug/L	B311080	
Barium	1.28		1.00	ug/L	B311080	
Cadmium	---	U	1.00	ug/L	B311080	
Chromium	---	U	2.00	ug/L	B311080	
Copper	8.04		1.00	ug/L	B311080	
Lead	---	U	1.00	ug/L	B311080	
Manganese	5.04		1.00	ug/L	B311080	
Nickel	---	U	1.00	ug/L	B311080	
Vanadium	---	U	1.00	ug/L	B311080	
Zinc	7.94		2.00	ug/L	B311080	

**Field ID:** [REDACTED]

**Sample ID: 2311021-57**

**Metals ICP**

Calcium	2790		500	ug/L	B311076	
Iron	268		50.0	ug/L	B311076	
Magnesium	1070		500	ug/L	B311076	
Potassium	4620		500	ug/L	B311076	
Sodium	92300		1000	ug/L	B311076	
Tin	---	U	10.0	ug/L	B311076	

**Metals ICPMS**

Aluminum	45.0		20.0	ug/L	B311080	
Antimony	---	U	1.00	ug/L	B311080	
Arsenic	---	U	1.00	ug/L	B311080	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-57**

**Metals ICPMS**

Barium	1.25		1.00	ug/L	B311080	
Cadmium	---	U	1.00	ug/L	B311080	
Chromium	---	U	2.00	ug/L	B311080	
Copper	19.8		1.00	ug/L	B311080	
Lead	1.45		1.00	ug/L	B311080	
Manganese	4.52		1.00	ug/L	B311080	
Nickel	---	U	1.00	ug/L	B311080	
Vanadium	---	U	1.00	ug/L	B311080	
Zinc	9.42		2.00	ug/L	B311080	

**Field ID:** [REDACTED]

**Sample ID: 2311021-58**

**Metals ICP**

Calcium	2800		500	ug/L	B311076	
Iron	290		50.0	ug/L	B311076	
Magnesium	1080		500	ug/L	B311076	
Potassium	4620		500	ug/L	B311076	
Sodium	92600		1000	ug/L	B311076	
Tin	---	U	10.0	ug/L	B311076	

**Metals ICPMS**

Aluminum	44.6		20.0	ug/L	B311080	
Antimony	---	U	1.00	ug/L	B311080	
Arsenic	---	U	1.00	ug/L	B311080	
Barium	1.26		1.00	ug/L	B311080	
Cadmium	---	U	1.00	ug/L	B311080	
Chromium	---	U	2.00	ug/L	B311080	
Copper	12.2		1.00	ug/L	B311080	
Lead	1.04		1.00	ug/L	B311080	
Manganese	4.82		1.00	ug/L	B311080	
Nickel	---	U	1.00	ug/L	B311080	
Vanadium	---	U	1.00	ug/L	B311080	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-58**

**Metals ICPMS**

Zinc	5.94		2.00	ug/L	B311080
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**Field ID:** [REDACTED]

**Sample ID: 2311021-59**

**Metals ICP**

Calcium	2790		500	ug/L	B311076
Iron	326		50.0	ug/L	B311076
Magnesium	1090		500	ug/L	B311076
Potassium	4560		500	ug/L	B311076
Sodium	91600		1000	ug/L	B311076
Tin	---	U	10.0	ug/L	B311076

**Metals ICPMS**

Aluminum	45.1		20.0	ug/L	B311080
Antimony	---	U	1.00	ug/L	B311080
Arsenic	---	U	1.00	ug/L	B311080
Barium	1.31		1.00	ug/L	B311080
Cadmium	---	U	1.00	ug/L	B311080
Chromium	---	U	2.00	ug/L	B311080
Copper	7.03		1.00	ug/L	B311080
Lead	---	U	1.00	ug/L	B311080
Manganese	5.42		1.00	ug/L	B311080
Nickel	---	U	1.00	ug/L	B311080
Vanadium	---	U	1.00	ug/L	B311080
Zinc	5.09		2.00	ug/L	B311080

**Field ID:** [REDACTED]

**Sample ID: 2311021-60**

**Metals ICP**

Calcium	2820		500	ug/L	B311076
Iron	343		50.0	ug/L	B311076
Magnesium	1100		500	ug/L	B311076
Potassium	4570		500	ug/L	B311076



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-60**

**Metals ICP**

Sodium	91900		1000	ug/L	B311076	
Tin	---	U	10.0	ug/L	B311076	

**Metals ICPMS**

Aluminum	44.3		20.0	ug/L	B311080	
Antimony	---	U	1.00	ug/L	B311080	
Arsenic	---	U	1.00	ug/L	B311080	
Barium	1.33		1.00	ug/L	B311080	
Cadmium	---	U	1.00	ug/L	B311080	
Chromium	---	U	2.00	ug/L	B311080	
Copper	6.83		1.00	ug/L	B311080	
Lead	---	U	1.00	ug/L	B311080	
Manganese	5.55		1.00	ug/L	B311080	
Nickel	---	U	1.00	ug/L	B311080	
Vanadium	---	U	1.00	ug/L	B311080	
Zinc	4.84		2.00	ug/L	B311080	

**Field ID:** [REDACTED]

**Sample ID: 2311021-61**

**Metals ICP**

Calcium	2840		500	ug/L	B311076	
Iron	293		50.0	ug/L	B311076	
Magnesium	1100		500	ug/L	B311076	
Potassium	4600		500	ug/L	B311076	
Sodium	92600		1000	ug/L	B311076	
Tin	---	U	10.0	ug/L	B311076	

**Metals ICPMS**

Aluminum	44.1		20.0	ug/L	B311080	
Antimony	---	U	1.00	ug/L	B311080	
Arsenic	---	U	1.00	ug/L	B311080	
Barium	1.37		1.00	ug/L	B311080	
Cadmium	---	U	1.00	ug/L	B311080	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-61**

**Metals ICPMS**

Chromium	---	U	2.00	ug/L	B311080
Copper	24.2		1.00	ug/L	B311080
Lead	1.77		1.00	ug/L	B311080
Manganese	4.83		1.00	ug/L	B311080
Nickel	---	U	1.00	ug/L	B311080
Vanadium	---	U	1.00	ug/L	B311080
Zinc	13.7		2.00	ug/L	B311080

**Field ID:** [REDACTED]

**Sample ID: 2311021-62**

**Metals ICP**

Calcium	3320		500	ug/L	B311077
Iron	96.7		50.0	ug/L	B311077
Magnesium	1020		500	ug/L	B311077
Potassium	4400		500	ug/L	B311077
Sodium	88200		1000	ug/L	B311077
Tin	---	U	10.0	ug/L	B311077

**Metals ICPMS**

Aluminum	30.5		20.0	ug/L	B311081
Antimony	---	U	1.00	ug/L	B311081
Arsenic	---	U	1.00	ug/L	B311081
Barium	4.32		1.00	ug/L	B311081
Cadmium	---	U	1.00	ug/L	B311081
Chromium	---	U	2.00	ug/L	B311081
Copper	77.1		1.00	ug/L	B311081
Lead	18.4		1.00	ug/L	B311081
Manganese	1.43		1.00	ug/L	B311081
Nickel	90.4		1.00	ug/L	B311081
Vanadium	---	U	1.00	ug/L	B311081
Zinc	227		4.00	ug/L	B311081



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-63**

**Metals ICP**

Calcium	3320		500	ug/L	B311077	
Iron	110		50.0	ug/L	B311077	
Magnesium	996		500	ug/L	B311077	
Potassium	4440		500	ug/L	B311077	
Sodium	88200		1000	ug/L	B311077	
Tin	---	U	10.0	ug/L	B311077	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311081	
Antimony	---	U	1.00	ug/L	B311081	
Arsenic	---	U	1.00	ug/L	B311081	
Barium	3.01		1.00	ug/L	B311081	
Cadmium	---	U	1.00	ug/L	B311081	
Chromium	---	U	2.00	ug/L	B311081	
Copper	107		1.00	ug/L	B311081	
Lead	6.73		1.00	ug/L	B311081	
Manganese	1.21		1.00	ug/L	B311081	
Nickel	6.56		1.00	ug/L	B311081	
Vanadium	---	U	1.00	ug/L	B311081	
Zinc	27.0		2.00	ug/L	B311081	

**Field ID:** [REDACTED]

**Sample ID: 2311021-64**

**Metals ICP**

Calcium	3230		500	ug/L	B311077	
Iron	155		50.0	ug/L	B311077	
Magnesium	987		500	ug/L	B311077	
Potassium	4360		500	ug/L	B311077	
Sodium	86900		1000	ug/L	B311077	
Tin	---	U	10.0	ug/L	B311077	

**Metals ICPMS**

Aluminum	54.7		20.0	ug/L	B311081	
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**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report  
Project: US VI Drinking Water - 2311021  
Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-64**

**Metals ICPMS**

Antimony	---	U	1.00	ug/L	B311081
Arsenic	---	U	1.00	ug/L	B311081
Barium	3.09		1.00	ug/L	B311081
Cadmium	---	U	1.00	ug/L	B311081
Chromium	---	U	2.00	ug/L	B311081
Copper	50.5		1.00	ug/L	B311081
Lead	8.02		1.00	ug/L	B311081
Manganese	2.29		1.00	ug/L	B311081
Nickel	2.69		1.00	ug/L	B311081
Vanadium	---	U	1.00	ug/L	B311081
Zinc	32.0		2.00	ug/L	B311081

**Field ID:** [REDACTED]

**Sample ID: 2311021-65**

**Metals ICP**

Calcium	3230		500	ug/L	B311077
Iron	235		50.0	ug/L	B311077
Magnesium	984		500	ug/L	B311077
Potassium	4390		500	ug/L	B311077
Sodium	87500		1000	ug/L	B311077
Tin	---	U	10.0	ug/L	B311077

**Metals ICPMS**

Aluminum	69.3		20.0	ug/L	B311081
Antimony	---	U	1.00	ug/L	B311081
Arsenic	---	U	1.00	ug/L	B311081
Barium	3.04		1.00	ug/L	B311081
Cadmium	---	U	1.00	ug/L	B311081
Chromium	---	U	2.00	ug/L	B311081
Copper	36.9		1.00	ug/L	B311081
Lead	5.03		1.00	ug/L	B311081
Manganese	3.07		1.00	ug/L	B311081





**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-65**

**Metals ICPMS**

Nickel	1.33		1.00	ug/L	B311081	
Vanadium	---	U	1.00	ug/L	B311081	
Zinc	20.7		2.00	ug/L	B311081	

**Field ID:** [REDACTED]

**Sample ID: 2311021-66**

**Metals ICP**

Calcium	3250		500	ug/L	B311077	
Iron	181		50.0	ug/L	B311077	
Magnesium	991		500	ug/L	B311077	
Potassium	4430		500	ug/L	B311077	
Sodium	88300		1000	ug/L	B311077	
Tin	---	U	10.0	ug/L	B311077	

**Metals ICPMS**

Aluminum	71.7		20.0	ug/L	B311081	
Antimony	---	U	1.00	ug/L	B311081	
Arsenic	---	U	1.00	ug/L	B311081	
Barium	2.94		1.00	ug/L	B311081	
Cadmium	---	U	1.00	ug/L	B311081	
Chromium	---	U	2.00	ug/L	B311081	
Copper	29.8		1.00	ug/L	B311081	
Lead	5.02		1.00	ug/L	B311081	
Manganese	2.83		1.00	ug/L	B311081	
Nickel	1.02		1.00	ug/L	B311081	
Vanadium	---	U	1.00	ug/L	B311081	
Zinc	15.5		2.00	ug/L	B311081	

**Field ID:** [REDACTED]

**Sample ID: 2311021-67**

**Metals ICP**

Calcium	3230		500	ug/L	B311077	
Iron	147		50.0	ug/L	B311077	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-67**

**Metals ICP**

Magnesium	988		500	ug/L	B311077	
Potassium	4370		500	ug/L	B311077	
Sodium	87700		1000	ug/L	B311077	
Tin	---	U	10.0	ug/L	B311077	

**Metals ICPMS**

Aluminum	71.2		20.0	ug/L	B311081	
Antimony	---	U	1.00	ug/L	B311081	
Arsenic	---	U	1.00	ug/L	B311081	
Barium	2.94		1.00	ug/L	B311081	
Cadmium	---	U	1.00	ug/L	B311081	
Chromium	---	U	2.00	ug/L	B311081	
Copper	24.4		1.00	ug/L	B311081	
Lead	3.14		1.00	ug/L	B311081	
Manganese	2.68		1.00	ug/L	B311081	
Nickel	---	U	1.00	ug/L	B311081	
Vanadium	---	U	1.00	ug/L	B311081	
Zinc	12.6		2.00	ug/L	B311081	

**Field ID:** [REDACTED]

**Sample ID: 2311021-68**

**Metals ICP**

Calcium	3240		500	ug/L	B311077	
Iron	154		50.0	ug/L	B311077	
Magnesium	989		500	ug/L	B311077	
Potassium	4410		500	ug/L	B311077	
Sodium	87900		1000	ug/L	B311077	
Tin	---	U	10.0	ug/L	B311077	

**Metals ICPMS**

Aluminum	70.8		20.0	ug/L	B311081	
Antimony	---	U	1.00	ug/L	B311081	
Arsenic	---	U	1.00	ug/L	B311081	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-68**

**Metals ICPMS**

Barium	2.92		1.00	ug/L	B311081	
Cadmium	---	U	1.00	ug/L	B311081	
Chromium	---	U	2.00	ug/L	B311081	
Copper	23.4		1.00	ug/L	B311081	
Lead	2.88		1.00	ug/L	B311081	
Manganese	2.66		1.00	ug/L	B311081	
Nickel	---	U	1.00	ug/L	B311081	
Vanadium	---	U	1.00	ug/L	B311081	
Zinc	13.3		2.00	ug/L	B311081	

**Field ID:** [REDACTED]

**Sample ID: 2311021-69**

**Metals ICP**

Calcium	3270		500	ug/L	B311077	
Iron	148		50.0	ug/L	B311077	
Magnesium	990		500	ug/L	B311077	
Potassium	4410		500	ug/L	B311077	
Sodium	88100		1000	ug/L	B311077	
Tin	---	U	10.0	ug/L	B311077	

**Metals ICPMS**

Aluminum	71.8		20.0	ug/L	B311081	
Antimony	---	U	1.00	ug/L	B311081	
Arsenic	---	U	1.00	ug/L	B311081	
Barium	2.96		1.00	ug/L	B311081	
Cadmium	---	U	1.00	ug/L	B311081	
Chromium	---	U	2.00	ug/L	B311081	
Copper	23.8		1.00	ug/L	B311081	
Lead	9.64		1.00	ug/L	B311081	
Manganese	2.63		1.00	ug/L	B311081	
Nickel	---	U	1.00	ug/L	B311081	
Vanadium	---	U	1.00	ug/L	B311081	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311021-69**

**Metals ICPMS**

Zinc	23.0		2.00	ug/L	B311081	
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**Field ID:** [REDACTED]

**Sample ID: 2311039-01**

**Metals ICP**

Calcium	---	U	500	ug/L	B311106	
Iron	---	U	50.0	ug/L	B311106	
Magnesium	---	U	500	ug/L	B311106	
Potassium	---	U	500	ug/L	B311106	
Sodium	---	U	1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	
Cadmium	---	U	1.00	ug/L	B311107	
Chromium	---	U	2.00	ug/L	B311107	
Copper	---	U	1.00	ug/L	B311107	
Lead	---	U	1.00	ug/L	B311107	
Manganese	---	U	1.00	ug/L	B311107	
Nickel	---	U	1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	---	U	2.00	ug/L	B311107	

**Field ID:** [REDACTED]

**Sample ID: 2311039-02**

**Metals ICP**

Calcium	2250		500	ug/L	B311106	
Iron	---	U	50.0	ug/L	B311106	
Magnesium	1030		500	ug/L	B311106	
Potassium	4550		500	ug/L	B311106	
Sodium	91300		1000	ug/L	B311106	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311039-02**

**Metals ICP**

Tin	---	U	10.0	ug/L	B311106
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**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311107
Antimony	---	U	1.00	ug/L	B311107
Arsenic	---	U	1.00	ug/L	B311107
Barium	---	U	1.00	ug/L	B311107
Cadmium	---	U	1.00	ug/L	B311107
Chromium	---	U	2.00	ug/L	B311107
Copper	87.9		1.00	ug/L	B311107
Lead	3.40		1.00	ug/L	B311107
Manganese	---	U	1.00	ug/L	B311107
Nickel	4.02		1.00	ug/L	B311107
Vanadium	---	U	1.00	ug/L	B311107
Zinc	2250		20.0	ug/L	B311107

**Field ID:** [REDACTED]

**Sample ID: 2311039-03**

**Metals ICP**

Calcium	2350		500	ug/L	B311106
Iron	---	U	50.0	ug/L	B311106
Magnesium	1090		500	ug/L	B311106
Potassium	4570		500	ug/L	B311106
Sodium	91500		1000	ug/L	B311106
Tin	---	U	10.0	ug/L	B311106

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311107
Antimony	---	U	1.00	ug/L	B311107
Arsenic	---	U	1.00	ug/L	B311107
Barium	---	U	1.00	ug/L	B311107
Cadmium	---	U	1.00	ug/L	B311107
Chromium	---	U	2.00	ug/L	B311107



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311039-03**

**Metals ICPMS**

Copper	179		1.00	ug/L	B311107	
Lead	1.37		1.00	ug/L	B311107	
Manganese	---	U	1.00	ug/L	B311107	
Nickel	---	U	1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	97.1		2.00	ug/L	B311107	

**Field ID:** [REDACTED]

**Sample ID: 2311039-04**

**Metals ICP**

Calcium	2110		500	ug/L	B311106	
Iron	---	U	50.0	ug/L	B311106	
Magnesium	978		500	ug/L	B311106	
Potassium	4550		500	ug/L	B311106	
Sodium	91200		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	
Cadmium	---	U	1.00	ug/L	B311107	
Chromium	---	U	2.00	ug/L	B311107	
Copper	240		1.00	ug/L	B311107	
Lead	1.70		1.00	ug/L	B311107	
Manganese	---	U	1.00	ug/L	B311107	
Nickel	---	U	1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	59.7		2.00	ug/L	B311107	

**Field ID:** [REDACTED]

**Sample ID: 2311039-05**



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311039-05**

**Metals ICP**

Calcium	2100		500	ug/L	B311106	
Iron	---	U	50.0	ug/L	B311106	
Magnesium	980		500	ug/L	B311106	
Potassium	4560		500	ug/L	B311106	
Sodium	91200		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	
Cadmium	---	U	1.00	ug/L	B311107	
Chromium	---	U	2.00	ug/L	B311107	
Copper	420		2.00	ug/L	B311107	
Lead	1.32		1.00	ug/L	B311107	
Manganese	---	U	1.00	ug/L	B311107	
Nickel	---	U	1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	57.4		2.00	ug/L	B311107	

**Field ID:** [REDACTED]

**Sample ID: 2311039-06**

**Metals ICP**

Calcium	2190		500	ug/L	B311106	
Iron	---	U	50.0	ug/L	B311106	
Magnesium	1030		500	ug/L	B311106	
Potassium	4510		500	ug/L	B311106	
Sodium	91200		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311107	
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**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311039-06**

**Metals ICPMS**

Antimony	---	U	1.00	ug/L	B311107
Arsenic	---	U	1.00	ug/L	B311107
Barium	---	U	1.00	ug/L	B311107
Cadmium	---	U	1.00	ug/L	B311107
Chromium	---	U	2.00	ug/L	B311107
Copper	465		2.00	ug/L	B311107
Lead	---	U	1.00	ug/L	B311107
Manganese	---	U	1.00	ug/L	B311107
Nickel	---	U	1.00	ug/L	B311107
Vanadium	---	U	1.00	ug/L	B311107
Zinc	22.8		2.00	ug/L	B311107

**Field ID:** [REDACTED]

**Sample ID: 2311039-07**

**Metals ICP**

Calcium	2670		500	ug/L	B311106
Iron	---	U	50.0	ug/L	B311106
Magnesium	1240		500	ug/L	B311106
Potassium	4560		500	ug/L	B311106
Sodium	91200		1000	ug/L	B311106
Tin	---	U	10.0	ug/L	B311106

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311107
Antimony	---	U	1.00	ug/L	B311107
Arsenic	---	U	1.00	ug/L	B311107
Barium	---	U	1.00	ug/L	B311107
Cadmium	---	U	1.00	ug/L	B311107
Chromium	---	U	2.00	ug/L	B311107
Copper	793		5.00	ug/L	B311107
Lead	---	U	1.00	ug/L	B311107
Manganese	---	U	1.00	ug/L	B311107





**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**  
**Project: US VI Drinking Water - 2311021**  
**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311039-07**

**Metals ICPMS**

Nickel	---	U	1.00	ug/L	B311107
Vanadium	---	U	1.00	ug/L	B311107
Zinc	25.7		2.00	ug/L	B311107

**Field ID:** [REDACTED]

**Sample ID: 2311039-08**

**Metals ICP**

Calcium	2560		500	ug/L	B311106
Iron	---	U	50.0	ug/L	B311106
Magnesium	1180		500	ug/L	B311106
Potassium	4560		500	ug/L	B311106
Sodium	91200		1000	ug/L	B311106
Tin	---	U	10.0	ug/L	B311106

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311107
Antimony	---	U	1.00	ug/L	B311107
Arsenic	---	U	1.00	ug/L	B311107
Barium	---	U	1.00	ug/L	B311107
Cadmium	---	U	1.00	ug/L	B311107
Chromium	---	U	2.00	ug/L	B311107
Copper	637		5.00	ug/L	B311107
Lead	---	U	1.00	ug/L	B311107
Manganese	---	U	1.00	ug/L	B311107
Nickel	---	U	1.00	ug/L	B311107
Vanadium	---	U	1.00	ug/L	B311107
Zinc	295		4.00	ug/L	B311107

**Field ID:** [REDACTED]

**Sample ID: 2311039-09**

**Metals ICP**

Calcium	2460		500	ug/L	B311106
Iron	---	U	50.0	ug/L	B311106
Magnesium	1130		500	ug/L	B311106



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311039-09**

**Metals ICP**

Potassium	4530		500	ug/L	B311106	
Sodium	90700		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	
Cadmium	---	U	1.00	ug/L	B311107	
Chromium	---	U	2.00	ug/L	B311107	
Copper	993		5.00	ug/L	B311107	
Lead	---	U	1.00	ug/L	B311107	
Manganese	---	U	1.00	ug/L	B311107	
Nickel	2.85		1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	220		2.00	ug/L	B311107	

**Field ID:** [REDACTED]

**Sample ID: 2311039-10**

**Metals ICP**

Calcium	2300		500	ug/L	B311106	
Iron	---	U	50.0	ug/L	B311106	
Magnesium	1060		500	ug/L	B311106	
Potassium	4570		500	ug/L	B311106	
Sodium	91600		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311039-10**

**Metals ICPMS**

Cadmium	---	U	1.00	ug/L	B311107	
Chromium	---	U	2.00	ug/L	B311107	
Copper	60.3		1.00	ug/L	B311107	
Lead	---	U	1.00	ug/L	B311107	
Manganese	---	U	1.00	ug/L	B311107	
Nickel	---	U	1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	35.0		2.00	ug/L	B311107	

**Field ID:** [REDACTED]

**Sample ID: 2311039-11**

**Metals ICP**

Calcium	3890		500	ug/L	B311106	
Iron	---	U	50.0	ug/L	B311106	
Magnesium	1010		500	ug/L	B311106	
Potassium	4540		500	ug/L	B311106	
Sodium	90700		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	
Cadmium	---	U	1.00	ug/L	B311107	
Chromium	---	U	2.00	ug/L	B311107	
Copper	124		1.00	ug/L	B311107	
Lead	1.04		1.00	ug/L	B311107	
Manganese	1.59		1.00	ug/L	B311107	
Nickel	19.8		1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	273		4.00	ug/L	B311107	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311039-12**

**Metals ICP**

Calcium	3730		500	ug/L	B311106	
Iron	58.6		50.0	ug/L	B311106	
Magnesium	977		500	ug/L	B311106	
Potassium	4450		500	ug/L	B311106	
Sodium	88400		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	25.0		20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	
Cadmium	---	U	1.00	ug/L	B311107	
Chromium	---	U	2.00	ug/L	B311107	
Copper	51.0		1.00	ug/L	B311107	
Lead	2.34		1.00	ug/L	B311107	
Manganese	2.57		1.00	ug/L	B311107	
Nickel	8.04		1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	671		10.0	ug/L	B311107	

**Field ID:** [REDACTED]

**Sample ID: 2311039-13**

**Metals ICP**

Calcium	3840		500	ug/L	B311106	
Iron	51.6		50.0	ug/L	B311106	
Magnesium	1000		500	ug/L	B311106	
Potassium	4500		500	ug/L	B311106	
Sodium	90100		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	28.8		20.0	ug/L	B311107	
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**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311039-13**

**Metals ICPMS**

Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	
Cadmium	---	U	1.00	ug/L	B311107	
Chromium	---	U	2.00	ug/L	B311107	
Copper	98.5		1.00	ug/L	B311107	
Lead	---	U	1.00	ug/L	B311107	
Manganese	1.25		1.00	ug/L	B311107	
Nickel	5.17		1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	158		2.00	ug/L	B311107	

**Field ID:** [REDACTED]

**Sample ID: 2311039-14**

**Metals ICP**

Calcium	3810		500	ug/L	B311106	
Iron	110		50.0	ug/L	B311106	
Magnesium	990		500	ug/L	B311106	
Potassium	4450		500	ug/L	B311106	
Sodium	89000		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	32.2		20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	
Cadmium	---	U	1.00	ug/L	B311107	
Chromium	---	U	2.00	ug/L	B311107	
Copper	315		2.00	ug/L	B311107	
Lead	2.96		1.00	ug/L	B311107	
Manganese	1.48		1.00	ug/L	B311107	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
---------	--------	-----------	-----------------	-------	-------	----------------------------

**Field ID:** [REDACTED]

**Sample ID: 2311039-14**

**Metals ICPMS**

Nickel	1.71		1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	318		4.00	ug/L	B311107	

**Field ID:** [REDACTED]

**Sample ID: 2311039-15**

**Metals ICP**

Calcium	3860		500	ug/L	B311106	
Iron	117		50.0	ug/L	B311106	
Magnesium	1000		500	ug/L	B311106	
Potassium	4540		500	ug/L	B311106	
Sodium	90100		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	22.8		20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	
Cadmium	---	U	1.00	ug/L	B311107	
Chromium	4.49		2.00	ug/L	B311107	
Copper	185		1.00	ug/L	B311107	
Lead	4.35		1.00	ug/L	B311107	
Manganese	1.52		1.00	ug/L	B311107	
Nickel	5.86		1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	675		10.0	ug/L	B311107	

**Field ID:** [REDACTED]

**Sample ID: 2311039-16**

**Metals ICP**

Calcium	3940		500	ug/L	B311106	
Iron	105		50.0	ug/L	B311106	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311039-16**

**Metals ICP**

Magnesium	1030		500	ug/L	B311106	
Potassium	4630		500	ug/L	B311106	
Sodium	92000		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	35.0		20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	
Cadmium	---	U	1.00	ug/L	B311107	
Chromium	3.96		2.00	ug/L	B311107	
Copper	113		1.00	ug/L	B311107	
Lead	2.53		1.00	ug/L	B311107	
Manganese	1.46		1.00	ug/L	B311107	
Nickel	3.80		1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	365		4.00	ug/L	B311107	

**Field ID:** [REDACTED]

**Sample ID: 2311039-17**

**Metals ICP**

Calcium	3850		500	ug/L	B311106	
Iron	70.5		50.0	ug/L	B311106	
Magnesium	1000		500	ug/L	B311106	
Potassium	4520		500	ug/L	B311106	
Sodium	89500		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	34.8		20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311039-17**

**Metals ICPMS**

Barium	---	U	1.00	ug/L	B311107	
Cadmium	---	U	1.00	ug/L	B311107	
Chromium	---	U	2.00	ug/L	B311107	
Copper	103		1.00	ug/L	B311107	
Lead	1.64		1.00	ug/L	B311107	
Manganese	1.08		1.00	ug/L	B311107	
Nickel	1.96		1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	196		2.00	ug/L	B311107	

**Field ID:** [REDACTED]

**Sample ID: 2311039-18**

**Metals ICP**

Calcium	3910		500	ug/L	B311106	
Iron	79.7		50.0	ug/L	B311106	
Magnesium	1020		500	ug/L	B311106	
Potassium	4530		500	ug/L	B311106	
Sodium	90100		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	31.2		20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	
Cadmium	---	U	1.00	ug/L	B311107	
Chromium	---	U	2.00	ug/L	B311107	
Copper	115		1.00	ug/L	B311107	
Lead	1.74		1.00	ug/L	B311107	
Manganese	1.06		1.00	ug/L	B311107	
Nickel	2.40		1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	





**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311039-18**

**Metals ICPMS**

Zinc	310		4.00	ug/L	B311107	
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**Field ID:** [REDACTED]

**Sample ID: 2311039-19**

**Metals ICP**

Calcium	3900		500	ug/L	B311106	
Iron	125		50.0	ug/L	B311106	
Magnesium	1020		500	ug/L	B311106	
Potassium	4540		500	ug/L	B311106	
Sodium	90300		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	39.1		20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	
Cadmium	---	U	1.00	ug/L	B311107	
Chromium	---	U	2.00	ug/L	B311107	
Copper	128		1.00	ug/L	B311107	
Lead	1.80		1.00	ug/L	B311107	
Manganese	1.50		1.00	ug/L	B311107	
Nickel	---	U	1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	125		2.00	ug/L	B311107	

**Field ID:** [REDACTED]

**Sample ID: 2311039-20**

**Metals ICP**

Calcium	3870		500	ug/L	B311106	
Iron	141		50.0	ug/L	B311106	
Magnesium	1010		500	ug/L	B311106	
Potassium	4540		500	ug/L	B311106	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311039-20**

**Metals ICP**

Sodium	90200		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	39.9		20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	
Cadmium	---	U	1.00	ug/L	B311107	
Chromium	---	U	2.00	ug/L	B311107	
Copper	86.8		1.00	ug/L	B311107	
Lead	1.53		1.00	ug/L	B311107	
Manganese	1.69		1.00	ug/L	B311107	
Nickel	---	U	1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	81.0		2.00	ug/L	B311107	

**Field ID:** [REDACTED]

**Sample ID: 2311039-21**

**Metals ICP**

Calcium	3840		500	ug/L	B311106	
Iron	96.5		50.0	ug/L	B311106	
Magnesium	1010		500	ug/L	B311106	
Potassium	4470		500	ug/L	B311106	
Sodium	89500		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	38.5		20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	
Cadmium	---	U	1.00	ug/L	B311107	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311039-21**

**Metals ICPMS**

Chromium	---	U	2.00	ug/L	B311107
Copper	64.7		1.00	ug/L	B311107
Lead	1.16		1.00	ug/L	B311107
Manganese	1.48		1.00	ug/L	B311107
Nickel	---	U	1.00	ug/L	B311107
Vanadium	---	U	1.00	ug/L	B311107
Zinc	64.1		2.00	ug/L	B311107

**Field ID:** [REDACTED]

**Sample ID: 2311039-22**

**Metals ICP**

Calcium	3840		500	ug/L	B311106
Iron	81.4		50.0	ug/L	B311106
Magnesium	1010		500	ug/L	B311106
Potassium	4490		500	ug/L	B311106
Sodium	89100		1000	ug/L	B311106
Tin	---	U	10.0	ug/L	B311106

**Metals ICPMS**

Aluminum	34.8		20.0	ug/L	B311107
Antimony	---	U	1.00	ug/L	B311107
Arsenic	---	U	1.00	ug/L	B311107
Barium	---	U	1.00	ug/L	B311107
Cadmium	---	U	1.00	ug/L	B311107
Chromium	---	U	2.00	ug/L	B311107
Copper	69.2		1.00	ug/L	B311107
Lead	1.11		1.00	ug/L	B311107
Manganese	1.34		1.00	ug/L	B311107
Nickel	---	U	1.00	ug/L	B311107
Vanadium	---	U	1.00	ug/L	B311107
Zinc	60.3		2.00	ug/L	B311107



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311039-23**

**Metals ICP**

Calcium	3760		500	ug/L	B311111	
Iron	2620		50.0	ug/L	B311111	
Magnesium	945		500	ug/L	B311111	
Potassium	4240		500	ug/L	B311111	
Sodium	85200		1000	ug/L	B311111	
Tin	12.4		10.0	ug/L	B311111	

**Metals ICPMS**

Aluminum	98.8		20.0	ug/L	B311105	
Antimony	---	U	1.00	ug/L	B311105	
Arsenic	---	U	1.00	ug/L	B311105	
Barium	1.73		1.00	ug/L	B311105	
Cadmium	---	U	1.00	ug/L	B311105	
Chromium	---	U	2.00	ug/L	B311105	
Copper	432		2.00	ug/L	B311105	
Lead	12.6		1.00	ug/L	B311105	
Manganese	20.0		1.00	ug/L	B311105	
Nickel	4.39		1.00	ug/L	B311105	
Vanadium	---	U	1.00	ug/L	B311105	
Zinc	190		2.00	ug/L	B311105	

**Field ID:** [REDACTED]

**Sample ID: 2311039-24**

**Metals ICP**

Calcium	3650		500	ug/L	B311111	
Iron	5750		50.0	ug/L	B311111	
Magnesium	991		500	ug/L	B311111	
Potassium	4470		500	ug/L	B311111	
Sodium	90100		1000	ug/L	B311111	
Tin	21.3		10.0	ug/L	B311111	

**Metals ICPMS**

Aluminum	166		20.0	ug/L	B311105	
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**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
---------	--------	-----------	-----------------	-------	-------	----------------------------

**Field ID:** [REDACTED]

**Sample ID: 2311039-24**

**Metals ICPMS**

Antimony	---	U	1.00	ug/L	B311105	
Arsenic	---	U	1.00	ug/L	B311105	
Barium	3.01		1.00	ug/L	B311105	
Cadmium	---	U	1.00	ug/L	B311105	
Chromium	---	U	2.00	ug/L	B311105	
Copper	950		5.00	ug/L	B311105	
Lead	23.2		1.00	ug/L	B311105	
Manganese	42.6		1.00	ug/L	B311105	
Nickel	8.32		1.00	ug/L	B311105	
Vanadium	---	U	1.00	ug/L	B311105	
Zinc	270		4.00	ug/L	B311105	

**Field ID:** [REDACTED]

**Sample ID: 2311039-25**

**Metals ICP**

Calcium	3010		500	ug/L	B311111	
Iron	1510		50.0	ug/L	B311111	
Magnesium	928		500	ug/L	B311111	
Potassium	4450		500	ug/L	B311111	
Sodium	89900		1000	ug/L	B311111	
Tin	---	U	10.0	ug/L	B311111	

**Metals ICPMS**

Aluminum	74.5		20.0	ug/L	B311105	
Antimony	---	U	1.00	ug/L	B311105	
Arsenic	---	U	1.00	ug/L	B311105	
Barium	1.17		1.00	ug/L	B311105	
Cadmium	---	U	1.00	ug/L	B311105	
Chromium	---	U	2.00	ug/L	B311105	
Copper	251		2.00	ug/L	B311105	
Lead	7.28		1.00	ug/L	B311105	
Manganese	11.4		1.00	ug/L	B311105	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
---------	--------	-----------	-----------------	-------	-------	----------------------------

**Field ID:** [REDACTED]

**Sample ID: 2311039-25**

**Metals ICPMS**

Nickel	2.69		1.00	ug/L	B311105	
Vanadium	---	U	1.00	ug/L	B311105	
Zinc	89.1		2.00	ug/L	B311105	

**Field ID:** [REDACTED]

**Sample ID: 2311039-26**

**Metals ICP**

Calcium	2980		500	ug/L	B311106	
Iron	466		50.0	ug/L	B311106	
Magnesium	957		500	ug/L	B311106	
Potassium	4520		500	ug/L	B311106	
Sodium	90300		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	47.6		20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	
Cadmium	---	U	1.00	ug/L	B311107	
Chromium	---	U	2.00	ug/L	B311107	
Copper	107		1.00	ug/L	B311107	
Lead	2.49		1.00	ug/L	B311107	
Manganese	3.68		1.00	ug/L	B311107	
Nickel	1.14		1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	47.3		2.00	ug/L	B311107	

**Field ID:** [REDACTED]

**Sample ID: 2311039-27**

**Metals ICP**

Calcium	2120		500	ug/L	B311106	
Iron	301		50.0	ug/L	B311106	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**  
**Project: US VI Drinking Water - 2311021**  
**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
---------	--------	-----------	-----------------	-------	-------	----------------------------

**Field ID:** [REDACTED]

**Sample ID: 2311039-27**

**Metals ICP**

Magnesium	631		500	ug/L	B311106	
Potassium	4570		500	ug/L	B311106	
Sodium	92600		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	
Cadmium	---	U	1.00	ug/L	B311107	
Chromium	---	U	2.00	ug/L	B311107	
Copper	3.64		1.00	ug/L	B311107	
Lead	2.89		1.00	ug/L	B311107	
Manganese	3.33		1.00	ug/L	B311107	
Nickel	359		2.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	172		2.00	ug/L	B311107	

**Field ID:** [REDACTED]

**Sample ID: 2311039-28**

**Metals ICP**

Calcium	1960		500	ug/L	B311106	
Iron	310		50.0	ug/L	B311106	
Magnesium	594		500	ug/L	B311106	
Potassium	4450		500	ug/L	B311106	
Sodium	90100		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311039-28**

**Metals ICPMS**

Barium	---	U	1.00	ug/L	B311107	
Cadmium	---	U	1.00	ug/L	B311107	
Chromium	---	U	2.00	ug/L	B311107	
Copper	3.37		1.00	ug/L	B311107	
Lead	1.57		1.00	ug/L	B311107	
Manganese	3.01		1.00	ug/L	B311107	
Nickel	19.3		1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	58.9		2.00	ug/L	B311107	

**Field ID:** [REDACTED]

**Sample ID: 2311039-29**

**Metals ICP**

Calcium	1940		500	ug/L	B311106	
Iron	431		50.0	ug/L	B311106	
Magnesium	574		500	ug/L	B311106	
Potassium	4520		500	ug/L	B311106	
Sodium	91800		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	20.8		20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	
Cadmium	---	U	1.00	ug/L	B311107	
Chromium	---	U	2.00	ug/L	B311107	
Copper	3.60		1.00	ug/L	B311107	
Lead	1.54		1.00	ug/L	B311107	
Manganese	3.44		1.00	ug/L	B311107	
Nickel	9.32		1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	





**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311039-29**

**Metals ICPMS**

Zinc	18.1		2.00	ug/L	B311107
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**Field ID:** [REDACTED]

**Sample ID: 2311039-30**

**Metals ICP**

Calcium	1960		500	ug/L	B311106
Iron	339		50.0	ug/L	B311106
Magnesium	576		500	ug/L	B311106
Potassium	4450		500	ug/L	B311106
Sodium	90100		1000	ug/L	B311106
Tin	---	U	10.0	ug/L	B311106

**Metals ICPMS**

Aluminum	20.6		20.0	ug/L	B311107
Antimony	---	U	1.00	ug/L	B311107
Arsenic	---	U	1.00	ug/L	B311107
Barium	---	U	1.00	ug/L	B311107
Cadmium	---	U	1.00	ug/L	B311107
Chromium	---	U	2.00	ug/L	B311107
Copper	2.88		1.00	ug/L	B311107
Lead	---	U	1.00	ug/L	B311107
Manganese	3.23		1.00	ug/L	B311107
Nickel	2.21		1.00	ug/L	B311107
Vanadium	---	U	1.00	ug/L	B311107
Zinc	5.76		2.00	ug/L	B311107

**Field ID:** [REDACTED]

**Sample ID: 2311039-31**

**Metals ICP**

Calcium	1990		500	ug/L	B311106
Iron	315		50.0	ug/L	B311106
Magnesium	582		500	ug/L	B311106
Potassium	4480		500	ug/L	B311106



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311039-31**

**Metals ICP**

Sodium	90600		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	21.8		20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	
Cadmium	---	U	1.00	ug/L	B311107	
Chromium	---	U	2.00	ug/L	B311107	
Copper	2.62		1.00	ug/L	B311107	
Lead	---	U	1.00	ug/L	B311107	
Manganese	3.44		1.00	ug/L	B311107	
Nickel	1.57		1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	5.32		2.00	ug/L	B311107	

**Field ID:** [REDACTED]

**Sample ID: 2311039-32**

**Metals ICP**

Calcium	2000		500	ug/L	B311106	
Iron	327		50.0	ug/L	B311106	
Magnesium	579		500	ug/L	B311106	
Potassium	4410		500	ug/L	B311106	
Sodium	89900		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	21.0		20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	
Cadmium	---	U	1.00	ug/L	B311107	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311039-32**

**Metals ICPMS**

Chromium	---	U	2.00	ug/L	B311107	
Copper	2.77		1.00	ug/L	B311107	
Lead	---	U	1.00	ug/L	B311107	
Manganese	3.36		1.00	ug/L	B311107	
Nickel	1.28		1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	5.38		2.00	ug/L	B311107	

**Field ID:** [REDACTED]

**Sample ID: 2311039-33**

**Metals ICP**

Calcium	2040		500	ug/L	B311106	
Iron	386		50.0	ug/L	B311106	
Magnesium	602		500	ug/L	B311106	
Potassium	4450		500	ug/L	B311106	
Sodium	90200		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	20.4		20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	
Cadmium	---	U	1.00	ug/L	B311107	
Chromium	---	U	2.00	ug/L	B311107	
Copper	3.03		1.00	ug/L	B311107	
Lead	---	U	1.00	ug/L	B311107	
Manganese	4.11		1.00	ug/L	B311107	
Nickel	1.10		1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	5.99		2.00	ug/L	B311107	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**  
**Project: US VI Drinking Water - 2311021**  
**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311039-34**

**Metals ICP**

Calcium	2070		500	ug/L	B311106	
Iron	321		50.0	ug/L	B311106	
Magnesium	614		500	ug/L	B311106	
Potassium	4470		500	ug/L	B311106	
Sodium	90000		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	
Cadmium	---	U	1.00	ug/L	B311107	
Chromium	---	U	2.00	ug/L	B311107	
Copper	2.74		1.00	ug/L	B311107	
Lead	---	U	1.00	ug/L	B311107	
Manganese	3.48		1.00	ug/L	B311107	
Nickel	---	U	1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	5.04		2.00	ug/L	B311107	

**Field ID:** [REDACTED]

**Sample ID: 2311039-35**

**Metals ICP**

Calcium	2050		500	ug/L	B311106	
Iron	287		50.0	ug/L	B311106	
Magnesium	605		500	ug/L	B311106	
Potassium	4430		500	ug/L	B311106	
Sodium	89500		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311107	
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**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311039-35**

**Metals ICPMS**

Antimony	---	U	1.00	ug/L	B311107
Arsenic	---	U	1.00	ug/L	B311107
Barium	---	U	1.00	ug/L	B311107
Cadmium	---	U	1.00	ug/L	B311107
Chromium	---	U	2.00	ug/L	B311107
Copper	2.51		1.00	ug/L	B311107
Lead	---	U	1.00	ug/L	B311107
Manganese	3.18		1.00	ug/L	B311107
Nickel	1.06		1.00	ug/L	B311107
Vanadium	---	U	1.00	ug/L	B311107
Zinc	4.74		2.00	ug/L	B311107

**Field ID:** [REDACTED]

**Sample ID: 2311039-36**

**Metals ICP**

Calcium	2090		500	ug/L	B311106
Iron	314		50.0	ug/L	B311106
Magnesium	611		500	ug/L	B311106
Potassium	4470		500	ug/L	B311106
Sodium	90600		1000	ug/L	B311106
Tin	---	U	10.0	ug/L	B311106

**Metals ICPMS**

Aluminum	20.0		20.0	ug/L	B311107
Antimony	---	U	1.00	ug/L	B311107
Arsenic	---	U	1.00	ug/L	B311107
Barium	---	U	1.00	ug/L	B311107
Cadmium	---	U	1.00	ug/L	B311107
Chromium	---	U	2.00	ug/L	B311107
Copper	2.48		1.00	ug/L	B311107
Lead	---	U	1.00	ug/L	B311107
Manganese	3.39		1.00	ug/L	B311107



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311039-36**

**Metals ICPMS**

Nickel	1.10		1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	4.93		2.00	ug/L	B311107	

**Field ID:** [REDACTED]

**Sample ID: 2311039-37**

**Metals ICP**

Calcium	2090		500	ug/L	B311106	
Iron	325		50.0	ug/L	B311106	
Magnesium	616		500	ug/L	B311106	
Potassium	4470		500	ug/L	B311106	
Sodium	90300		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	
Cadmium	---	U	1.00	ug/L	B311107	
Chromium	---	U	2.00	ug/L	B311107	
Copper	2.19		1.00	ug/L	B311107	
Lead	---	U	1.00	ug/L	B311107	
Manganese	3.69		1.00	ug/L	B311107	
Nickel	---	U	1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	4.64		2.00	ug/L	B311107	

**Field ID:** [REDACTED]

**Sample ID: 2311039-38**

**Metals ICP**

Calcium	2110		500	ug/L	B311106	
Iron	424		50.0	ug/L	B311106	
Magnesium	626		500	ug/L	B311106	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311039-38**

**Metals ICP**

Potassium	4490		500	ug/L	B311106	
Sodium	90900		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	
Cadmium	---	U	1.00	ug/L	B311107	
Chromium	---	U	2.00	ug/L	B311107	
Copper	2.60		1.00	ug/L	B311107	
Lead	---	U	1.00	ug/L	B311107	
Manganese	4.45		1.00	ug/L	B311107	
Nickel	---	U	1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	5.34		2.00	ug/L	B311107	

**Field ID:** [REDACTED]

**Sample ID: 2311039-39**

**Metals ICP**

Calcium	2110		500	ug/L	B311106	
Iron	398		50.0	ug/L	B311106	
Magnesium	629		500	ug/L	B311106	
Potassium	4470		500	ug/L	B311106	
Sodium	90500		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311039-39**

**Metals ICPMS**

Cadmium	---	U	1.00	ug/L	B311107	
Chromium	---	U	2.00	ug/L	B311107	
Copper	2.67		1.00	ug/L	B311107	
Lead	---	U	1.00	ug/L	B311107	
Manganese	4.46		1.00	ug/L	B311107	
Nickel	---	U	1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	6.02		2.00	ug/L	B311107	

**Field ID:** [REDACTED]

**Sample ID: 2311039-40**

**Metals ICP**

Calcium	2300		500	ug/L	B311106	
Iron	327		50.0	ug/L	B311106	
Magnesium	938		500	ug/L	B311106	
Potassium	4410		500	ug/L	B311106	
Sodium	89100		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	
Cadmium	---	U	1.00	ug/L	B311107	
Chromium	5.77		2.00	ug/L	B311107	
Copper	26.9		1.00	ug/L	B311107	
Lead	3.35		1.00	ug/L	B311107	
Manganese	2.70		1.00	ug/L	B311107	
Nickel	59.7		1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	195		2.00	ug/L	B311107	





**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311039-41**

**Metals ICP**

Calcium	2260		500	ug/L	B311106	
Iron	283		50.0	ug/L	B311106	
Magnesium	925		500	ug/L	B311106	
Potassium	4430		500	ug/L	B311106	
Sodium	89000		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	
Cadmium	---	U	1.00	ug/L	B311107	
Chromium	---	U	2.00	ug/L	B311107	
Copper	8.36		1.00	ug/L	B311107	
Lead	1.28		1.00	ug/L	B311107	
Manganese	2.66		1.00	ug/L	B311107	
Nickel	4.27		1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	104		2.00	ug/L	B311107	

**Field ID:** [REDACTED]

**Sample ID: 2311039-42**

**Metals ICP**

Calcium	2340		500	ug/L	B311106	
Iron	381		50.0	ug/L	B311106	
Magnesium	957		500	ug/L	B311106	
Potassium	4540		500	ug/L	B311106	
Sodium	91000		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311107	
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**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311039-42**

**Metals ICPMS**

Antimony	---	U	1.00	ug/L	B311107
Arsenic	---	U	1.00	ug/L	B311107
Barium	---	U	1.00	ug/L	B311107
Cadmium	---	U	1.00	ug/L	B311107
Chromium	---	U	2.00	ug/L	B311107
Copper	12.6		1.00	ug/L	B311107
Lead	1.76		1.00	ug/L	B311107
Manganese	3.42		1.00	ug/L	B311107
Nickel	1.57		1.00	ug/L	B311107
Vanadium	---	U	1.00	ug/L	B311107
Zinc	28.4		2.00	ug/L	B311107

**Field ID:** [REDACTED]

**Sample ID: 2311039-43**

**Metals ICP**

Calcium	2260		500	ug/L	B311106
Iron	478		50.0	ug/L	B311106
Magnesium	932		500	ug/L	B311106
Potassium	4430		500	ug/L	B311106
Sodium	88800		1000	ug/L	B311106
Tin	---	U	10.0	ug/L	B311106

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311107
Antimony	---	U	1.00	ug/L	B311107
Arsenic	---	U	1.00	ug/L	B311107
Barium	---	U	1.00	ug/L	B311107
Cadmium	---	U	1.00	ug/L	B311107
Chromium	---	U	2.00	ug/L	B311107
Copper	14.5		1.00	ug/L	B311107
Lead	2.11		1.00	ug/L	B311107
Manganese	4.14		1.00	ug/L	B311107



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311039-43**

**Metals ICPMS**

Nickel	---	U	1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	16.3		2.00	ug/L	B311107	

**Field ID:** [REDACTED]

**Sample ID: 2311039-44**

**Metals ICP**

Calcium	2250		500	ug/L	B311106	
Iron	627		50.0	ug/L	B311106	
Magnesium	935		500	ug/L	B311106	
Potassium	4450		500	ug/L	B311106	
Sodium	89300		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	
Cadmium	---	U	1.00	ug/L	B311107	
Chromium	---	U	2.00	ug/L	B311107	
Copper	20.9		1.00	ug/L	B311107	
Lead	2.56		1.00	ug/L	B311107	
Manganese	4.85		1.00	ug/L	B311107	
Nickel	---	U	1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	21.1		2.00	ug/L	B311107	

**Field ID:** [REDACTED]

**Sample ID: 2311039-45**

**Metals ICP**

Calcium	2250		500	ug/L	B311106	
Iron	577		50.0	ug/L	B311106	
Magnesium	936		500	ug/L	B311106	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**  
**Project: US VI Drinking Water - 2311021**  
**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311039-45**

**Metals ICP**

Potassium	4450		500	ug/L	B311106	
Sodium	89400		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	
Cadmium	---	U	1.00	ug/L	B311107	
Chromium	---	U	2.00	ug/L	B311107	
Copper	21.9		1.00	ug/L	B311107	
Lead	2.42		1.00	ug/L	B311107	
Manganese	4.36		1.00	ug/L	B311107	
Nickel	---	U	1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	20.1		2.00	ug/L	B311107	

**Field ID:** [REDACTED]

**Sample ID: 2311039-46**

**Metals ICP**

Calcium	2320		500	ug/L	B311106	
Iron	533		50.0	ug/L	B311106	
Magnesium	970		500	ug/L	B311106	
Potassium	4490		500	ug/L	B311106	
Sodium	91300		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311039-46**

**Metals ICPMS**

Cadmium	---	U	1.00	ug/L	B311107	
Chromium	---	U	2.00	ug/L	B311107	
Copper	19.0		1.00	ug/L	B311107	
Lead	2.26		1.00	ug/L	B311107	
Manganese	4.10		1.00	ug/L	B311107	
Nickel	---	U	1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	19.8		2.00	ug/L	B311107	

**Field ID:** [REDACTED]

**Sample ID: 2311039-47**

**Metals ICP**

Calcium	2300		500	ug/L	B311106	
Iron	709		50.0	ug/L	B311106	
Magnesium	963		500	ug/L	B311106	
Potassium	4510		500	ug/L	B311106	
Sodium	91000		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	
Cadmium	---	U	1.00	ug/L	B311107	
Chromium	---	U	2.00	ug/L	B311107	
Copper	21.9		1.00	ug/L	B311107	
Lead	2.47		1.00	ug/L	B311107	
Manganese	5.14		1.00	ug/L	B311107	
Nickel	---	U	1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	20.9		2.00	ug/L	B311107	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311039-48**

**Metals ICP**

Calcium	2330		500	ug/L	B311106	
Iron	528		50.0	ug/L	B311106	
Magnesium	978		500	ug/L	B311106	
Potassium	4560		500	ug/L	B311106	
Sodium	92100		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	
Cadmium	---	U	1.00	ug/L	B311107	
Chromium	---	U	2.00	ug/L	B311107	
Copper	18.8		1.00	ug/L	B311107	
Lead	2.06		1.00	ug/L	B311107	
Manganese	4.04		1.00	ug/L	B311107	
Nickel	---	U	1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	18.4		2.00	ug/L	B311107	

**Field ID:** [REDACTED]

**Sample ID: 2311039-49**

**Metals ICP**

Calcium	2330		500	ug/L	B311106	
Iron	657		50.0	ug/L	B311106	
Magnesium	977		500	ug/L	B311106	
Potassium	4550		500	ug/L	B311106	
Sodium	92200		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311107	
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**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311039-49**

**Metals ICPMS**

Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	
Cadmium	---	U	1.00	ug/L	B311107	
Chromium	---	U	2.00	ug/L	B311107	
Copper	19.7		1.00	ug/L	B311107	
Lead	2.11		1.00	ug/L	B311107	
Manganese	6.17		1.00	ug/L	B311107	
Nickel	---	U	1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	19.3		2.00	ug/L	B311107	

**Field ID:** [REDACTED]

**Sample ID: 2311039-50**

**Metals ICP**

Calcium	2340		500	ug/L	B311106	
Iron	889		50.0	ug/L	B311106	
Magnesium	977		500	ug/L	B311106	
Potassium	4550		500	ug/L	B311106	
Sodium	92200		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	
Cadmium	---	U	1.00	ug/L	B311107	
Chromium	---	U	2.00	ug/L	B311107	
Copper	22.8		1.00	ug/L	B311107	
Lead	2.24		1.00	ug/L	B311107	
Manganese	6.28		1.00	ug/L	B311107	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report  
Project: US VI Drinking Water - 2311021  
Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311039-50**

**Metals ICPMS**

Nickel	---	U	1.00	ug/L	B311107
Vanadium	---	U	1.00	ug/L	B311107
Zinc	21.3		2.00	ug/L	B311107

**Field ID:** [REDACTED]

**Sample ID: 2311039-51**

**Metals ICP**

Calcium	2330		500	ug/L	B311106
Iron	742		50.0	ug/L	B311106
Magnesium	978		500	ug/L	B311106
Potassium	4540		500	ug/L	B311106
Sodium	91900		1000	ug/L	B311106
Tin	---	U	10.0	ug/L	B311106

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311107
Antimony	---	U	1.00	ug/L	B311107
Arsenic	---	U	1.00	ug/L	B311107
Barium	---	U	1.00	ug/L	B311107
Cadmium	---	U	1.00	ug/L	B311107
Chromium	---	U	2.00	ug/L	B311107
Copper	21.7		1.00	ug/L	B311107
Lead	2.16		1.00	ug/L	B311107
Manganese	5.35		1.00	ug/L	B311107
Nickel	---	U	1.00	ug/L	B311107
Vanadium	---	U	1.00	ug/L	B311107
Zinc	20.8		2.00	ug/L	B311107

**Field ID:** [REDACTED]

**Sample ID: 2311039-52**

**Metals ICP**

Calcium	2330		500	ug/L	B311106
Iron	923		50.0	ug/L	B311106
Magnesium	972		500	ug/L	B311106





**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311039-52**

**Metals ICP**

Potassium	4510		500	ug/L	B311106	
Sodium	91700		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	
Cadmium	---	U	1.00	ug/L	B311107	
Chromium	---	U	2.00	ug/L	B311107	
Copper	23.1		1.00	ug/L	B311107	
Lead	2.47		1.00	ug/L	B311107	
Manganese	6.30		1.00	ug/L	B311107	
Nickel	---	U	1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	20.2		2.00	ug/L	B311107	

**Field ID:** [REDACTED]

**Sample ID: 2311039-53**

**Metals ICP**

Calcium	2340		500	ug/L	B311106	
Iron	1090		50.0	ug/L	B311106	
Magnesium	978		500	ug/L	B311106	
Potassium	4560		500	ug/L	B311106	
Sodium	92200		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

Analyte	Result	Qualifier	Reporting Limit	Units	Batch	Date and Time of Analysis*
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**Field ID:** [REDACTED]

**Sample ID: 2311039-53**

**Metals ICPMS**

Cadmium	---	U	1.00	ug/L	B311107	
Chromium	---	U	2.00	ug/L	B311107	
Copper	30.7		1.00	ug/L	B311107	
Lead	3.81		1.00	ug/L	B311107	
Manganese	8.08		1.00	ug/L	B311107	
Nickel	---	U	1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	25.2		2.00	ug/L	B311107	

**Field ID:** [REDACTED]

**Sample ID: 2311039-54**

**Metals ICP**

Calcium	2340		500	ug/L	B311106	
Iron	782		50.0	ug/L	B311106	
Magnesium	978		500	ug/L	B311106	
Potassium	4500		500	ug/L	B311106	
Sodium	92000		1000	ug/L	B311106	
Tin	---	U	10.0	ug/L	B311106	

**Metals ICPMS**

Aluminum	---	U	20.0	ug/L	B311107	
Antimony	---	U	1.00	ug/L	B311107	
Arsenic	---	U	1.00	ug/L	B311107	
Barium	---	U	1.00	ug/L	B311107	
Cadmium	---	U	1.00	ug/L	B311107	
Chromium	---	U	2.00	ug/L	B311107	
Copper	26.9		1.00	ug/L	B311107	
Lead	4.87		1.00	ug/L	B311107	
Manganese	5.71		1.00	ug/L	B311107	
Nickel	---	U	1.00	ug/L	B311107	
Vanadium	---	U	1.00	ug/L	B311107	
Zinc	17.8		2.00	ug/L	B311107	



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

**Metals ICP - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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**Batch B311076**

**Blank (B311076-BLK1)**

Calcium	--- U	500	ug/L						
Iron	--- U	50.0	ug/L						
Magnesium	--- U	500	ug/L						
Potassium	--- U	500	ug/L						
Sodium	--- U	1000	ug/L						
Tin	--- U	10.0	ug/L						

**Blank (B311076-BLK2)**

Calcium	--- U	500	ug/L						
Iron	--- U	50.0	ug/L						
Magnesium	--- U	500	ug/L						
Potassium	--- U	500	ug/L						
Sodium	--- U	1000	ug/L						
Tin	--- U	10.0	ug/L						

**LCS (B311076-BS1)**

Calcium	4860	500	ug/L	5000		97.2	85-115		
Iron	4960	50.0	ug/L	5000		99.2	85-115		
Magnesium	4940	500	ug/L	5000		98.9	85-115		
Potassium	4900	500	ug/L	5000		98.0	85-115		
Sodium	4730	1000	ug/L	5000		94.6	85-115		
Tin	196	10.0	ug/L	200.0		98.1	85-115		

**LCS (B311076-BS2)**

Calcium	4810	500	ug/L	5000		96.2	85-115		
Iron	4970	50.0	ug/L	5000		99.4	85-115		
Magnesium	4940	500	ug/L	5000		98.9	85-115		
Potassium	4940	500	ug/L	5000		98.7	85-115		
Sodium	4770	1000	ug/L	5000		95.3	85-115		
Tin	200	10.0	ug/L	200.0		100	85-115		



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

**Metals ICP - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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**Batch B311076**

**LCS Dup (B311076-BSD1)**

Calcium	4880	500	ug/L	5000		97.6	85-115	0.382	20
Iron	4980	50.0	ug/L	5000		99.6	85-115	0.392	20
Magnesium	4960	500	ug/L	5000		99.1	85-115	0.234	20
Potassium	4920	500	ug/L	5000		98.4	85-115	0.399	20
Sodium	4750	1000	ug/L	5000		95.0	85-115	0.512	20
Tin	198	10.0	ug/L	200.0		98.9	85-115	0.853	20

**LCS Dup (B311076-BSD2)**

Calcium	4790	500	ug/L	5000		95.8	85-115	0.465	20
Iron	4940	50.0	ug/L	5000		98.9	85-115	0.571	20
Magnesium	4910	500	ug/L	5000		98.3	85-115	0.611	20
Potassium	4920	500	ug/L	5000		98.3	85-115	0.396	20
Sodium	4740	1000	ug/L	5000		94.7	85-115	0.649	20
Tin	197	10.0	ug/L	200.0		98.6	85-115	1.46	20

**Matrix Spike (B311076-MS1)**

**Source: 2311021-48**

Calcium	8070	500	ug/L	5000	2860	104	80-120		
Iron	5600	50.0	ug/L	5000	260	107	80-120		
Magnesium	6340	500	ug/L	5000	1100	105	80-120		
Potassium	9670	500	ug/L	5000	4570	102	80-120		
Sodium	95500	1000	ug/L	5000	92300	63.5	80-120		
Tin	223	10.0	ug/L	200.0	ND	112	80-120		

**Matrix Spike (B311076-MS2)**

**Source: 2311021-41**

Calcium	8140	500	ug/L	5000	2930	104	80-120		
Iron	5450	50.0	ug/L	5000	52.4	108	80-120		
Magnesium	6300	500	ug/L	5000	1030	105	80-120		
Potassium	9750	500	ug/L	5000	4640	102	80-120		
Sodium	95700	1000	ug/L	5000	92800	57.5	80-120		
Tin	225	10.0	ug/L	200.0	ND	112	80-120		



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

**Metals ICP - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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**Batch B311076**

**Matrix Spike (B311076-MS3)**

**Source: 2311021-19**

Calcium	7770	500	ug/L	5000	2650	102	80-120		
Iron	5320	50.0	ug/L	5000	72.4	105	80-120		
Magnesium	6110	500	ug/L	5000	998	102	80-120		
Potassium	9610	500	ug/L	5000	4570	101	80-120		
Sodium	95100	1000	ug/L	5000	91600	71.1	80-120		
Tin	221	10.0	ug/L	200.0	ND	111	80-120		

**Matrix Spike Dup (B311076-MSD1)**

**Source: 2311021-48**

Calcium	7320	2500	ug/L	5000	2860	89.0	80-120	9.84	10
Iron	5080	250	ug/L	5000	260	96.4	80-120	9.66	10
Magnesium	5710	2500	ug/L	5000	1100	92.2	80-120	10.3	10
Potassium	9470	2500	ug/L	5000	4570	98.0	80-120	2.11	10
Sodium	89800	5000	ug/L	5000	92300	NR	80-120	6.19	10
Tin	201	50.0	ug/L	200.0	ND	101	80-120	10.2	10

**Matrix Spike Dup (B311076-MSD2)**

**Source: 2311021-41**

Calcium	7740	2500	ug/L	5000	2930	96.3	80-120	4.97	10
Iron	5190	250	ug/L	5000	52.4	103	80-120	4.85	10
Magnesium	6000	2500	ug/L	5000	1030	99.4	80-120	4.82	10
Potassium	9530	2500	ug/L	5000	4640	97.8	80-120	2.28	10
Sodium	93700	5000	ug/L	5000	92800	16.8	80-120	2.15	10
Tin	212	50.0	ug/L	200.0	ND	106	80-120	5.63	10

**Matrix Spike Dup (B311076-MSD3)**

**Source: 2311021-19**

Calcium	7040	2500	ug/L	5000	2650	87.8	80-120	9.80	10
Iron	4850	250	ug/L	5000	72.4	95.6	80-120	9.19	10
Magnesium	5550	2500	ug/L	5000	998	91.1	80-120	9.60	10
Potassium	9280	2500	ug/L	5000	4570	94.4	80-120	3.47	10
Sodium	89400	5000	ug/L	5000	91600	NR	80-120	6.22	10
Tin	210	50.0	ug/L	200.0	ND	105	80-120	5.04	10



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

**Metals ICP - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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**Batch B311077**

**Blank (B311077-BLK1)**

Calcium	--- U	500	ug/L						
Iron	--- U	50.0	ug/L						
Magnesium	--- U	500	ug/L						
Potassium	--- U	500	ug/L						
Sodium	--- U	1000	ug/L						
Tin	--- U	10.0	ug/L						

**Blank (B311077-BLK2)**

Calcium	--- U	500	ug/L						
Iron	--- U	50.0	ug/L						
Magnesium	--- U	500	ug/L						
Potassium	--- U	500	ug/L						
Sodium	--- U	1000	ug/L						
Tin	--- U	10.0	ug/L						

**LCS (B311077-BS1)**

Calcium	4820	500	ug/L	5000		96.4	85-115		
Iron	4840	50.0	ug/L	5000		96.9	85-115		
Magnesium	4880	500	ug/L	5000		97.5	85-115		
Potassium	4880	500	ug/L	5000		97.6	85-115		
Sodium	4660	1000	ug/L	5000		93.2	85-115		
Tin	190	10.0	ug/L	200.0		95.2	85-115		

**LCS (B311077-BS2)**

Calcium	4880	500	ug/L	5000		97.6	85-115		
Iron	4910	50.0	ug/L	5000		98.1	85-115		
Magnesium	4940	500	ug/L	5000		98.7	85-115		
Potassium	4970	500	ug/L	5000		99.4	85-115		
Sodium	4760	1000	ug/L	5000		95.2	85-115		
Tin	194	10.0	ug/L	200.0		96.8	85-115		



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

**Metals ICP - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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**Batch B311077**

**LCS Dup (B311077-BSD1)**

Calcium	4870	500	ug/L	5000		97.4	85-115	1.04	20
Iron	4900	50.0	ug/L	5000		98.0	85-115	1.11	20
Magnesium	4930	500	ug/L	5000		98.6	85-115	1.04	20
Potassium	4950	500	ug/L	5000		98.9	85-115	1.34	20
Sodium	4730	1000	ug/L	5000		94.5	85-115	1.47	20
Tin	194	10.0	ug/L	200.0		97.0	85-115	1.87	20

**LCS Dup (B311077-BSD2)**

Calcium	4790	500	ug/L	5000		95.8	85-115	1.88	20
Iron	4820	50.0	ug/L	5000		96.3	85-115	1.84	20
Magnesium	4840	500	ug/L	5000		96.8	85-115	1.95	20
Potassium	4890	500	ug/L	5000		97.8	85-115	1.65	20
Sodium	4670	1000	ug/L	5000		93.5	85-115	1.79	20
Tin	189	10.0	ug/L	200.0		94.5	85-115	2.35	20

**Matrix Spike (B311077-MS1)**

**Source: 2311021-62**

Calcium	8220	500	ug/L	5000	3320	98.0	80-120		
Iron	5060	50.0	ug/L	5000	96.7	99.3	80-120		
Magnesium	5960	500	ug/L	5000	1020	98.7	80-120		
Potassium	9290	500	ug/L	5000	4400	97.7	80-120		
Sodium	91100	1000	ug/L	5000	88200	57.6	80-120		
Tin	210	10.0	ug/L	200.0	ND	105	80-120		

**Matrix Spike (B311077-MS2)**

**Source: 2311021-06**

Calcium	7730	500	ug/L	5000	2900	96.6	80-120		
Iron	5050	50.0	ug/L	5000	149	98.0	80-120		
Magnesium	5820	500	ug/L	5000	969	96.9	80-120		
Potassium	9190	500	ug/L	5000	4390	96.1	80-120		
Sodium	88900	1000	ug/L	5000	86300	51.9	80-120		
Tin	202	10.0	ug/L	200.0	ND	101	80-120		



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

**Metals ICP - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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**Batch B311077**

**Matrix Spike (B311077-MS3)**

**Source: 2311021-21**

Calcium	13400	500	ug/L	5000	8770	92.5	80-120		
Iron	4940	50.0	ug/L	5000	34.7	98.1	80-120		
Magnesium	5370	500	ug/L	5000	515	97.0	80-120		
Potassium	9290	500	ug/L	5000	4480	96.2	80-120		
Sodium	92400	1000	ug/L	5000	91100	27.6	80-120		
Tin	201	10.0	ug/L	200.0	ND	101	80-120		

**Matrix Spike (B311077-MS4)**

**Source: 2311021-32**

Calcium	7900	500	ug/L	5000	3100	96.0	80-120		
Iron	7450	50.0	ug/L	5000	2710	94.9	80-120		
Magnesium	5790	500	ug/L	5000	948	96.9	80-120		
Potassium	9150	500	ug/L	5000	4400	95.0	80-120		
Sodium	88600	1000	ug/L	5000	86800	37.3	80-120		
Tin	202	10.0	ug/L	200.0	ND	101	80-120		

**Matrix Spike Dup (B311077-MSD1)**

**Source: 2311021-62**

Calcium	7660	2500	ug/L	5000	3320	86.8	80-120	7.05	10
Iron	4730	250	ug/L	5000	96.7	92.6	80-120	6.86	10
Magnesium	5430	2500	ug/L	5000	1020	88.1	80-120	9.25	10
Potassium	9010	2500	ug/L	5000	4400	92.1	80-120	3.06	10
Sodium	87400	5000	ug/L	5000	88200	NR	80-120	4.13	10
Tin	191	50.0	ug/L	200.0	ND	95.6	80-120	9.52	10

**Matrix Spike Dup (B311077-MSD2)**

**Source: 2311021-06**

Calcium	7270	2500	ug/L	5000	2900	87.3	80-120	6.19	10
Iron	4740	250	ug/L	5000	149	91.9	80-120	6.22	10
Magnesium	5340	2500	ug/L	5000	969	87.5	80-120	8.47	10
Potassium	9070	2500	ug/L	5000	4390	93.6	80-120	1.35	10
Sodium	86000	5000	ug/L	5000	86300	NR	80-120	3.42	10
Tin	193	50.0	ug/L	200.0	ND	96.4	80-120	4.92	10





**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

**Metals ICP - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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**Batch B311077**

**Matrix Spike Dup (B311077-MSD3)**

**Source: 2311021-21**

Calcium	12200	2500	ug/L	5000	8770	68.1	80-120	9.55	10
Iron	4500	250	ug/L	5000	ND	89.9	80-120	9.37	10
Magnesium	4790	2500	ug/L	5000	515	85.6	80-120	11.3	10
Potassium	8910	2500	ug/L	5000	4480	88.8	80-120	4.10	10
Sodium	86900	5000	ug/L	5000	91100	NR	80-120	6.14	10
Tin	189	50.0	ug/L	200.0	ND	94.4	80-120	6.35	10

**Matrix Spike Dup (B311077-MSD4)**

**Source: 2311021-32**

Calcium	7510	2500	ug/L	5000	3100	88.2	80-120	5.09	10
Iron	7150	250	ug/L	5000	2710	88.7	80-120	4.22	10
Magnesium	5370	2500	ug/L	5000	948	88.5	80-120	7.51	10
Potassium	9000	2500	ug/L	5000	4400	91.9	80-120	1.70	10
Sodium	86900	5000	ug/L	5000	86800	2.94	80-120	1.96	10
Tin	194	50.0	ug/L	200.0	ND	97.1	80-120	4.05	10

**Batch B311106**

**Blank (B311106-BLK1)**

Calcium	--- U	500	ug/L						
Iron	--- U	50.0	ug/L						
Magnesium	--- U	500	ug/L						
Potassium	--- U	500	ug/L						
Sodium	--- U	1000	ug/L						
Tin	--- U	10.0	ug/L						

**Blank (B311106-BLK2)**

Calcium	--- U	500	ug/L						
Iron	--- U	50.0	ug/L						
Magnesium	--- U	500	ug/L						
Potassium	--- U	500	ug/L						
Sodium	--- U	1000	ug/L						
Tin	--- U	10.0	ug/L						



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

**Metals ICP - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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**Batch B311106**

**Blank (B311106-BLK3)**

Calcium	--- U	500	ug/L						
Iron	--- U	50.0	ug/L						
Magnesium	--- U	500	ug/L						
Potassium	--- U	500	ug/L						
Sodium	--- U	1000	ug/L						
Tin	--- U	10.0	ug/L						

**LCS (B311106-BS1)**

Calcium	4850	500	ug/L	5000		97.1	85-115		
Iron	4880	50.0	ug/L	5000		97.7	85-115		
Magnesium	4820	500	ug/L	5000		96.4	85-115		
Potassium	4820	500	ug/L	5000		96.4	85-115		
Sodium	4700	1000	ug/L	5000		94.0	85-115		
Tin	185	10.0	ug/L	200.0		92.7	85-115		

**LCS (B311106-BS2)**

Calcium	4940	500	ug/L	5000		98.7	85-115		
Iron	5010	50.0	ug/L	5000		100	85-115		
Magnesium	4920	500	ug/L	5000		98.4	85-115		
Potassium	4930	500	ug/L	5000		98.6	85-115		
Sodium	4880	1000	ug/L	5000		97.6	85-115		
Tin	199	10.0	ug/L	200.0		99.7	85-115		

**LCS (B311106-BS3)**

Calcium	4820	500	ug/L	5000		96.5	85-115		
Iron	4900	50.0	ug/L	5000		98.0	85-115		
Magnesium	4770	500	ug/L	5000		95.4	85-115		
Potassium	4840	500	ug/L	5000		96.8	85-115		
Sodium	4780	1000	ug/L	5000		95.5	85-115		
Tin	193	10.0	ug/L	200.0		96.3	85-115		



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

**Metals ICP - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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**Batch B311106**

**LCS Dup (B311106-BSD1)**

Calcium	4890	500	ug/L	5000		97.8	85-115	0.745	20
Iron	4920	50.0	ug/L	5000		98.5	85-115	0.820	20
Magnesium	4870	500	ug/L	5000		97.4	85-115	1.00	20
Potassium	4870	500	ug/L	5000		97.3	85-115	0.969	20
Sodium	4730	1000	ug/L	5000		94.6	85-115	0.670	20
Tin	193	10.0	ug/L	200.0		96.6	85-115	4.15	20

**LCS Dup (B311106-BSD2)**

Calcium	4910	500	ug/L	5000		98.3	85-115	0.458	20
Iron	4980	50.0	ug/L	5000		99.6	85-115	0.486	20
Magnesium	4890	500	ug/L	5000		97.8	85-115	0.566	20
Potassium	4910	500	ug/L	5000		98.1	85-115	0.461	20
Sodium	4820	1000	ug/L	5000		96.5	85-115	1.17	20
Tin	199	10.0	ug/L	200.0		99.5	85-115	0.181	20

**LCS Dup (B311106-BSD3)**

Calcium	4790	500	ug/L	5000		95.8	85-115	0.682	20
Iron	4870	50.0	ug/L	5000		97.4	85-115	0.613	20
Magnesium	4740	500	ug/L	5000		94.9	85-115	0.558	20
Potassium	4800	500	ug/L	5000		96.0	85-115	0.821	20
Sodium	4730	1000	ug/L	5000		94.5	85-115	1.09	20
Tin	192	10.0	ug/L	200.0		96.2	85-115	0.156	20

**Matrix Spike (B311106-MS1)**

**Source: 2311039-02**

Calcium	7330	500	ug/L	5000	2250	102	80-120		
Iron	5170	50.0	ug/L	5000	26.1	103	80-120		
Magnesium	6030	500	ug/L	5000	1030	100	80-120		
Potassium	9550	500	ug/L	5000	4550	100	80-120		
Sodium	94000	1000	ug/L	5000	91300	53.9	80-120		
Tin	209	10.0	ug/L	200.0	ND	104	80-120		



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

**Metals ICP - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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**Batch B311106**

**Matrix Spike (B311106-MS2)**

**Source: 2311039-12**

Calcium	8940	500	ug/L	5000	3730	104	80-120		
Iron	5260	50.0	ug/L	5000	58.6	104	80-120		
Magnesium	6020	500	ug/L	5000	977	101	80-120		
Potassium	9600	500	ug/L	5000	4450	103	80-120		
Sodium	94200	1000	ug/L	5000	88400	117	80-120		
Tin	213	10.0	ug/L	200.0	ND	107	80-120		

**Matrix Spike (B311106-MS3)**

**Source: 2311039-22**

Calcium	8990	500	ug/L	5000	3840	103	80-120		
Iron	5320	50.0	ug/L	5000	81.4	105	80-120		
Magnesium	6060	500	ug/L	5000	1010	101	80-120		
Potassium	9590	500	ug/L	5000	4490	102	80-120		
Sodium	93100	1000	ug/L	5000	89100	80.0	80-120		
Tin	216	10.0	ug/L	200.0	ND	108	80-120		

**Matrix Spike (B311106-MS4)**

**Source: 2311039-35**

Calcium	7160	500	ug/L	5000	2050	102	80-120		
Iron	5500	50.0	ug/L	5000	287	104	80-120		
Magnesium	5600	500	ug/L	5000	605	99.8	80-120		
Potassium	9480	500	ug/L	5000	4430	101	80-120		
Sodium	93000	1000	ug/L	5000	89500	68.8	80-120		
Tin	213	10.0	ug/L	200.0	ND	107	80-120		

**Matrix Spike (B311106-MS5)**

**Source: 2311039-45**

Calcium	7370	500	ug/L	5000	2250	102	80-120		
Iron	5760	50.0	ug/L	5000	577	104	80-120		
Magnesium	5960	500	ug/L	5000	936	100	80-120		
Potassium	9450	500	ug/L	5000	4450	100	80-120		
Sodium	93100	1000	ug/L	5000	89400	75.5	80-120		
Tin	210	10.0	ug/L	200.0	ND	105	80-120		



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

**Metals ICP - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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**Batch B311106**

**Matrix Spike (B311106-MS6)**

**Source: 2311039-54**

Calcium	7610	500	ug/L	5000	2340	105	80-120		
Iron	6090	50.0	ug/L	5000	782	106	80-120		
Magnesium	6230	500	ug/L	5000	978	105	80-120		
Potassium	9660	500	ug/L	5000	4500	103	80-120		
Sodium	95600	1000	ug/L	5000	92000	72.3	80-120		
Tin	221	10.0	ug/L	200.0	ND	110	80-120		

**Matrix Spike Dup (B311106-MSD1)**

**Source: 2311039-02**

Calcium	6890	2500	ug/L	5000	2250	92.7	80-120	6.19	10
Iron	4860	250	ug/L	5000	ND	97.3	80-120	6.14	10
Magnesium	5580	2500	ug/L	5000	1030	91.1	80-120	7.70	10
Potassium	9360	2500	ug/L	5000	4550	96.2	80-120	2.05	10
Sodium	90700	5000	ug/L	5000	91300	NR	80-120	3.56	10
Tin	207	50.0	ug/L	200.0	ND	103	80-120	0.943	10

**Matrix Spike Dup (B311106-MSD2)**

**Source: 2311039-12**

Calcium	8290	2500	ug/L	5000	3730	91.2	80-120	7.55	10
Iron	4870	250	ug/L	5000	58.6	96.3	80-120	7.61	10
Magnesium	5530	2500	ug/L	5000	977	91.0	80-120	8.49	10
Potassium	9350	2500	ug/L	5000	4450	98.1	80-120	2.59	10
Sodium	90300	5000	ug/L	5000	88400	39.3	80-120	4.21	10
Tin	198	50.0	ug/L	200.0	ND	98.8	80-120	7.59	10

**Matrix Spike Dup (B311106-MSD3)**

**Source: 2311039-22**

Calcium	8630	2500	ug/L	5000	3840	95.8	80-120	4.08	10
Iron	5120	250	ug/L	5000	81.4	101	80-120	3.90	10
Magnesium	5760	2500	ug/L	5000	1010	95.2	80-120	4.96	10
Potassium	9470	2500	ug/L	5000	4490	99.7	80-120	1.20	10
Sodium	92600	5000	ug/L	5000	89100	70.2	80-120	0.527	10
Tin	208	50.0	ug/L	200.0	ND	104	80-120	3.98	10



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

**Metals ICP - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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**Batch B311106**

**Matrix Spike Dup (B311106-MSD4)**

**Source: 2311039-35**

Calcium	6790	2500	ug/L	5000	2050	94.7	80-120	5.34	10
Iron	5200	250	ug/L	5000	287	98.3	80-120	5.62	10
Magnesium	5290	2500	ug/L	5000	605	93.6	80-120	5.69	10
Potassium	9350	2500	ug/L	5000	4430	98.4	80-120	1.34	10
Sodium	91200	5000	ug/L	5000	89500	32.4	80-120	1.98	10
Tin	203	50.0	ug/L	200.0	ND	101	80-120	5.10	10

**Matrix Spike Dup (B311106-MSD5)**

**Source: 2311039-45**

Calcium	6980	2500	ug/L	5000	2250	94.5	80-120	5.54	10
Iron	5410	250	ug/L	5000	577	96.7	80-120	6.22	10
Magnesium	5580	2500	ug/L	5000	936	92.8	80-120	6.62	10
Potassium	8930	2500	ug/L	5000	4450	89.7	80-120	5.61	10
Sodium	90600	5000	ug/L	5000	89400	24.8	80-120	2.76	10
Tin	203	50.0	ug/L	200.0	ND	101	80-120	3.28	10

**Matrix Spike Dup (B311106-MSD6)**

**Source: 2311039-54**

Calcium	7340	2500	ug/L	5000	2340	100	80-120	3.54	10
Iron	5880	250	ug/L	5000	782	102	80-120	3.56	10
Magnesium	5880	2500	ug/L	5000	978	98.1	80-120	5.80	10
Potassium	9560	2500	ug/L	5000	4500	101	80-120	1.08	10
Sodium	95500	5000	ug/L	5000	92000	70.5	80-120	0.0943	10
Tin	209	50.0	ug/L	200.0	ND	105	80-120	5.36	10

**Batch B311111**

**Blank (B311111-BLK1)**

Calcium	--- U	500	ug/L						
Iron	--- U	50.0	ug/L						
Magnesium	--- U	500	ug/L						
Potassium	--- U	500	ug/L						
Sodium	--- U	1000	ug/L						
Tin	--- U	10.0	ug/L						



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

**Metals ICP - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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**Batch B311111**

**LCS (B311111-BS1)**

Calcium	4780	500	ug/L	5000		95.6	85-115		
Iron	4890	50.0	ug/L	5000		97.8	85-115		
Magnesium	4680	500	ug/L	5000		93.6	85-115		
Potassium	4870	500	ug/L	5000		97.4	85-115		
Sodium	4710	1000	ug/L	5000		94.2	85-115		
Tin	196	10.0	ug/L	200.0		97.9	85-115		

**LCS Dup (B311111-BSD1)**

Calcium	4770	500	ug/L	5000		95.4	85-115	0.231	20
Iron	4840	50.0	ug/L	5000		96.8	85-115	0.975	20
Magnesium	4640	500	ug/L	5000		92.7	85-115	0.941	20
Potassium	4830	500	ug/L	5000		96.6	85-115	0.841	20
Sodium	4660	1000	ug/L	5000		93.2	85-115	1.04	20
Tin	193	10.0	ug/L	200.0		96.3	85-115	1.64	20

**Matrix Spike (B311111-MS1)**

**Source: 2311039-25**

Calcium	7640	500	ug/L	5000	3010	92.6	80-120		
Iron	6280	50.0	ug/L	5000	1510	95.3	80-120		
Magnesium	5460	500	ug/L	5000	928	90.7	80-120		
Potassium	9040	500	ug/L	5000	4450	91.9	80-120		
Sodium	90500	1000	ug/L	5000	89900	11.0	80-120		
Tin	200	10.0	ug/L	200.0	5.61	97.1	80-120		

**Matrix Spike Dup (B311111-MSD1)**

**Source: 2311039-25**

Calcium	7680	2500	ug/L	5000	3010	93.4	80-120	0.484	10
Iron	6310	250	ug/L	5000	1510	95.9	80-120	0.441	10
Magnesium	5530	2500	ug/L	5000	928	92.1	80-120	1.25	10
Potassium	9240	2500	ug/L	5000	4450	95.8	80-120	2.13	10
Sodium	93300	5000	ug/L	5000	89900	68.8	80-120	3.15	10
Tin	207	50.0	ug/L	200.0	ND	103	80-120	3.30	10



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

**Metals ICPMS - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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**Batch B311080**

**Blank (B311080-BLK1)**

Aluminum	--- U	20.0	ug/L						
Antimony	--- U	1.00	ug/L						
Arsenic	--- U	1.00	ug/L						
Barium	--- U	1.00	ug/L						
Cadmium	--- U	1.00	ug/L						
Chromium	--- U	2.00	ug/L						
Copper	--- U	1.00	ug/L						
Lead	--- U	1.00	ug/L						
Manganese	--- U	1.00	ug/L						
Nickel	--- U	1.00	ug/L						
Vanadium	--- U	1.00	ug/L						
Zinc	--- U	2.00	ug/L						

**Blank (B311080-BLK2)**

Aluminum	--- U	20.0	ug/L						
Antimony	--- U	1.00	ug/L						
Arsenic	--- U	1.00	ug/L						
Barium	--- U	1.00	ug/L						
Cadmium	--- U	1.00	ug/L						
Chromium	--- U	2.00	ug/L						
Copper	--- U	1.00	ug/L						
Lead	--- U	1.00	ug/L						
Manganese	--- U	1.00	ug/L						
Nickel	--- U	1.00	ug/L						
Vanadium	--- U	1.00	ug/L						
Zinc	--- U	2.00	ug/L						

**LCS (B311080-BS1)**

Aluminum	470	20.0	ug/L	500.0		94.1	85-115		
Antimony	47.8	1.00	ug/L	50.00		95.5	85-115		
Arsenic	46.1	1.00	ug/L	50.00		92.1	85-115		
Barium	46.3	1.00	ug/L	50.00		92.7	85-115		
Cadmium	44.8	1.00	ug/L	50.00		89.7	85-115		
Chromium	48.5	2.00	ug/L	50.00		96.9	85-115		
Copper	47.9	1.00	ug/L	50.00		95.8	85-115		
Lead	48.9	1.00	ug/L	50.00		97.7	85-115		

U.S.E.P.A Region 2 Laboratory

NOTE: The results recorded in this report relate only to the samples as received on the date and at the time noted  
Reported: 11/20/2023





**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

**Metals ICPMS - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch B311080</b>									
<b>LCS (B311080-BS1)</b>									
Manganese	48.7	1.00	ug/L	50.00		97.5	85-115		
Nickel	48.6	1.00	ug/L	50.00		97.3	85-115		
Vanadium	49.3	1.00	ug/L	50.00		98.5	85-115		
Zinc	45.1	2.00	ug/L	50.00		90.3	85-115		
<b>LCS (B311080-BS2)</b>									
Aluminum	476	20.0	ug/L	500.0		95.2	85-115		
Antimony	46.5	1.00	ug/L	50.00		93.0	85-115		
Arsenic	47.0	1.00	ug/L	50.00		93.9	85-115		
Barium	47.0	1.00	ug/L	50.00		94.1	85-115		
Cadmium	43.9	1.00	ug/L	50.00		87.8	85-115		
Chromium	48.3	2.00	ug/L	50.00		96.6	85-115		
Copper	49.5	1.00	ug/L	50.00		99.1	85-115		
Lead	48.4	1.00	ug/L	50.00		96.8	85-115		
Manganese	48.0	1.00	ug/L	50.00		96.0	85-115		
Nickel	50.4	1.00	ug/L	50.00		101	85-115		
Vanadium	49.4	1.00	ug/L	50.00		98.9	85-115		
Zinc	44.2	2.00	ug/L	50.00		88.4	85-115		
<b>LCS Dup (B311080-BSD1)</b>									
Aluminum	470	20.0	ug/L	500.0		93.9	85-115	0.148	20
Antimony	47.5	1.00	ug/L	50.00		95.0	85-115	0.535	20
Arsenic	45.6	1.00	ug/L	50.00		91.3	85-115	0.966	20
Barium	45.9	1.00	ug/L	50.00		91.8	85-115	0.872	20
Cadmium	44.8	1.00	ug/L	50.00		89.5	85-115	0.127	20
Chromium	48.5	2.00	ug/L	50.00		97.1	85-115	0.159	20
Copper	48.1	1.00	ug/L	50.00		96.3	85-115	0.531	20
Lead	48.7	1.00	ug/L	50.00		97.5	85-115	0.240	20
Manganese	48.5	1.00	ug/L	50.00		97.0	85-115	0.479	20
Nickel	48.7	1.00	ug/L	50.00		97.5	85-115	0.197	20
Vanadium	49.4	1.00	ug/L	50.00		98.7	85-115	0.193	20
Zinc	45.2	2.00	ug/L	50.00		90.3	85-115	0.0886	20



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

**Metals ICPMS - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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**Batch B311080**

**LCS Dup (B311080-BSD2)**

Aluminum	480	20.0	ug/L	500.0		96.1	85-115	0.850	20
Antimony	47.7	1.00	ug/L	50.00		95.4	85-115	2.53	20
Arsenic	47.4	1.00	ug/L	50.00		94.8	85-115	0.905	20
Barium	47.5	1.00	ug/L	50.00		94.9	85-115	0.887	20
Cadmium	44.2	1.00	ug/L	50.00		88.4	85-115	0.670	20
Chromium	48.8	2.00	ug/L	50.00		97.6	85-115	1.05	20
Copper	49.8	1.00	ug/L	50.00		99.6	85-115	0.560	20
Lead	49.0	1.00	ug/L	50.00		97.9	85-115	1.17	20
Manganese	48.3	1.00	ug/L	50.00		96.7	85-115	0.677	20
Nickel	50.6	1.00	ug/L	50.00		101	85-115	0.325	20
Vanadium	50.0	1.00	ug/L	50.00		99.9	85-115	1.03	20
Zinc	44.7	2.00	ug/L	50.00		89.4	85-115	1.12	20

**Matrix Spike (B311080-MS1)**

**Source: 2311021-48**

Aluminum	515	20.0	ug/L	500.0	44.4	94.1	80-120		
Antimony	49.0	1.00	ug/L	50.00	ND	98.0	80-120		
Arsenic	48.0	1.00	ug/L	50.00	0.140	95.6	80-120		
Barium	48.1	1.00	ug/L	50.00	1.32	93.6	80-120		
Cadmium	45.1	1.00	ug/L	50.00	ND	90.2	80-120		
Chromium	47.6	2.00	ug/L	50.00	ND	95.1	80-120		
Copper	54.0	1.00	ug/L	50.00	7.31	93.5	80-120		
Lead	50.0	1.00	ug/L	50.00	0.398	99.2	80-120		
Manganese	51.3	1.00	ug/L	50.00	4.30	93.9	80-120		
Nickel	49.8	1.00	ug/L	50.00	3.28	93.0	80-120		
Vanadium	50.1	1.00	ug/L	50.00	ND	100	80-120		
Zinc	75.9	2.00	ug/L	50.00	26.8	98.3	80-120		

**Matrix Spike (B311080-MS2)**

**Source: 2311021-41**

Aluminum	484	20.0	ug/L	500.0	8.38	95.2	80-120		
Antimony	48.5	1.00	ug/L	50.00	ND	97.0	80-120		
Arsenic	48.4	1.00	ug/L	50.00	0.322	96.1	80-120		
Barium	48.1	1.00	ug/L	50.00	0.365	95.4	80-120		
Cadmium	44.5	1.00	ug/L	50.00	0.105	88.8	80-120		
Chromium	47.9	2.00	ug/L	50.00	ND	95.8	80-120		
Copper	56.6	1.00	ug/L	50.00	9.21	94.7	80-120		
Lead	51.9	1.00	ug/L	50.00	2.26	99.2	80-120		

U.S.E.P.A Region 2 Laboratory

NOTE: The results recorded in this report relate only to the samples as received on the date and at the time noted

Reported: 11/20/2023



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

**Metals ICPMS - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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**Batch B311080**

**Matrix Spike (B311080-MS2)**

**Source: 2311021-41**

Manganese	48.1	1.00	ug/L	50.00	1.32	93.5	80-120		
Nickel	49.5	1.00	ug/L	50.00	2.23	94.5	80-120		
Vanadium	50.2	1.00	ug/L	50.00	ND	100	80-120		
Zinc	696	10.0	ug/L	50.00	652	88.4	80-120		

**Matrix Spike (B311080-MS3)**

**Source: 2311021-19**

Aluminum	489	20.0	ug/L	500.0	15.1	94.8	80-120		
Antimony	49.4	1.00	ug/L	50.00	ND	98.8	80-120		
Arsenic	48.5	1.00	ug/L	50.00	0.228	96.6	80-120		
Barium	47.4	1.00	ug/L	50.00	0.376	94.1	80-120		
Cadmium	44.3	1.00	ug/L	50.00	ND	88.7	80-120		
Chromium	47.4	2.00	ug/L	50.00	ND	94.8	80-120		
Copper	51.0	1.00	ug/L	50.00	3.95	94.1	80-120		
Lead	50.3	1.00	ug/L	50.00	0.551	99.5	80-120		
Manganese	49.1	1.00	ug/L	50.00	2.46	93.3	80-120		
Nickel	48.0	1.00	ug/L	50.00	0.391	95.2	80-120		
Vanadium	50.2	1.00	ug/L	50.00	ND	100	80-120		
Zinc	57.9	2.00	ug/L	50.00	14.7	86.5	80-120		

**Batch B311081**

**Blank (B311081-BLK1)**

Aluminum	--- U	20.0	ug/L						
Antimony	--- U	1.00	ug/L						
Arsenic	--- U	1.00	ug/L						
Barium	--- U	1.00	ug/L						
Cadmium	--- U	1.00	ug/L						
Chromium	--- U	2.00	ug/L						
Copper	--- U	1.00	ug/L						
Lead	--- U	1.00	ug/L						
Manganese	--- U	1.00	ug/L						
Nickel	--- U	1.00	ug/L						
Vanadium	--- U	1.00	ug/L						
Zinc	--- U	2.00	ug/L						



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

**Metals ICPMS - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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**Batch B311081**

**LCS (B311081-BS1)**

Aluminum	474	20.0	ug/L	500.0		94.8	85-115		
Antimony	47.9	1.00	ug/L	50.00		95.7	85-115		
Arsenic	46.4	1.00	ug/L	50.00		92.9	85-115		
Barium	47.0	1.00	ug/L	50.00		94.1	85-115		
Cadmium	46.5	1.00	ug/L	50.00		93.0	85-115		
Chromium	48.8	2.00	ug/L	50.00		97.6	85-115		
Copper	48.6	1.00	ug/L	50.00		97.1	85-115		
Lead	49.1	1.00	ug/L	50.00		98.2	85-115		
Manganese	48.9	1.00	ug/L	50.00		97.7	85-115		
Nickel	49.4	1.00	ug/L	50.00		98.7	85-115		
Vanadium	49.4	1.00	ug/L	50.00		98.9	85-115		
Zinc	46.6	2.00	ug/L	50.00		93.3	85-115		

**LCS Dup (B311081-BSD1)**

Aluminum	467	20.0	ug/L	500.0		93.4	85-115	1.48	20
Antimony	46.9	1.00	ug/L	50.00		93.8	85-115	2.02	20
Arsenic	46.0	1.00	ug/L	50.00		92.0	85-115	0.985	20
Barium	46.0	1.00	ug/L	50.00		92.1	85-115	2.16	20
Cadmium	45.6	1.00	ug/L	50.00		91.2	85-115	1.90	20
Chromium	48.2	2.00	ug/L	50.00		96.3	85-115	1.35	20
Copper	47.8	1.00	ug/L	50.00		95.7	85-115	1.49	20
Lead	47.8	1.00	ug/L	50.00		95.7	85-115	2.60	20
Manganese	48.0	1.00	ug/L	50.00		96.0	85-115	1.82	20
Nickel	48.4	1.00	ug/L	50.00		96.9	85-115	1.88	20
Vanadium	48.4	1.00	ug/L	50.00		96.8	85-115	2.14	20
Zinc	45.8	2.00	ug/L	50.00		91.6	85-115	1.75	20

**Matrix Spike (B311081-MS1)**

**Source: 2311021-62**

Aluminum	493	20.0	ug/L	500.0	30.5	92.6	80-120		
Antimony	49.5	1.00	ug/L	50.00	ND	99.0	80-120		
Arsenic	48.4	1.00	ug/L	50.00	0.271	96.2	80-120		
Barium	51.2	1.00	ug/L	50.00	4.32	93.7	80-120		
Cadmium	46.3	1.00	ug/L	50.00	ND	92.6	80-120		
Chromium	48.1	2.00	ug/L	50.00	0.684	94.8	80-120		
Copper	121	1.00	ug/L	50.00	77.1	87.0	80-120		
Lead	68.2	1.00	ug/L	50.00	18.4	99.5	80-120		

U.S.E.P.A Region 2 Laboratory

NOTE: The results recorded in this report relate only to the samples as received on the date and at the time noted  
Reported: 11/20/2023



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

**Metals ICPMS - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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**Batch B311081**

**Matrix Spike (B311081-MS1)**

**Source: 2311021-62**

Manganese	48.2	1.00	ug/L	50.00	1.43	93.5	80-120		
Nickel	133	1.00	ug/L	50.00	90.4	85.2	80-120		
Vanadium	49.5	1.00	ug/L	50.00	ND	98.9	80-120		
Zinc	269	4.00	ug/L	50.00	227	83.6	80-120		

**Matrix Spike (B311081-MS2)**

**Source: 2311021-06**

Aluminum	594	20.0	ug/L	500.0	121	94.8	80-120		
Antimony	49.5	1.00	ug/L	50.00	ND	99.0	80-120		
Arsenic	49.1	1.00	ug/L	50.00	0.714	96.7	80-120		
Barium	49.0	1.00	ug/L	50.00	1.26	95.5	80-120		
Cadmium	46.6	1.00	ug/L	50.00	ND	93.3	80-120		
Chromium	48.1	2.00	ug/L	50.00	0.297	95.6	80-120		
Copper	73.9	1.00	ug/L	50.00	28.5	90.8	80-120		
Lead	52.5	1.00	ug/L	50.00	2.44	100	80-120		
Manganese	49.2	1.00	ug/L	50.00	2.00	94.3	80-120		
Nickel	47.3	1.00	ug/L	50.00	0.565	93.5	80-120		
Vanadium	50.3	1.00	ug/L	50.00	0.579	99.4	80-120		
Zinc	75.9	2.00	ug/L	50.00	27.0	97.8	80-120		

**Batch B311084**

**Blank (B311084-BLK1)**

Aluminum	--- U	20.0	ug/L						
Antimony	--- U	1.00	ug/L						
Arsenic	--- U	1.00	ug/L						
Barium	--- U	1.00	ug/L						
Cadmium	--- U	1.00	ug/L						
Chromium	--- U	2.00	ug/L						
Copper	--- U	1.00	ug/L						
Lead	--- U	1.00	ug/L						
Manganese	--- U	1.00	ug/L						
Nickel	--- U	1.00	ug/L						
Vanadium	--- U	1.00	ug/L						
Zinc	--- U	2.00	ug/L						



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

**Metals ICPMS - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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**Batch B311084**

**LCS (B311084-BS1)**

Aluminum	475	20.0	ug/L	500.0		95.1	85-115		
Antimony	48.0	1.00	ug/L	50.00		96.0	85-115		
Arsenic	46.8	1.00	ug/L	50.00		93.6	85-115		
Barium	47.2	1.00	ug/L	50.00		94.5	85-115		
Cadmium	45.9	1.00	ug/L	50.00		91.8	85-115		
Chromium	48.4	2.00	ug/L	50.00		96.7	85-115		
Copper	48.6	1.00	ug/L	50.00		97.3	85-115		
Lead	48.7	1.00	ug/L	50.00		97.3	85-115		
Manganese	48.5	1.00	ug/L	50.00		97.0	85-115		
Nickel	49.2	1.00	ug/L	50.00		98.5	85-115		
Vanadium	48.8	1.00	ug/L	50.00		97.7	85-115		
Zinc	46.0	2.00	ug/L	50.00		92.0	85-115		

**LCS Dup (B311084-BSD1)**

Aluminum	478	20.0	ug/L	500.0		95.6	85-115	0.559	20
Antimony	47.8	1.00	ug/L	50.00		95.6	85-115	0.461	20
Arsenic	47.1	1.00	ug/L	50.00		94.2	85-115	0.613	20
Barium	47.2	1.00	ug/L	50.00		94.3	85-115	0.129	20
Cadmium	45.9	1.00	ug/L	50.00		91.8	85-115	0.0414	20
Chromium	48.7	2.00	ug/L	50.00		97.3	85-115	0.653	20
Copper	49.1	1.00	ug/L	50.00		98.2	85-115	0.960	20
Lead	49.1	1.00	ug/L	50.00		98.2	85-115	0.861	20
Manganese	48.4	1.00	ug/L	50.00		96.8	85-115	0.142	20
Nickel	49.5	1.00	ug/L	50.00		99.0	85-115	0.555	20
Vanadium	49.2	1.00	ug/L	50.00		98.4	85-115	0.793	20
Zinc	46.3	2.00	ug/L	50.00		92.7	85-115	0.721	20

**Matrix Spike (B311084-MS1)**

**Source: 2311021-32**

Aluminum	503	20.0	ug/L	500.0	32.3	94.0	80-120		
Antimony	49.1	1.00	ug/L	50.00	ND	98.1	80-120		
Arsenic	47.8	1.00	ug/L	50.00	0.316	95.0	80-120		
Barium	47.8	1.00	ug/L	50.00	0.643	94.4	80-120		
Cadmium	45.8	1.00	ug/L	50.00	0.095	91.4	80-120		
Chromium	47.4	2.00	ug/L	50.00	0.203	94.4	80-120		
Copper	189	1.00	ug/L	50.00	147	84.2	80-120		
Lead	78.4	1.00	ug/L	50.00	28.8	99.1	80-120		

U.S.E.P.A Region 2 Laboratory

NOTE: The results recorded in this report relate only to the samples as received on the date and at the time noted

Reported: 11/20/2023



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

**Metals ICPMS - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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**Batch B311084**

**Matrix Spike (B311084-MS1)**

**Source: 2311021-32**

Manganese	73.1	1.00	ug/L	50.00	26.8	92.6	80-120		
Nickel	48.7	1.00	ug/L	50.00	2.02	93.4	80-120		
Vanadium	49.4	1.00	ug/L	50.00	ND	98.8	80-120		
Zinc	915	10.0	ug/L	50.00	856	118	80-120		

**Matrix Spike (B311084-MS2)**

**Source: 2311021-21**

Aluminum	553	20.0	ug/L	500.0	87.5	93.0	80-120		
Antimony	49.3	1.00	ug/L	50.00	ND	98.5	80-120		
Arsenic	48.1	1.00	ug/L	50.00	0.403	95.3	80-120		
Barium	52.7	1.00	ug/L	50.00	6.09	93.3	80-120		
Cadmium	46.0	1.00	ug/L	50.00	ND	92.0	80-120		
Chromium	47.7	2.00	ug/L	50.00	0.484	94.4	80-120		
Copper	46.7	1.00	ug/L	50.00	0.816	91.9	80-120		
Lead	49.3	1.00	ug/L	50.00	ND	98.6	80-120		
Manganese	46.9	1.00	ug/L	50.00	0.501	92.8	80-120		
Nickel	46.8	1.00	ug/L	50.00	0.847	91.9	80-120		
Vanadium	49.8	1.00	ug/L	50.00	0.527	98.6	80-120		
Zinc	84.4	2.00	ug/L	50.00	36.7	95.6	80-120		

**Batch B311105**

**Blank (B311105-BLK1)**

Aluminum	--- U	20.0	ug/L						
Antimony	--- U	1.00	ug/L						
Arsenic	--- U	1.00	ug/L						
Barium	--- U	1.00	ug/L						
Cadmium	--- U	1.00	ug/L						
Chromium	--- U	2.00	ug/L						
Copper	--- U	1.00	ug/L						
Lead	--- U	1.00	ug/L						
Manganese	--- U	1.00	ug/L						
Nickel	--- U	1.00	ug/L						
Vanadium	--- U	1.00	ug/L						
Zinc	--- U	2.00	ug/L						



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

**Metals ICPMS - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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**Batch B311105**

**LCS (B311105-BS1)**

Aluminum	488	20.0	ug/L	500.0		97.7	85-115		
Antimony	52.0	1.00	ug/L	50.00		104	85-115		
Arsenic	48.0	1.00	ug/L	50.00		96.0	85-115		
Barium	48.5	1.00	ug/L	50.00		97.0	85-115		
Cadmium	49.4	1.00	ug/L	50.00		98.9	85-115		
Chromium	52.5	2.00	ug/L	50.00		105	85-115		
Copper	49.4	1.00	ug/L	50.00		98.8	85-115		
Lead	52.6	1.00	ug/L	50.00		105	85-115		
Manganese	52.4	1.00	ug/L	50.00		105	85-115		
Nickel	50.1	1.00	ug/L	50.00		100	85-115		
Vanadium	52.5	1.00	ug/L	50.00		105	85-115		
Zinc	49.4	2.00	ug/L	50.00		98.8	85-115		

**LCS Dup (B311105-BSD1)**

Aluminum	478	20.0	ug/L	500.0		95.7	85-115	2.03	20
Antimony	51.2	1.00	ug/L	50.00		102	85-115	1.62	20
Arsenic	47.5	1.00	ug/L	50.00		95.0	85-115	1.04	20
Barium	47.7	1.00	ug/L	50.00		95.4	85-115	1.66	20
Cadmium	49.0	1.00	ug/L	50.00		98.0	85-115	0.861	20
Chromium	51.5	2.00	ug/L	50.00		103	85-115	1.82	20
Copper	48.1	1.00	ug/L	50.00		96.2	85-115	2.57	20
Lead	51.6	1.00	ug/L	50.00		103	85-115	1.94	20
Manganese	51.1	1.00	ug/L	50.00		102	85-115	2.54	20
Nickel	49.1	1.00	ug/L	50.00		98.1	85-115	2.05	20
Vanadium	51.4	1.00	ug/L	50.00		103	85-115	2.15	20
Zinc	48.2	2.00	ug/L	50.00		96.3	85-115	2.49	20

**Matrix Spike (B311105-MS1)**

**Source: 2311039-25**

Aluminum	556	20.0	ug/L	500.0	74.5	96.3	80-120		
Antimony	52.8	1.00	ug/L	50.00	ND	106	80-120		
Arsenic	47.4	1.00	ug/L	50.00	ND	94.8	80-120		
Barium	48.5	1.00	ug/L	50.00	1.17	94.6	80-120		
Cadmium	49.0	1.00	ug/L	50.00	ND	98.0	80-120		
Chromium	51.3	2.00	ug/L	50.00	0.809	101	80-120		
Copper	295	2.00	ug/L	50.00	251	88.2	80-120		
Lead	59.0	1.00	ug/L	50.00	7.28	103	80-120		

U.S.E.P.A Region 2 Laboratory

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Reported: 11/20/2023





**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

**Metals ICPMS - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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**Batch B311105**

**Matrix Spike (B311105-MS1)**

**Source: 2311039-25**

Manganese	60.9	1.00	ug/L	50.00	11.4	99.0	80-120		
Nickel	50.4	1.00	ug/L	50.00	2.69	95.4	80-120		
Vanadium	52.7	1.00	ug/L	50.00	ND	105	80-120		
Zinc	136	2.00	ug/L	50.00	89.1	94.4	80-120		

**Batch B311107**

**Blank (B311107-BLK1)**

Aluminum	---	U	20.0	ug/L					
Antimony	---	U	1.00	ug/L					
Arsenic	---	U	1.00	ug/L					
Barium	---	U	1.00	ug/L					
Cadmium	---	U	1.00	ug/L					
Chromium	---	U	2.00	ug/L					
Copper	---	U	1.00	ug/L					
Lead	---	U	1.00	ug/L					
Manganese	---	U	1.00	ug/L					
Nickel	---	U	1.00	ug/L					
Vanadium	---	U	1.00	ug/L					
Zinc	---	U	2.00	ug/L					

**Blank (B311107-BLK2)**

Aluminum	---	U	20.0	ug/L					
Antimony	---	U	1.00	ug/L					
Arsenic	---	U	1.00	ug/L					
Barium	---	U	1.00	ug/L					
Cadmium	---	U	1.00	ug/L					
Chromium	---	U	2.00	ug/L					
Copper	---	U	1.00	ug/L					
Lead	---	U	1.00	ug/L					
Manganese	---	U	1.00	ug/L					
Nickel	---	U	1.00	ug/L					
Vanadium	---	U	1.00	ug/L					
Zinc	---	U	2.00	ug/L					



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

**Metals ICPMS - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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**Batch B311107**

**Blank (B311107-BLK3)**

Aluminum	--- U	20.0	ug/L						
Antimony	--- U	1.00	ug/L						
Arsenic	--- U	1.00	ug/L						
Barium	--- U	1.00	ug/L						
Cadmium	--- U	1.00	ug/L						
Chromium	--- U	2.00	ug/L						
Copper	--- U	1.00	ug/L						
Lead	--- U	1.00	ug/L						
Manganese	--- U	1.00	ug/L						
Nickel	--- U	1.00	ug/L						
Vanadium	--- U	1.00	ug/L						
Zinc	--- U	2.00	ug/L						

**LCS (B311107-BS1)**

Aluminum	472	20.0	ug/L	500.0		94.3	85-115		
Antimony	46.4	1.00	ug/L	50.00		92.8	85-115		
Arsenic	46.8	1.00	ug/L	50.00		93.5	85-115		
Barium	46.5	1.00	ug/L	50.00		93.1	85-115		
Cadmium	44.6	1.00	ug/L	50.00		89.2	85-115		
Chromium	47.2	2.00	ug/L	50.00		94.3	85-115		
Copper	47.1	1.00	ug/L	50.00		94.2	85-115		
Lead	48.2	1.00	ug/L	50.00		96.3	85-115		
Manganese	47.5	1.00	ug/L	50.00		95.0	85-115		
Nickel	48.1	1.00	ug/L	50.00		96.3	85-115		
Vanadium	48.1	1.00	ug/L	50.00		96.2	85-115		
Zinc	44.8	2.00	ug/L	50.00		89.6	85-115		

**LCS (B311107-BS2)**

Aluminum	472	20.0	ug/L	500.0		94.3	85-115		
Antimony	46.8	1.00	ug/L	50.00		93.5	85-115		
Arsenic	45.9	1.00	ug/L	50.00		91.8	85-115		
Barium	46.4	1.00	ug/L	50.00		92.8	85-115		
Cadmium	44.4	1.00	ug/L	50.00		88.8	85-115		
Chromium	47.5	2.00	ug/L	50.00		94.9	85-115		
Copper	47.9	1.00	ug/L	50.00		95.9	85-115		
Lead	48.2	1.00	ug/L	50.00		96.4	85-115		

U.S.E.P.A Region 2 Laboratory

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Reported: 11/20/2023



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

**Metals ICPMS - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
<b>Batch B311107</b>									
<b>LCS (B311107-BS2)</b>									
Manganese	47.6	1.00	ug/L	50.00		95.2	85-115		
Nickel	48.3	1.00	ug/L	50.00		96.5	85-115		
Vanadium	48.2	1.00	ug/L	50.00		96.4	85-115		
Zinc	45.1	2.00	ug/L	50.00		90.3	85-115		
<b>LCS (B311107-BS3)</b>									
Aluminum	478	20.0	ug/L	500.0		95.7	85-115		
Antimony	47.1	1.00	ug/L	50.00		94.2	85-115		
Arsenic	47.4	1.00	ug/L	50.00		94.7	85-115		
Barium	47.6	1.00	ug/L	50.00		95.2	85-115		
Cadmium	45.5	1.00	ug/L	50.00		91.0	85-115		
Chromium	48.3	2.00	ug/L	50.00		96.5	85-115		
Copper	48.4	1.00	ug/L	50.00		96.7	85-115		
Lead	48.6	1.00	ug/L	50.00		97.2	85-115		
Manganese	48.0	1.00	ug/L	50.00		96.0	85-115		
Nickel	49.0	1.00	ug/L	50.00		98.0	85-115		
Vanadium	48.5	1.00	ug/L	50.00		97.1	85-115		
Zinc	45.8	2.00	ug/L	50.00		91.7	85-115		
<b>LCS Dup (B311107-BSD1)</b>									
Aluminum	477	20.0	ug/L	500.0		95.3	85-115	1.03	20
Antimony	47.3	1.00	ug/L	50.00		94.7	85-115	1.94	20
Arsenic	46.9	1.00	ug/L	50.00		93.8	85-115	0.290	20
Barium	46.8	1.00	ug/L	50.00		93.7	85-115	0.604	20
Cadmium	45.0	1.00	ug/L	50.00		90.0	85-115	0.886	20
Chromium	47.6	2.00	ug/L	50.00		95.1	85-115	0.834	20
Copper	48.1	1.00	ug/L	50.00		96.2	85-115	2.03	20
Lead	48.6	1.00	ug/L	50.00		97.2	85-115	0.953	20
Manganese	48.0	1.00	ug/L	50.00		95.9	85-115	0.991	20
Nickel	48.4	1.00	ug/L	50.00		96.7	85-115	0.458	20
Vanadium	48.4	1.00	ug/L	50.00		96.8	85-115	0.601	20
Zinc	45.3	2.00	ug/L	50.00		90.6	85-115	1.10	20



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

**Metals ICPMS - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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**Batch B311107**

**LCS Dup (B311107-BSD2)**

Aluminum	473	20.0	ug/L	500.0		94.7	85-115	0.387	20
Antimony	47.2	1.00	ug/L	50.00		94.4	85-115	0.947	20
Arsenic	47.1	1.00	ug/L	50.00		94.3	85-115	2.62	20
Barium	47.1	1.00	ug/L	50.00		94.2	85-115	1.43	20
Cadmium	45.7	1.00	ug/L	50.00		91.4	85-115	2.87	20
Chromium	47.8	2.00	ug/L	50.00		95.5	85-115	0.636	20
Copper	48.0	1.00	ug/L	50.00		96.0	85-115	0.0855	20
Lead	47.9	1.00	ug/L	50.00		95.8	85-115	0.656	20
Manganese	47.7	1.00	ug/L	50.00		95.3	85-115	0.202	20
Nickel	48.2	1.00	ug/L	50.00		96.5	85-115	0.0622	20
Vanadium	47.9	1.00	ug/L	50.00		95.8	85-115	0.637	20
Zinc	45.8	2.00	ug/L	50.00		91.5	85-115	1.40	20

**LCS Dup (B311107-BSD3)**

Aluminum	473	20.0	ug/L	500.0		94.6	85-115	1.14	20
Antimony	47.2	1.00	ug/L	50.00		94.4	85-115	0.161	20
Arsenic	46.8	1.00	ug/L	50.00		93.7	85-115	1.13	20
Barium	47.1	1.00	ug/L	50.00		94.3	85-115	0.933	20
Cadmium	45.5	1.00	ug/L	50.00		91.0	85-115	0.0505	20
Chromium	47.8	2.00	ug/L	50.00		95.6	85-115	0.998	20
Copper	48.0	1.00	ug/L	50.00		96.0	85-115	0.801	20
Lead	48.4	1.00	ug/L	50.00		96.8	85-115	0.396	20
Manganese	47.9	1.00	ug/L	50.00		95.9	85-115	0.0917	20
Nickel	48.4	1.00	ug/L	50.00		96.7	85-115	1.34	20
Vanadium	48.2	1.00	ug/L	50.00		96.4	85-115	0.637	20
Zinc	45.6	2.00	ug/L	50.00		91.2	85-115	0.451	20

**Matrix Spike (B311107-MS1)**

**Source: 2311039-02**

Aluminum	479	20.0	ug/L	500.0	ND	95.9	80-120		
Antimony	48.6	1.00	ug/L	50.00	ND	97.2	80-120		
Arsenic	48.0	1.00	ug/L	50.00	0.448	95.1	80-120		
Barium	47.2	1.00	ug/L	50.00	0.546	93.4	80-120		
Cadmium	45.2	1.00	ug/L	50.00	ND	90.3	80-120		
Chromium	47.0	2.00	ug/L	50.00	ND	94.0	80-120		
Copper	132	1.00	ug/L	50.00	87.9	88.7	80-120		
Lead	53.0	1.00	ug/L	50.00	3.40	99.2	80-120		

U.S.E.P.A Region 2 Laboratory

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Reported: 11/20/2023



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

**Metals ICPMS - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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**Batch B311107**

**Matrix Spike (B311107-MS1)**

**Source: 2311039-02**

Manganese	47.1	1.00	ug/L	50.00	0.546	93.1	80-120		
Nickel	50.1	1.00	ug/L	50.00	4.02	92.3	80-120		
Vanadium	49.2	1.00	ug/L	50.00	ND	98.4	80-120		
Zinc	2240	20.0	ug/L	50.00	2250	NR	80-120		

**Matrix Spike (B311107-MS2)**

**Source: 2311039-12**

Aluminum	496	20.0	ug/L	500.0	25.0	94.3	80-120		
Antimony	48.5	1.00	ug/L	50.00	ND	97.0	80-120		
Arsenic	48.1	1.00	ug/L	50.00	0.612	95.0	80-120		
Barium	46.9	1.00	ug/L	50.00	0.630	92.5	80-120		
Cadmium	45.1	1.00	ug/L	50.00	ND	90.1	80-120		
Chromium	47.3	2.00	ug/L	50.00	0.347	93.9	80-120		
Copper	95.0	1.00	ug/L	50.00	51.0	88.0	80-120		
Lead	51.8	1.00	ug/L	50.00	2.34	98.9	80-120		
Manganese	48.7	1.00	ug/L	50.00	2.57	92.4	80-120		
Nickel	54.0	1.00	ug/L	50.00	8.04	91.9	80-120		
Vanadium	49.0	1.00	ug/L	50.00	ND	97.9	80-120		
Zinc	717	10.0	ug/L	50.00	671	91.7	80-120		

**Matrix Spike (B311107-MS3)**

**Source: 2311039-22**

Aluminum	504	20.0	ug/L	500.0	34.8	93.8	80-120		
Antimony	49.4	1.00	ug/L	50.00	ND	98.7	80-120		
Arsenic	47.9	1.00	ug/L	50.00	0.485	94.7	80-120		
Barium	47.2	1.00	ug/L	50.00	0.487	93.5	80-120		
Cadmium	45.6	1.00	ug/L	50.00	ND	91.2	80-120		
Chromium	47.0	2.00	ug/L	50.00	0.345	93.4	80-120		
Copper	113	1.00	ug/L	50.00	69.2	87.6	80-120		
Lead	49.9	1.00	ug/L	50.00	1.11	97.7	80-120		
Manganese	47.5	1.00	ug/L	50.00	1.34	92.3	80-120		
Nickel	46.4	1.00	ug/L	50.00	0.466	92.0	80-120		
Vanadium	48.6	1.00	ug/L	50.00	ND	97.2	80-120		
Zinc	109	2.00	ug/L	50.00	60.3	97.2	80-120		



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

**Metals ICPMS - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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**Batch B311107**

**Matrix Spike (B311107-MS4)**

**Source: 2311039-35**

Aluminum	486	20.0	ug/L	500.0	19.9	93.2	80-120		
Antimony	48.6	1.00	ug/L	50.00	ND	97.2	80-120		
Arsenic	48.3	1.00	ug/L	50.00	0.536	95.6	80-120		
Barium	47.4	1.00	ug/L	50.00	0.526	93.7	80-120		
Cadmium	45.9	1.00	ug/L	50.00	ND	91.8	80-120		
Chromium	46.6	2.00	ug/L	50.00	ND	93.3	80-120		
Copper	47.8	1.00	ug/L	50.00	2.51	90.5	80-120		
Lead	49.6	1.00	ug/L	50.00	0.536	98.1	80-120		
Manganese	49.3	1.00	ug/L	50.00	3.18	92.2	80-120		
Nickel	46.7	1.00	ug/L	50.00	1.06	91.2	80-120		
Vanadium	48.6	1.00	ug/L	50.00	ND	97.2	80-120		
Zinc	49.5	2.00	ug/L	50.00	4.74	89.6	80-120		

**Matrix Spike (B311107-MS5)**

**Source: 2311039-45**

Aluminum	486	20.0	ug/L	500.0	17.3	93.7	80-120		
Antimony	49.4	1.00	ug/L	50.00	ND	98.7	80-120		
Arsenic	47.8	1.00	ug/L	50.00	0.500	94.7	80-120		
Barium	47.1	1.00	ug/L	50.00	0.311	93.5	80-120		
Cadmium	45.3	1.00	ug/L	50.00	ND	90.6	80-120		
Chromium	47.0	2.00	ug/L	50.00	ND	94.1	80-120		
Copper	66.5	1.00	ug/L	50.00	21.9	89.3	80-120		
Lead	52.1	1.00	ug/L	50.00	2.42	99.3	80-120		
Manganese	50.5	1.00	ug/L	50.00	4.36	92.2	80-120		
Nickel	46.6	1.00	ug/L	50.00	0.783	91.7	80-120		
Vanadium	48.9	1.00	ug/L	50.00	ND	97.8	80-120		
Zinc	67.6	2.00	ug/L	50.00	20.1	95.0	80-120		

**Matrix Spike (B311107-MS6)**

**Source: 2311039-54**

Aluminum	491	20.0	ug/L	500.0	18.0	94.6	80-120		
Antimony	49.6	1.00	ug/L	50.00	ND	99.3	80-120		
Arsenic	48.1	1.00	ug/L	50.00	0.650	94.9	80-120		
Barium	47.5	1.00	ug/L	50.00	0.365	94.3	80-120		
Cadmium	45.6	1.00	ug/L	50.00	ND	91.2	80-120		
Chromium	47.2	2.00	ug/L	50.00	ND	94.3	80-120		
Copper	71.8	1.00	ug/L	50.00	26.9	89.8	80-120		
Lead	54.8	1.00	ug/L	50.00	4.87	99.9	80-120		

U.S.E.P.A Region 2 Laboratory

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Reported: 11/20/2023



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
Region 2 Laboratory**

**Final Report**

**Project: US VI Drinking Water - 2311021**

**Project Number: 2311021**

**Metals ICPMS - Quality Control**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
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**Batch B311107**

**Matrix Spike (B311107-MS6)**

**Source: 2311039-54**

Manganese	52.5	1.00	ug/L	50.00	5.71	93.5	80-120		
Nickel	46.8	1.00	ug/L	50.00	0.718	92.2	80-120		
Vanadium	49.2	1.00	ug/L	50.00	ND	98.4	80-120		
Zinc	64.8	2.00	ug/L	50.00	17.8	94.0	80-120		