YEAR-END REPORT
FOR THE 2022 FIELD SEASON
AT LEVIATHAN MINE

Alpine County, California

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1. INTRODUCTION

Leviathan Mine is a former sulfur mine that the State of California acquired in the early 1980s to address water quality problems caused by historical mining. Jurisdiction over Leviathan Mine rests with the State Water Resources Control Board, which, in turn, has delegated jurisdiction over cleanup work to the California Regional Water Quality Control Board, Lahontan Region (Water Board). On May 11, 2000, the United States Environmental Protection Agency (USEPA) placed Leviathan Mine on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) National Priorities List, thus making Leviathan Mine a federal Superfund site.

On July 19, 2000, pursuant to its authority under CERCLA, USEPA issued an Administrative Abatement Action (AAA) to the Water Board and directed the Water Board to implement certain pollution abatement and site monitoring activities at Leviathan Mine. With slight modifications, USEPA reissued the AAA in 2001, 2002, 2003, 2004, and 2005. In its 2005 AAA, instead of issuing the AAA every year, USEPA decided to allow its Remedial Project Manager to notify the Water Board of the necessity to continue the work for an additional year, for each year that the first phase of Non-Time Critical Removal Action (NTCRA) continues.

This Year-End Report for the 2022 Field Season at Leviathan Mine (Year-End Report) has been prepared by the Water Board for the USEPA to comply with Paragraph No. 50 of USEPA's July 14, 2005 AAA, which states:

> Within thirty (30) days after the LRWQCB [Water Board] concludes that the seasonal work on the NTCRA has been fully performed, the LRWQCB shall so notify EPA and shall schedule and conduct a pre-certification inspection to be attended by the LRWQCB and EPA. The pre-certification inspection shall be followed by a written report submitted within ninety (90) days of the inspection by the LRWQCB's Project Coordinator certifying that all work to date on the NTCRA has been completed in full satisfaction of the requirements of this Administrative Action.

USEPA and Water Board staff conducted the pre-certification inspection for the Leviathan Mine site with a virtual meeting to discuss the 2022 field season on December 5, 2022.

This Year-End Report constitutes the "written report" as referenced in Paragraph No. 50 of the AAA and contains year-end summaries of Water Board field activities performed in 2022. The activities required of the Water Board by the USEPA are described in Paragraph No. 37 of the AAA. These activities consist of:

1. Summer treatment of Acid Mine Drainage (AMD) captured year-round in a series of ponds;
2. Site maintenance of ponds, drainage and diversion channels, and gates and fences; and

3. Site monitoring of water quality, water quantity, and meteorological information[1].

Water Board staff conducted the above-listed activities in accordance with the *2022 Work Plan for Leviathan Mine, Alpine County, California* (Work Plan) prepared by the Water Board.

This Year-End Report describes the site activities performed by the Water Board in 2022, and is organized into the following sections:

- Background – provides a description of the site setting and history; collection and storage of AMD; and the treatment process;
- Pond Water Treatment and Sludge Removal – provides a description of AMD treatment and the removal and disposal of sludge in 2022;
- Surface Water Monitoring – provides a description of ongoing surface water flow monitoring in 2022; and
- Site Maintenance – provides a description of 2022 site maintenance activities.

Pond Water Treatment (PWT) data and operator logs are summarized in five tables in Appendix A (A-1 through A-5). Laboratory reports and electronic data deliverables (EDDs) for PWT samples, Water Board's contractor AECOM Technical Services (AECOM) Data Quality Summary Report, and United States Geological Survey (USGS) flow and stage data are included as electronic files and are organized into Appendices B through D. These files are included in the submittal to USEPA on the USEPA SharePoint site for distribution to other stakeholders including Atlantic Richfield Company (ARC) for inclusion in the Site-Wide Database.

2. BACKGROUND

2.1 Site Setting and History

Leviathan Mine is located on the eastern slope of the Sierra Nevada Mountains in Alpine County, California (Figure 1). The mine is approximately six miles east of Markleeville, California and five miles west of Topaz Lake, Nevada. Based on the Final Title Search and Survey Report conducted by Science Applications International Corporation (SAIC) for the USEPA on January 31, 2000, the Leviathan Mine encompasses thirty-two patented mineral claims and a patented mill site. The majority of land disturbed by mining activities is on state-owned property, with the remainder of the disturbance located on property owned by the United States Department of Agriculture, Forest Service, Humboldt-Toiyabe National Forest (USFS). The USFS owns the majority of land surrounding the mine according to the above-mentioned SAIC

[1] In a letter dated March 28, 2011, the USEPA authorized the Water Board to discontinue surface water quality monitoring and meteorological monitoring responsibilities for the Leviathan Mine site. Surface water monitoring was discontinued in 2011 and meteorological monitoring was discontinued when the station become inoperable in 2016.

report, with the exception of ten private parcels along the southern boundary of the Leviathan Mine site.

Leviathan and Aspen Creeks (Figure 2) flow across the Leviathan Mine site and join below the mine. Approximately 1.5 miles downstream of the confluence of Leviathan and Aspen Creeks, Leviathan Creek joins Mountaineer Creek. The combined flow of Leviathan and Mountaineer Creeks forms Bryant Creek. Approximately 3.5 miles downstream of the confluence of Leviathan and Mountaineer Creeks, Bryant Creek flows across the Nevada state line. Approximately 3.3 miles downstream of the Nevada state line, Bryant Creek joins the East Fork Carson River.

Historical mining activities at Leviathan Mine included underground and open pit extraction of sulfur-rich ore. These activities resulted in the exposure of naturally occurring sulfide minerals to air and water. This exposure triggered a series of chemical reactions that caused local groundwater to become acidic and metal-rich. The acidic groundwater discharges (also known as AMD) from an old mine tunnel as well as seeps at several locations within the Leviathan Mine site. When AMD enters local surface water bodies, it adversely affects water quality, which, in turn, affects algae, insect, and fish growth, and damages the in-stream habitat through deposition of metal-rich precipitates.

The Water Board has implemented several projects to abate AMD from entering local surface water bodies. In 1985, the Water Board completed construction of a pollution abatement project at Leviathan Mine to address certain specific problem areas. This project included the construction of AMD storage and evaporation ponds, which are a major component of the Water Board's pond water collection and treatment activities.

2.2 AMD Collection and Storage

The 1985 pollution abatement project included construction of five lined evaporation ponds (Figure 3) to capture and evaporate AMD from remnant underground mine workings. The primary sources of AMD to the pond system are the Adit and the Pit Under-Drain (PUD).

The Adit is the location where acidic groundwater emanates from a remnant tunnel excavated during underground mining activities in the 1930s. The exact condition of the interior of the tunnel is unknown, but the tunnel is collapsed at its portal. The approximate location of the tunnel and other site features are shown in Figure 3. As part of the 1985 pollution abatement project, the Water Board's contractor installed an underground drain to collect acidic groundwater emanating from the Adit. The underground drain consists of a 12-inch-diameter perforated pipe in a bed of drain rock. The perforated pipe is connected to a non-perforated 12-inch pipe that carries the AMD to a concrete flow control structure. AMD from the Adit has a pH of less than 3.0 and typically has a discharge rate between nine (9) and 15 gallons per minute (gpm) with rates as high as approximately 67 gpm (based on flow data collected by USGS at 15-minute intervals from 1999 to present).

The Water Board's contractor installed the PUD during construction of the 1985 pollution abatement project to dewater saturated soils in the bottom of the open pit (Pit)

prior to backfilling the Pit to its current elevation. The PUD consists of approximately 1,500 linear feet of 12-inch-diameter perforated pipe set in a bed of drain rock beneath the Pit bottom, buried in backfill material. The perforated pipes connect to a non-perforated 18-inch-diameter pipe that conveys the PUD discharge to the flow control structure. AMD from the PUD has a pH of less than 3.0 and typically has a flow rate between 0.1 and 4 gpm, with rates as high as approximately 67 gpm (based on flow data collected by USGS at 15-minute intervals from 1999 to present).

The five evaporation ponds (Ponds 1, 2 South, 2 North, 3, and 4; see Figure 3) cover a combined surface area of approximately 11.8 acres with a cumulative holding capacity of approximately 15.4 million gallons (based on a 2012 survey conducted by ARC). AMD from the flow control structure is routed to the pond system via underground polyvinyl chloride (PVC) piping. AMD is directed to the pond system by gravity to any combination of Ponds 1, 2 South, and 2 North via a series of valves, as these ponds are interconnected and are at the same elevation. These three ponds are commonly referred to as the "upper ponds" and have a combined storage volume of approximately 13 million gallons. Pond 3 can receive overflow from the upper ponds by gravity via PVC overflow pipes. Overflow from Pond 3 flows in PVC piping and can be directed by gravity, via valves, to either Leviathan Creek or to Pond 4. Overflow from Pond 4 flows directly to Leviathan Creek via PVC piping. ARC is using Pond 4 for storage and treatment of other AMD sources. Since the spring of 2006, Pond 4 has been isolated from Pond 3 by a closed valve, and there has been no discharge from Pond 3 to Pond 4. Any discharges from Pond 3 are routed to Leviathan Creek. In 2022, Pond 3 did not receive overflow from any of the upper ponds, and there were no discharges from Pond 3 to Leviathan Creek.

2.3 Pond Water Treatment Processes

The Water Board treats AMD from the upper ponds and discharges the treated AMD during the summer (and winter/spring, if needed) to renew pond storage capacity for the subsequent winter and spring months. The Water Board's treatment of AMD contained in the ponds is accomplished through lime neutralization. The neutralization of AMD by the addition of lime has long been accepted as an effective means to raise pH and remove metals in AMD. Lime (calcium hydroxide or $Ca[OH]_2$) is mixed into the AMD from the ponds; the addition of lime causes an increase in pH and the precipitation of dissolved constituents, including metals, contained in the AMD. The precipitated solids are settled out of solution, and the final products are: (1) an effluent that meets USEPA Discharge Criteria with near neutral pH, and (2) a metal-rich waste sludge.

3. 2022 POND WATER TREATMENT AND SLUDGE REMOVAL

The 2022 AMD treatment and associated activities included sludge removal from the Pit Clarifier in late-June, and AMD treatment at the PWT Plant adjacent to Pond 1 (Plant) from early-July through late-July.

3.1 Pit Clarifier Sludge Removal and Disposal

Approximately 277 tons of sludge generated during operations of the Plant in 2021 were removed from the Pit Clarifier by the Water Board's contractor AECOM, in late-June

2022. The sludge was sampled, analyzed, and characterized in the fall of 2021; the results from the fall 2021 sampling were reported in the Water Board's 2021 Year-End Report. The sludge was hauled to a Class I hazardous waste landfill in Beatty, Nevada for disposal. Hazardous waste manifests are available for review at the Water Board's office in South Lake Tahoe. The sand drainage layer in the bottom of the Pit Clarifier was evaluated; the sand layer was within the specified thickness, and replenishment was not necessary. Sludge removal and disposal activities are shown in Photo 1.

3.2 2022 Summer Pond Water Treatment Plant Operation

The Water Board assembled the Plant during the 1999 field season on the northeast corner of Pond 1 and tested the process at full-scale during the 1999 and 2000 field seasons. The Water Board has continued to operate the Plant during the summer months from 2001 through 2022. The typical Water Board field season at Leviathan Mine runs from mid-June through mid-October.

The Plant has also been referred to as the Pond 1 lime treatment plant, because it is located adjacent to Pond 1 and treats AMD stored in Ponds 1, 2 North, and 2 South using lime treatment technology. The Plant draws AMD from Pond 1 for treatment, thereby lowering the surface elevation of AMD stored in Pond 1. The lower level in Pond 1 causes AMD from Pond 2 North and Pond 2 South to flow by gravity to Pond 1. As the level of AMD drops near the end of the treatment season, portable transfer pumps are used to move water from Pond 2 North and Pond 2 South to Pond 1. The Plant conveys the treated AMD and suspended precipitated solids to the Pit Clarifier located in the bottom of the Pit. The Pit Clarifier has plan dimensions of approximately 150 feet by 150 feet, and includes a gravel/sand-covered perforated pipe underdrain and a 10-inch diameter PVC decanting device, known as the piccolo decant structure.

The Water Board contracted with AECOM for Plant operations for the 2022 field season. AMD treatment began in early-July, with the first treated AMD entering the Pit Clarifier on July 6, 2022. Discharge of treated AMD from the Pit Clarifier to Leviathan Creek began on July 8, 2022, and treatment ceased on July 28, 2022. Plant operations were not conducted on July 25, 2022, due to poor air quality from wildfires. AECOM chose to operate the Plant 24 hours per day, approximately five days per week during treatment operations.

In 2022, AECOM used dry lime delivered to the site in 50-pound bags. AECOM batched lime slurry by mixing dry lime with Leviathan Creek water from upstream of the disturbed portion of the site and when necessary treated effluent as discussed below. AECOM added lime at two-points in the treatment process during the 2022 treatment season.

Figure 4 shows the Plant system layout and Figure 5 shows a simplified piping and instrumentation diagram of the Plant. AECOM pumped AMD from Pond 1 to a 10,000-gallon fiberglass tank (R-1). A pH probe installed in R-1 measured the pH in R-1 and controlled the amount of lime slurry added to R-1. The lime slurry raised the pH of the AMD from approximately 2.5 to an approximate range of 3.0 to 4.0, as measured in R-1. A mixer and compressed air were used in R-1 at all times to agitate, oxidize, and promote mixing. The AMD flowed by gravity from R-1 through a two-chambered

combination flash/flocculation mix tank (FF-1). The fluid mixture flowed by gravity from FF-1 into a 10,000-gallon fiberglass reaction tank referred to as R-2. A mixer and compressed air were used in R-2 to further agitate, oxidize, and promote mixing. A pH probe in R-2 measured pH and metered the addition of lime slurry. The lime slurry raised the pH of the partially-treated AMD to an approximate range of 8.2 to 8.5, as measured in R-2. The fluid mixture then flowed by gravity through a second flash/flocculation mix tank (FF-2) in which compressed air and/or mixers were used to promote mixing.

The fluid mixture flowed by gravity from FF-2 into a clarifier tank (CL-2). A polyacrylamide polymer solution was injected into the fluid mixture at the bottom of CL-2 to promote flocculation and solids settling in the Pit Clarifier. Two 10-horsepower slurry pumps transferred the fluid mixture from the bottom of CL-2 to the Pit Clarifier, where solids settled out in near-quiescent conditions. During the 2022 treatment season, AECOM used a pH probe in FF-2 to control the slurry pumps and to prevent the transfer of treated AMD having a pH below 8.1 or above 8.7 to the Pit Clarifier. By means of this control system, treated AMD having a pH outside the range of 8.1-8.7 is automatically diverted back to Pond 1 for re-treatment. The pH probe, controller, and pump combination provided additional reliability as well as a final confirmation pH measurement.

A small portion of utility water is used to dilute the polyacrylamide polymer that is added into the fluid mixture at the bottom of CL-2. Typically, this utility water is collected from Leviathan Creek upstream of the disturbed portion of the site and is stored in two 15,000-gallon utility water tanks adjacent to the Plant. This year the flow in Leviathan Creek was insufficient to supply an adequate volume of utility water for the entire treatment season. As done in the past, AECOM utilized treated AMD from the effluent weir box as a source of utility water when the flow in Leviathan Creek became insufficient. Based on laboratory analytical results of effluent samples and field observations, no negative impacts on treatment efficiency were observed while using treated effluent as utility water.

In 2022, treated AMD was discharged from the Pit Clarifier using the underdrain and piccolo decant structure. Treated AMD from the Pit Clarifier is routed through the effluent weir box prior to discharging to Leviathan Creek. Treated AMD stage data and water quality samples were collected at the 90-degree V-notch weir in the effluent weir box. Stage data were recorded at 15-minute intervals using a data logger/pressure transducer system. The stage data were used to calculate treated effluent discharge volumes from the Pit Clarifier.

Discharge of treated AMD from the Pit Clarifier to Leviathan Creek began on July 8, 2022. Discharge to Leviathan Creek then occurred continuously until all treated AMD was discharged from the Pit Clarifier. After the pond water was treated and the Plant was shut down on July 28, 2022, treated AMD continued to be discharged from the Pit Clarifier as the accumulated sludge drained. By August 24, 2022, approximately 2.7 million gallons of treated AMD had been discharged to Leviathan Creek and flows from the Pit Clarifier underdrain were well below five gpm. A summary of daily treated AMD volumes discharged to Leviathan Creek is presented in Table A-1 of Appendix A. Table 1 includes the total volume of AMD treated each year since 1999.

The 2022 Plant operation consumed 41.6 tons of high calcium hydrated lime (approximately 90 percent calcium hydroxide by weight), 86 gallons of liquid flocculent, 1,412 gallons of diesel fuel, and 63.5 gallons of gasoline. This information is also included in Table 1. The Water Board's treatment effort in 2022, combined with natural evaporation, resulted in the upper pond system having the maximum available storage capacity of approximately 13 million gallons at the end of the treatment effort.

Sludge generated by the Plant in 2022 is contained in the Pit Clarifier to allow for further dewatering. Dewatering of the sludge over the winter will increase solids content and reduce both the volume and mass of the sludge. Water Board staff estimates that approximately 216 – 270 tons of sludge, generated during 2022 summer operations, will be disposed of in 2023.

3.3 Summer Pond Water Treatment Monitoring

Treatment process monitoring, sampling, and analysis were performed in accordance with the Water Board's May 2022 *Sampling and Analysis Plan for Leviathan Mine Site Pond Water Treatment* (PWT SAP). A summary of the monitoring parameters, locations, and frequencies for the 2022 PWT monitoring program is presented in Table 2. Specific details of sample collection and handling are described in the PWT SAP. Effluent samples were collected and analyzed for comparison with USEPA Discharge Criteria; the USEPA Discharge Criteria are set forth in the September 25, 2008 NTCRA for the Leviathan Mine site and are summarized in Table 3. In 2022, there were 102 minor deviations from the PWT SAP, as explained in Section 3.4.3. Samples collected by AECOM staff were transferred under Chain of Custody for laboratory analysis by offsite laboratory, Microbac, of Marietta, Ohio.

To confirm the quality of treated AMD discharged to Leviathan Creek, AECOM collected grab samples of the treated AMD (effluent) twice weekly during the 2022 treatment season. AECOM collected effluent samples from the Water Board's effluent weir box located near the Pit Clarifier. As specified in the 2022 Work Plan, effluent sample collection stopped when the discharge of effluent dropped below five (5) gpm, which occurred on August 12, 2022. The first effluent sample was collected on July 8, 2022, and the last effluent sample was collected on August 11, 2022. To confirm the USEPA Discharge Criteria would be met, one pre-discharge sample was taken prior to discharging effluent to Leviathan Creek. This sample was collected by AECOM on July 7, 2022 from the Pit Clarifier. Additionally, AECOM collected Plant influent samples from the line conveying pond water to the Plant weekly during the 2022 treatment season.

In summary, AECOM collected the following samples for analytical laboratory analysis as part of the 2022 PWT monitoring program:

- 11 effluent samples (two [2] per week)
- Two (2) effluent duplicate samples
- One (1) pre-discharge sample
- Four (4) pre-treatment influent samples
- Two (2) field method blank samples

A portion of each grab sample was field filtered using a 0.45 micron filter, preserved with nitric acid, and submitted to the laboratory to be analyzed for the following dissolved metals/metalloids: aluminum (Al), arsenic (As), copper (Cu), chromium (Cr), cadmium (Cd), nickel (Ni), iron (Fe), lead (Pb), and zinc (Zn). An unfiltered portion of each grab sample was preserved with nitric acid and submitted to the laboratory for total recoverable selenium (Se) analysis. At least once per week, in addition to the above analyses, AECOM submitted to the laboratory samples of Plant influent and effluent for total dissolved solids (TDS), dissolved sulfate (SO_4), calcium (Ca), cobalt (Co), magnesium (Mg), manganese (Mn), antimony (Sb), barium (Ba), beryllium (Be), mercury (Hg), silver (Ag), thallium (Tl), and vanadium (V). During influent and effluent sample collection activities, AECOM monitored and recorded pH and temperature in the field on sampling record forms. Sample identification tracking forms and sampling record forms are available for review at the Water Board's office in South Lake Tahoe. Analytical and field monitoring results of Plant effluent and influent samples are summarized in Tables A-2 and A-3 of Appendix A, respectively. These tables include non-detect results for effluent and influent samples, in which case the lab qualifier of a U (The analyte was analyzed for but was not detected above the reported quantitation limit. The quantitation limit has been adjusted for any dilution or concentration of the sample.) is included in the Data Qualifier column and the method detection limit value is included in the table with a less than symbol (<) proceeding it.

To provide real-time information on effluent quality and system operation, treatment plant operators measured the pH and temperature approximately every hour while the system was operating at four (4) mid-process locations (R-1, R-2, FF-2, and influent to Pit Clarifier) and at one effluent location (effluent weir box). Operators used these data to check against in-system pH probes to modify lime additions, if necessary, and maintain effluent quality. Temperature and pH data collected by AECOM from R-1, R-2, FF-2, the Pit Clarifier, and the weir box are summarized in Table A-4 of Appendix A. Copies of AECOM's operator logs are available for review in the Water Board's office in South Lake Tahoe.

Sludge generated during the 2022 treatment effort, and contained in the Pit Clarifier, was sampled on September 27, 2022, for waste characterization and disposal purposes. AECOM collected three (3) discrete sludge samples from three (3) different locations in the Pit Clarifier. At the time of sampling, the depth of accumulated sludge in the Pit Clarifier ranged from 18 to 24 inches.

Sludge samples were analyzed for comparisons with Total Threshold Limit Concentrations (TTLC) and Soluble Threshold Limit Concentrations (STLC) for California Code of Regulations Title 22 metals (Sb, As, Ba, Be, Cd, Cr, Co, Cu, Pb, Hg, molybdenum (Mo), Ni, Se, Ag, Tl, V, and Zn), Al, and Fe; and percent solids. Additionally, sludge samples were analyzed pursuant to the Toxicity Characteristic Leaching Procedure (TCLP) for disposal purposes. Analytical results for the sludge samples are summarized in Table A-5 of Appendix A. Table A-5 includes non-detect results for sludge samples, in which case the lab qualifier ND is included in the Data Qualifier column and the method detection limit value is included in the table with a less than symbol (<) proceeding it.

3.4 Sampling Results from Summer Pond Water Treatment Monitoring

3.4.1 Monitoring Objectives

Specific objectives of the PWT monitoring program are:

- Identify the chemical characteristics of the Plant influent.
- Identify the chemical characteristics of the Plant effluent.
- Identify the chemical characteristics of solids generated in the treatment process.
- Monitor field pH at critical points within the treatment system and at the discharge point as a means to monitor and control treatment efficacy.
- Monitor the Plant's effectiveness in meeting USEPA Discharge Criteria.

3.4.2 Data Summary

Laboratory analytical results for effluent are summarized in Table A-2. These data are collected for comparison with the USEPA Daily Maximum Discharge Criteria, which are also included in Table A-2. All PWT effluent data met the USEPA Daily Maximum Discharge Criteria in 2022.

Table A-3 summarizes laboratory analytical results for Plant influent samples. Results are generally consistent with previous treatment seasons. Plant influent sample pH ranged from 2.24 to 2.68 and TDS ranged from 5,700 to 7,430 mg/L with an average of 6,705 mg/L. Results of pH and temperature for data collected by Plant operators are included in Table A-4. Measurements of pH taken by Plant operators show that the discharge of effluent to Leviathan Creek met USEPA Discharge Criteria, and that desired pH levels were achieved in the Plant throughout the treatment season.

A summary of daily discharge from the Pit Clarifier is included in Table A-1. A total of approximately 2.7 million gallons of effluent was discharged from the Pit Clarifier to Leviathan Creek in 2022. The 15-minute discharge stage data recorded by the data logger (which are the basis of discharge flow calculations) are available for review at the Water Board's office in South Lake Tahoe.

Results of the Pit Clarifier sludge characterization analyses are presented in Table A-5 for sludge generated during the 2022 treatment season. On September 27, 2022, AECOM collected three sludge samples from the Pit Clarifier to characterize sludge generated during the 2022 treatment season. These three sludge samples averaged 13.3 percent solids at the time of collection. With the exception of the TTLC analysis for As, the sludge did not exceed any other STLC or TTLC limits. The total concentrations for As exceeded the TTLC in two of the three sludge samples. The arithmetic average As concentration for these two samples was 527.5 milligrams per kilogram (mg/kg) on a dry-weight basis. The regulatory standard TTLC for As is 500 mg/kg as measured on a wet-weight basis. Sludge sample results are reported on a dry-weight basis for this sampling effort because the percent solids at the time of disposal is not known. Therefore, the dry-weight basis results constitute the most conservative evaluation of sludge quality. At the time of disposal in the late spring or early summer, the concentration of solids in the sludge has typically varied from about 25 to 55 percent.

The average concentration of As measured in the sludge would not exceed the TTLC on a wet-weight basis unless the sludge was approximately 95 percent or greater solids by weight. Therefore, it is possible the sludge could exceed the TTLC when it is disposed of in the late spring or early summer of 2023.

Copies of the laboratory's EDD files for Plant influent, effluent, and sludge samples are provided in Appendix B. Appendix B also includes Portable Document Format (PDF) versions of the hard copy laboratory reports.

Sample identification number (ID) 2223PWT021 was not used during the 2022 field season. This sample ID was inadvertently skipped in the sample naming sequence.

3.4.3 Data Quality Evaluation

AECOM and Water Board staff reviewed the quality of the PWT monitoring results. Sample collection, handling, preservation, and analysis were conducted as specified in the PWT SAP. Field quality control samples, including two field duplicate samples and two field method blank (FMB) samples, were collected. A Chain of Custody form was completed for each group of samples submitted to the analytical laboratories. Upon receipt of the laboratory report, Water Board staff reviewed the Chain of Custody to ensure that details such as the project name, sample ID numbers, sample dates, sample times, and requested parameters were properly reported. Water Board staff's data review also included an evaluation of sample holding times, an assessment of precision, an assessment of anomalous data, and a review of field duplicate sample and FMB results.

Data qualifiers from the laboratory and AECOM review are presented with the data in Tables A-2, A-3, and A-5. AECOM data qualifiers are summarized in Appendix C – AECOM 2022 Data Summary Report, Attachment 4. The data qualifiers assigned by AECOM are called EPA Qualifiers in Tables A-2, A-3, and A-5.

AECOM submitted two field duplicate samples to the laboratory to measure the precision of the entire measurement system including sampling and analytical procedures in 2022. The relative percent difference (RPD) was calculated for each analyte in the primary and corresponding duplicate samples, as follows:

- If both the sample and duplicate values were equal to or greater than five times the RL, then the RPD was calculated by dividing the absolute value of the difference of the two measurements by the average of the two measurements and multiplying by 100. The RPD must be equal to or less than 25 percent to be within control limits.

- If either the sample or duplicate value was less than five times the RL, then the absolute value of the difference between the sample and duplicate values had to be equal to or less than the RL to be within control limits.

In 2022, the field duplicate samples were within the control limits for RPD for all analytes with two (2) exceptions. For the sample/duplicate pair (sample ID 2223PWT005-EFF and duplicate sample ID 2223PWT007-EFF), the RPD for Mn was 120 percent, and the RPD for Se was 38 percent. Per the PWT SAP, the control limit of

25 percent is based on the analytical precision goals for the laboratory matrix spike duplicate samples.

Two FMB samples were collected and submitted for laboratory analysis of the same parameters as PWT effluent samples. The FMB sample is collected and processed in the same method as effluent samples, except using laboratory-supplied purified deionized water for the FMB. There was one positive detection in the FMB samples in 2022. For sample ID 2223PWT016-FMB, the parameter that was detected was Mn, which does not have discharge criteria established by the USEPA for Leviathan Mine. For sample ID 2223PWT016-FMB, there was one positive detection of Mn at 0.347 mg/L, compared to sample ID 2223PWT017-EFF Mn concentration of 0.542 mg/L and sample ID 2223PWT018-EFF (field duplicate sample) Mn concentration of 0.575 mg/L, which were taken on the same day as the FMB sample.

In 2022, there were a total of 102 minor deviations (10 influent, 30 effluent, and 62 sludge sample concentrations) from the PWT SAP due to samples being analyzed past the holding times and at reporting limits higher than specified in the PWT SAP. The method detection limits for these analytes are included in Table A-2 (effluent), Table A-3 (influent), and Table A-5 (sludge) of Appendix A in the result column preceded with a less than symbol (<). In all instances for the effluent samples the method detection limit was below the USEPA Discharge Criteria. These deviations are discussed below.

Influent Samples

- All four (4) samples analyzed for TDS were reanalyzed past the holding time of seven days using less volume since the initial analysis contained residue in the crucible above what is allowed by the method.

- Sample ID 2223PWT009-INF four (4) analytes (Sb, Ba, Pb, and Ag) were non-detect and were analyzed at reporting limits higher than specified in the PWT SAP.

- Sample ID 2223PWT012-INF two (2) analytes (Ba and Pb) were non-detect and were analyzed at reporting limits higher than specified in the PWT SAP.

- Sample ID 2223PWT009-INF sulfate concentration was much lower than expected based on current and past sulfate results. The laboratory confirmed the reported concentration and the dilution was correct. The reported sulfate concentration is considered an anomalous result and has a footnote included in Table A-3 (note this is not a deviation from the PWT SAP).

Effluent Samples

- Sample ID 2223PWT010-EFF 10 analytes (Sb, Be, Pb, As, Cd, Cr, Co, Cu, Ni, and Ag) were non-detect and were analyzed at a reporting limit higher than specified in the PWT SAP.

- Sample ID 2223PWT011-EFF five (5) analytes (Pb, AS, Cd, Cr, and Cu) were non-detect and were analyzed at a reporting limit higher than specified in the PWT SAP.

- Sample ID 2223PWT013-EFF six (6) analytes (Sb, Be, Cr, Cu, Ni, and Ag) were non-detect and were analyzed at a reporting limit higher than specified in the PWT SAP.

- Sample ID 2223PWT014-EFF four (4) analytes (As, Cr, Cu, and Ni) were non-detect and were analyzed at a reporting limit higher than specified in the PWT SAP.

- Sample ID 2223PWT015-EFF five (5) analytes (Sb, Be, Cr, Cu and Ag) were non-detect and were analyzed at a reporting limit higher than specified in the PWT SAP.

- Sample ID 2223PWT010-EFF sulfate concentration was much lower than expected based on current and past sulfate results. The laboratory confirmed the reported concentration and the dilution was correct. The reported sulfate concentration is considered an anomalous result and has a footnote included in Table A-2 (note this is not a deviation from the PWT SAP).

The laboratory has explained that an elevated reporting limit occurred from additional dilutions that were required due to a matrix interference for sample IDs 2223PWT009-INF, 2223PWT010-EFF, 2223PWT011-EFF, 2223PWT012-INF, 2223PWT013-EFF, 2223PWT014-EFF, and 2223PWT015-EFF. In an effort to determine matrix interferences, the following samples were chosen to be re-analyzed by the laboratory for chloride and sulfur (the sulfur result is from a calculation from SO_4 ran by Standard Methods 4500): sample IDs 2223PWT012-INF, 2223PWT013-EFF, 2223PWT015-EFF, 2223PWT017-EFF, 2223PWT018-EFF, and 2223PWT019-EFF. Although sulfur was detected in all samples, some of these samples had more elevated concentrations of sulfur and the laboratory suggested this additional amount is enough to have contributed to matrix interferences for metals samples. Sample IDs 2223PWT017-EFF, 2223PWT018-EFF, and 2223PWT019-EFF did not have any matrix interference issues and the average concentration of sulfur in these samples was 551.6 mg/L, compared to the average concentration of sulfur of 591.5 mg/L for sample IDs 2223PWT013-EFF and 2223PWT015-EFF, which did have matrix interferences. The difference in average sulfur concentrations between the samples with matrix interference issues and the samples that did not is 39.9 mg/L. The results from the re-analysis of samples for chloride, SO_4 (by Standard Methods 4500) and sulfur are included in Tables A-2 and A-3 in Appendix A. Since these samples were re-analyzed, the following samples were analyzed out of the 28-day hold time for SO_4, which was used in the calculation of sulfur: sample IDs 2223PWT012-INF, 2223PWT013-EFF, 2223PWT015-EFF, 2223PWT017-EFF, and 2223PWT018-EFF.

<u>Sludge Samples</u>

There were 62 minor deviations from the PWT SAP where sludge samples were analyzed at a reporting limit higher than specified in the PWT SAP. The moisture content in the collected sludge samples did not allow the laboratory to meet the specified reporting limits. Although the reporting limits were higher than specified in the PWT SAP, all of the reporting limits achieved by the laboratory were well below the sludge disposal regulatory criteria.

- Sample ID 2223PWT022-PC-A 19 minor deviations were observed since the reporting limits for TTLC analytes Sb, Mo, Ag, and Hg, STLC analytes Sb, Pb and Tl, and TCLP analytes Sb, As, Ba, Cu, Fe, Pb, Mo, Se, Ag, Tl, V, and Hg were higher than specified in the PWT SAP.

- Sample ID 2223PWT022-PC-B 22 minor deviations were observed since the reporting limits for TTLC analytes Sb, Pb, Mo, Se, Ag, Hg, and Tl, STLC analytes Sb, Pb and Tl, and TCLP analytes Sb, As, Ba, Cu, Fe, Pb, Mo, Se, Ag, Tl, V, and Hg were higher than specified in the PWT SAP.

- Sample ID 2232PWT022-PC-C 21 minor deviations were observed since the reporting limits for TTLC analytes Sb, Mo, Se, Ag, Tl, and Hg, STLC analytes Sb, Pb and Tl, and TCLP analytes Sb, As, Ba, Cu, Fe, Pb, Mo, Se, Ag, Tl, V, and Hg were higher than specified in the PWT SAP.

3.4.4 Database Format Discrepancies

Water Board staff did not format the laboratory-supplied EDDs in accordance with the template provided by ARC in their September 2006 Database Tech memo report (section B.6.3.1 of the 2010 PWT QAPP). ARC indicated in early January 2011 that they are trying to improve consistency across the Site-Wide Database and therefore the EDD templates are being refined. The laboratory used by the Water Board's contractor provides laboratory data in an EDD that will require changes by ARC prior to upload to the database. This information was submitted to ARC in a letter dated January 13, 2011, and the USEPA was also copied on this communication.

Water Board staff will continue to coordinate with subcontractors and laboratories during 2023 Pond Water Treatment activities to ensure that samples required by the Water Board's Work Plan are collected and analyzed in accordance with the PWT SAP. Water Board staff plan to discuss continued improvements with their contractor prior to the 2023 field season.

4. SURFACE WATER MONITORING

The Water Board continued its efforts through the 2022 water year to monitor surface water flow in the vicinity of Leviathan Mine. The Water Board also monitored the water surface elevation of Pond 1. Surface water flow and Pond 1 surface elevation data generated by Water Board monitoring activities are presented in the following section.

4.1 Flow and Stage Monitoring

Flow data are reported on the basis of water year. The 2022 water year began October 1, 2021 and ended September 30, 2022. Under contract to the Water Board, the USGS monitored surface water stage/flow rates and pond water stage at 14 locations during the 2022 water year. Flow monitoring locations, USGS station numbers, and equipment are identified in Table 4 and are shown on Figure 6. As shown in Table 4, 12 of the 14 stations have continuous stage records. One of the 14 stations (Station 16, Aspen Creek above the confluence of Aspen and Leviathan Creeks) is monitored manually, when conditions allow, only during USGS field visits, which occur

approximately every six weeks, and one station (Station 24, Mountaineer Creek) is a calculated relationship derived by subtracting Station 23 (Leviathan Creek above the confluence of Mountaineer and Leviathan Creeks) from Station 25 (Bryant Creek below the confluence of Mountaineer and Leviathan Creeks). Tables D-1 through D-12 (Appendix D) provide the final flow or stage data for the 2022 water year. Some flow and stage data may have been impacted by snow and/or ice and modified accordingly by the USGS.

Real-time provisional flow and stage recordings can be viewed on the web for the following eleven stations: Adit, PUD, Pond 1, Station 1, Station 15, Station 22, Station 23, Station 25, Pit Junction Box, Upper Tributary, and 4L Creek. The real-time data can be accessed through the USGS's website at: http://waterdata.usgs.gov/ca/nwis/current?type=flow. Published data reports can be searched by USGS station number at the USGS website: http://ca.water.usgs.gov/waterdata/.

5. SITE MAINTENANCE

The Water Board conducted routine and non-routine site maintenance work during the 2022 field season in accordance with the 2022 Work Plan.

5.1 Routine Maintenance

Routine maintenance activities performed in 2022 included repairing the perimeter fence, maintaining Best Management Practices (BMPs) for erosion control, removal of sediment from the Lower Tributary, maintaining pond liner cover material, removing invasive weeds, wildfire hardening activities, and asphalt crack sealing.

The perimeter fencing is barbed-wire and surrounds the majority of Leviathan Mine property. Water Board staff inspected the perimeter fence in August and noted that the fence required minor repairs in numerous locations around the site. Due to the numerous repairs required, Water Board staff requested that AECOM hire a fence subcontractor to repair the perimeter fence. AECOM's subcontractor repaired the perimeter fence in mid-September 2022.

Water Board staff noted that the BMPs along the Pit access road and in the Pond 1 area needed minor maintenance. Periodically during field season Water Board staff performed minor maintenance of the BMPs along the Pit access road and in the Pond 1 area.

During the spring of 2022 Water Board and USGS staff observed that sediment accumulation in the Lower Tributary was beginning to impede on the USGS monitoring equipment. During early-July 2022 Water Board staff removed sediment from the Lower Tributary.

Water Board staff inspected the perimeters of Ponds 1, 2 North, 2 South, and 3 periodically throughout the field season and identified areas where the pond liners had become exposed due to erosion or displacement of the earthen liner cover. Water Board staff filled in minor rills in the Pond 1, Pond 2 North, Pond 2 South, and Pond 3 liner cover material on an as needed basis throughout the field season.

Periodically throughout the 2022 field season, Water Board staff inspected areas for the presence of the invasive plant, dyers woad (*Isatis tinctoria L.*). Dyers woad plants found by Water Board staff were removed using a small trowel to remove as much of the root as possible. Invasive plants were placed in sealed plastic bags for disposal. The El Dorado County Department of Agriculture (EDCDA) visited Leviathan Mine on September 15, 2022, and spot applied an herbicide (Telar) on invasive plants. This year, EDCDA sprayed to eradicate tall whitetop (*Lepidium latifolium*) and dyers woad (*Isatis tinctoria L.*).

On August 17, 2022, Water Board, USEPA, and ARC staff met with California Department of Forestry and Fire Protection (CalFire) and Alpine County staff to discuss potential fire hardening activities that could be implemented onsite. Following recommendations provided by CalFire, Water Board staff directed AECOM to remove limbs and thin trees and bushes around Pond 1 and on the hillsides to the west and north of the Plant. All vegetation that was removed was chipped and stockpiled onsite for potential future use. These fire hardening activities will help minimize potential damage to the Plant should the area be exposed to wildfire. Vegetation removal activities near Pond 1 can be seen in Photo 2.

In 2011, portions of the road through Leviathan Mine were paved. In recent years, Water Board staff has observed some cracking of the pavement. In 2018, the Water Board began performing periodic crack sealing activities to preserve the integrity of the pavement and prevent infiltration of water into the road subgrade. During the 2022 field season, Water Board staff requested that AECOM fill/seal new cracks that developed since the last time crack sealing was performed in 2020. Pavement repairs were completed using a hot applied, polymer modified crack and joint sealant for use on asphalt and concrete pavements. None of the cracks were wide enough to require cold mix asphalt repair material. AECOM completed the asphalt pavement crack sealing in late-September 2022.

5.2 Non-Routine Maintenance

5.2.1 Channel Underdrain Video Inspection

During the 2021 field season, the Water Board's contractor successfully removed metal precipitates from the Channel Underdrain (CUD) pipe. Due to the cleanout being completed very late in the field season, and the onset of winter weather, video inspection was not possible at that time. During early-July 2022 field conditions allowed a video inspection to occur.

The Water Board's contractor cut an access port in the top of the exposed CUD conveyance pipe. A remote-controlled video camera on wheels was inserted into the access port and advanced up the CUD pipe. The video inspection was advanced approximately 96 feet up from the access port at which time the inspection was ended due to the remote vehicle stirring up silt/sludge that had accumulated on the bottom of the pipe.

The Water Board's contractor used mesh bags placed over the end of the CUD pipe to capture any larger dislodged particles. Smaller particles that passed through the mesh bag were conveyed to ARC's CUD capture infrastructure and pumped to Pond 4.

During the video inspection it was noted that the interior of the CUD pipe is in good condition and that the perforations extend all the way to the bottom end of the CUD pipe.

Photos 3 through 5 show CUD video inspection activities.

5.2.2 Pond 3 Improvements

In the event of heavy winter precipitation and elevated early spring flows, winter/spring treatment activities at Pond 3 with portable treatment units are employed, if possible, to avoid overflow of untreated pond water to Leviathan Creek.

To improve working conditions, the Water Board constructed a concrete pad during the 2022 field season at Pond 3 which provides a durable working surface for winter/spring treatment operations. The concrete pad supports winter/spring treatment system components and is sloped to convey any releases from treatment operations back to Pond 3.

Improvements were also made to the access road on the east side of Pond 3 mitigating muddy conditions encountered during previous winter/spring treatment operations. Aggregate base was added to the road and the road was sloped away from Pond 3 to the adjacent stormwater ditch. The new concrete pad at Pond 3 can be seen in Photo 6.

5.2.3 Pond Water Treatment Plant Upgrades Pre-Project Demolition

Water Board staff are coordinating with the California Department of General Services to finalize design plans and obtain a contract to make improvements to the existing Plant. Final design plans for improvements to the Plant will be completed spring of 2023 and the construction contract will be awarded summer of 2023.

As part of the design process, Water Board staff identified modifications to the current Plant to simplify treatment operations for 2023 and improve construction sequencing. The modifications were completed in 2022 by the Water Board's PWT contractor and included the removal of legacy Plant components no longer in use, rerouting of pipelines, the partial removal of a raised earthen platform and its corresponding retaining wall, and the construction of a new retaining wall.

Photo 7 shows the Plant prior to modifications. Photos 8 and 9 show modifications completed to the Plant in 2022.

5.2.4 Pond 1 Temporary Liner Patching

In October of 2022, Water Board staff discovered several holes in the Pond 1 liner. Given unfavorable weather conditions and subcontractor availability, the Water Board were unable to have the holes patched by a liner specialist prior to the onset of winter weather. In late-October, the Water Board's contractor, AECOM, applied a temporary

patch as directed by a liner specialist. AECOM used a hand held heat welding gun to weld a Reinforced Polypropylene patch to the existing Pond 1 liner. During the 2023 field season, the Water Board intends to replace the temporary patch with a permanent patch.

Photo 10 shows the holes in the Pond 1 liner and Photo 11 shows the completed temporary patch.

FIGURES

Figure 1: Site Location Map

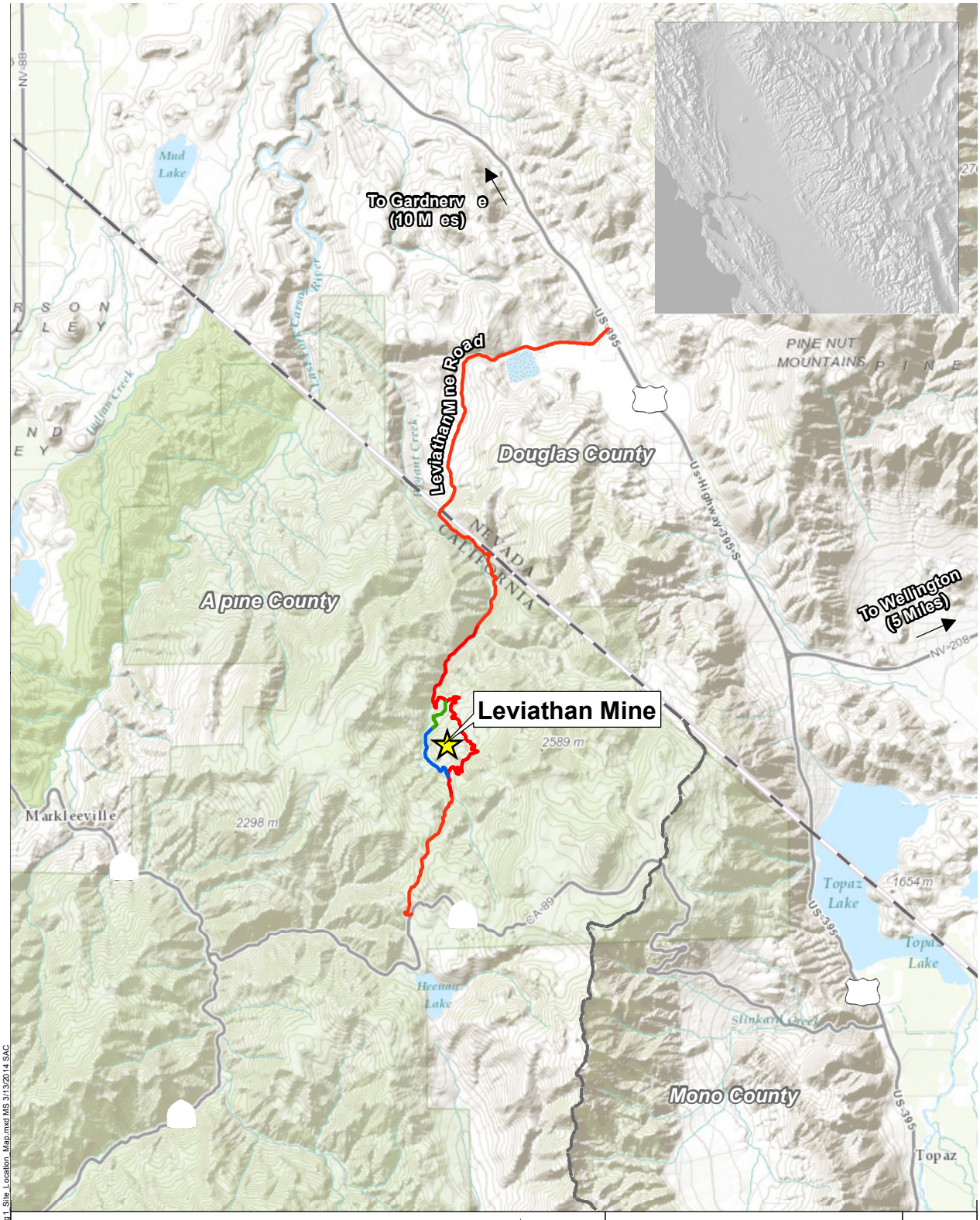
Figure 2: Bryant Creek Watershed

Figure 3: Lahontan Water Board AMD Capture and Treatment System

Figure 4: Leviathan Mine Pond Water Treatment System – System Layout

Figure 5: Leviathan Mine Pond Water Treatment System – Simplified Piping & Instrumentation Diagram

Figure 6: Flow and Stage Monitoring Locations



Forest Service Road 31348
Leviathan Mine Access Road
Leviathan Mine Road
(Forest Service Road 31052)
National Forest

N
0 1 2
Miles

Leviathan Mine
Site Location Map

Figure 1

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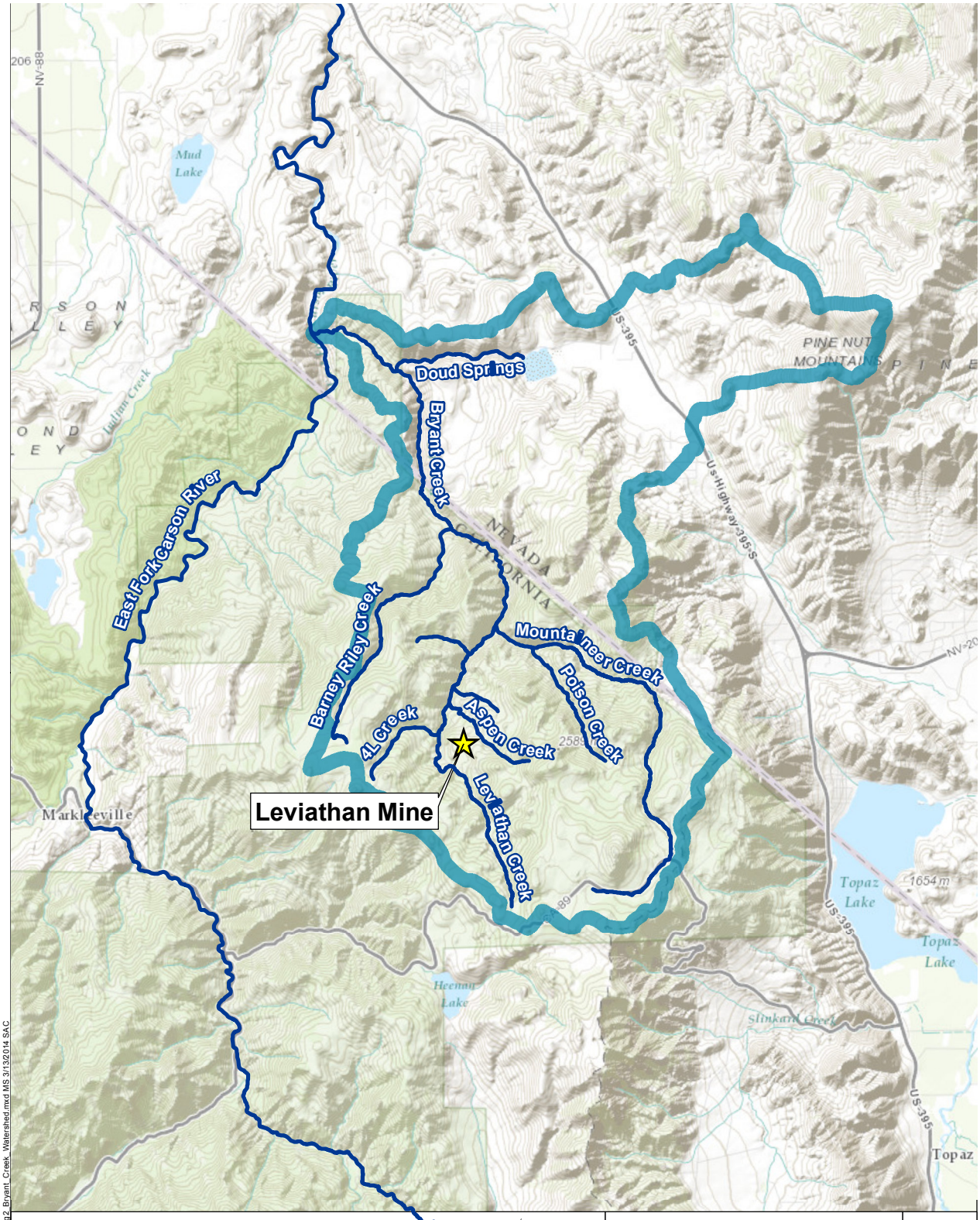

Bryant Creek Watershed

Figure 2

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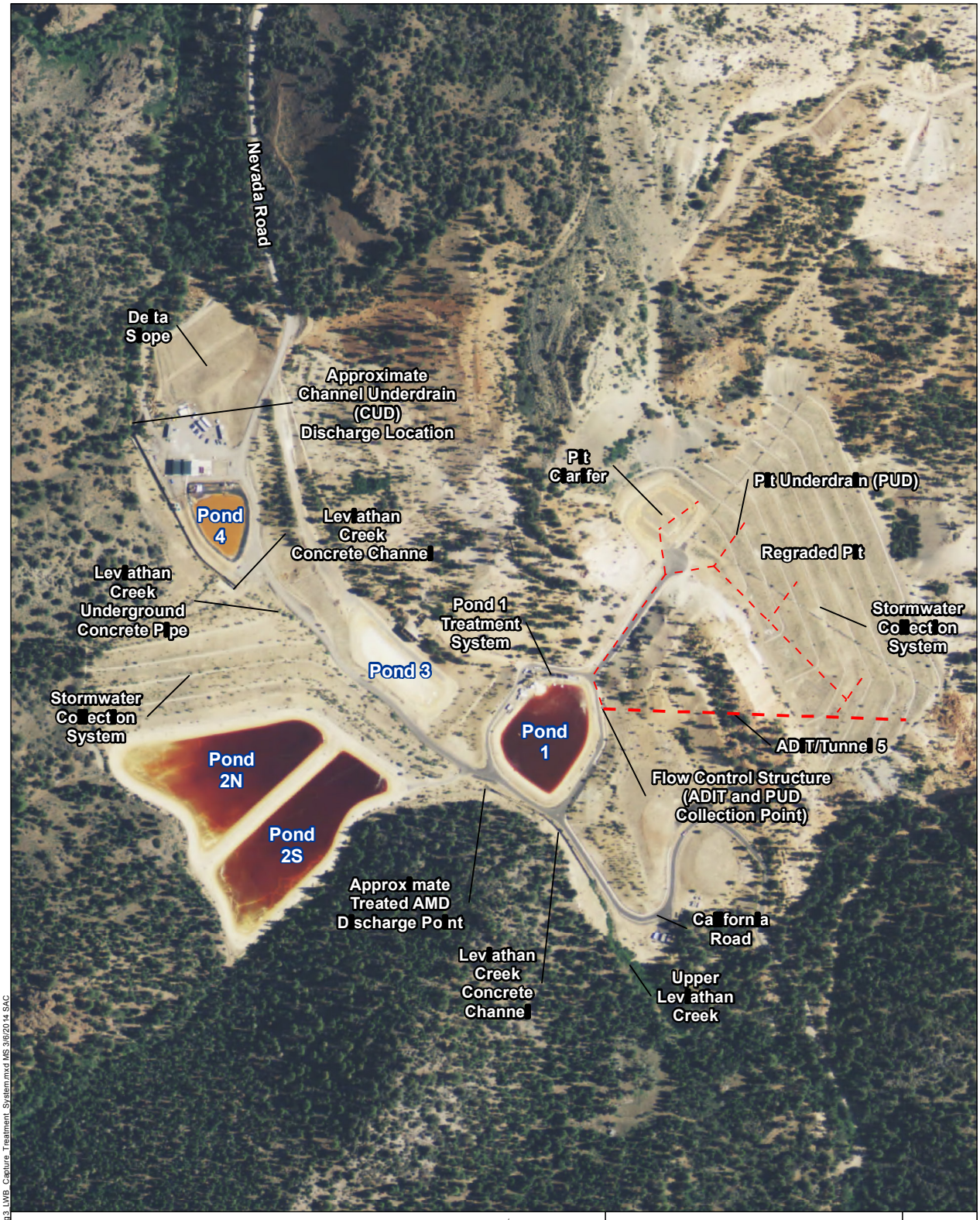

ADIT/Tunnel 5

Pit Underdrain (PUD)

N

0 250 500

Feet

Lahontan Water Board AMD Capture and Treatment System

Figure 3

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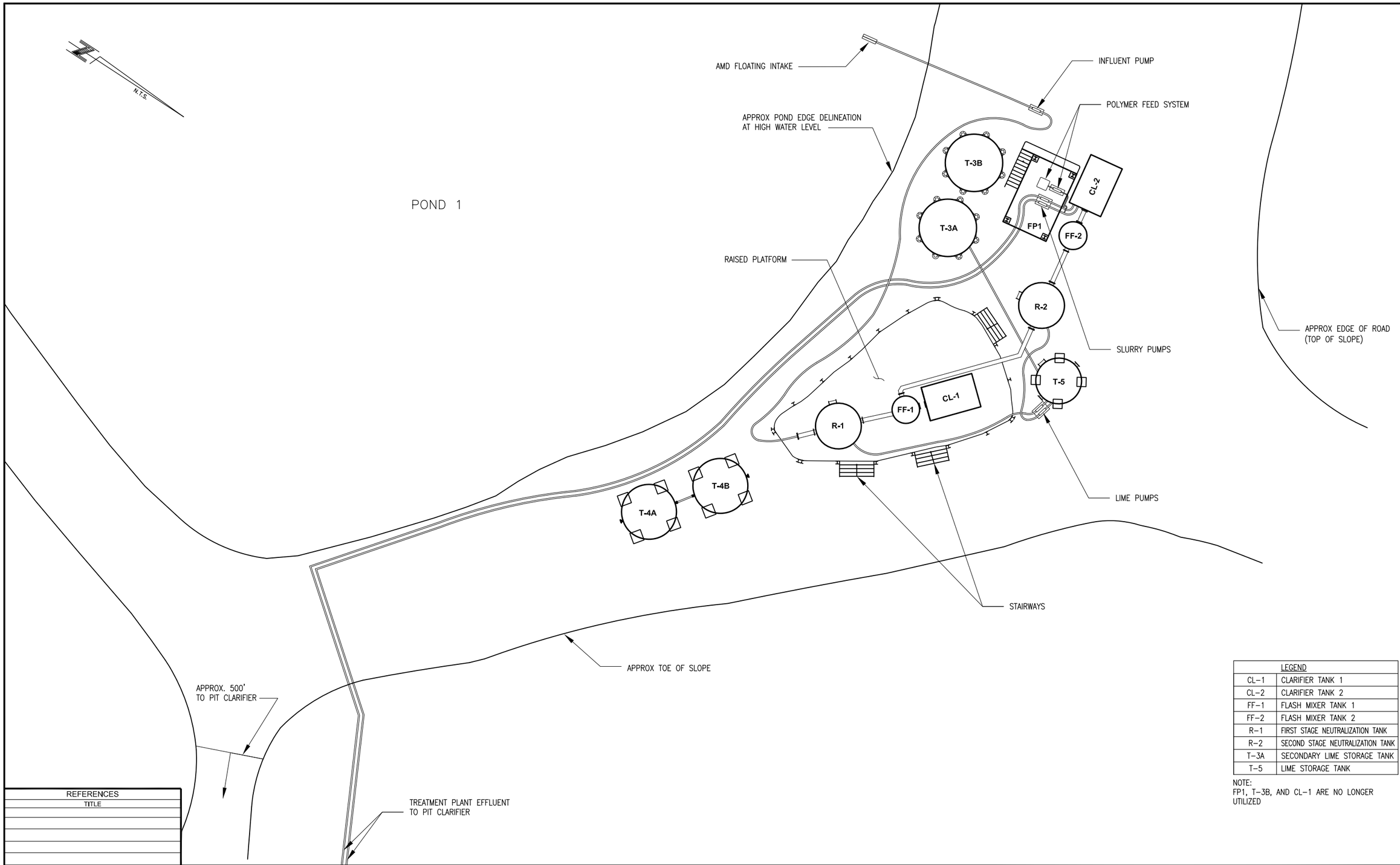


LEGEND	
CL-1	CLARIFIER TANK 1
CL-2	CLARIFIER TANK 2
FF-1	FLASH MIXER TANK 1
FF-2	FLASH MIXER TANK 2
R-1	FIRST STAGE NEUTRALIZATION TANK
R-2	SECOND STAGE NEUTRALIZATION TANK
T-3A	SECONDARY LIME STORAGE TANK
T-5	LIME STORAGE TANK

NOTE:
FP1, T-3B, AND CL-1 ARE NO LONGER UTILIZED

REFERENCES

TITLE

GRAPHIC SCALE
SCALE IN FEET
10 0 10 20

REVISIONS				REVISIONS			
NO.	BY.	DATE	DESCRIPTION	NO.	BY.	DATE	DESCRIPTION

DRAWING SCALE	AS NOTED
	DATE
DESIGNED BY:	
DRAWN BY:	
CHECKED BY:	
APPROVED BY:	

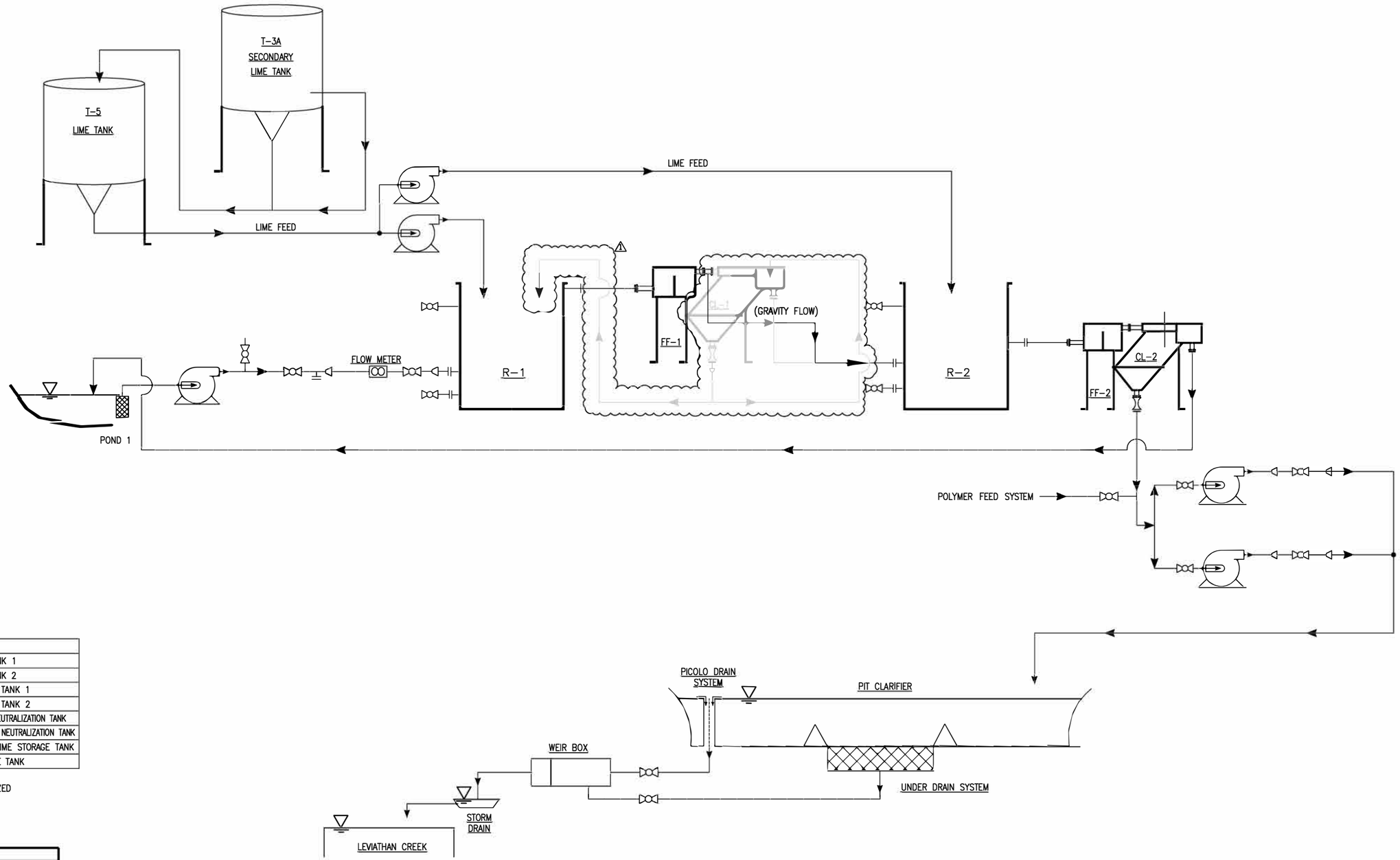
California Water Boards
STATE WATER RESOURCES CONTROL BOARD
REGIONAL WATER QUALITY CONTROL BOARDS

LEVIATHAN MINE POND WATER TREATMENT SYSTEM

SYSTEM LAYOUT

JOB NO.
PROJECT
SHEET NO.

Figure 4



LEGEND	
CL-1	CLARIFIER TANK 1
CL-2	CLARIFIER TANK 2
FF-1	FLASH MIXER TANK 1
FF-2	FLASH MIXER TANK 2
R-1	FIRST STAGE NEUTRALIZATION TANK
R-2	SECOND STAGE NEUTRALIZATION TANK
T-3A	SECONDARY LIME STORAGE TANK
T-5	LIME STORAGE TANK

NOTE:
CL-1 IS NO LONGER UTILIZED

REFERENCES
TITLE

DRAWING SCALE AS NOTED

REVISIONS

NO.	BY.	DATE	DESCRIPTION
1	DRL	03/2013	2011/2012 SYSTEM UPGRADES

REVISIONS

NO.	BY.	DATE	DESCRIPTION

DRAWING SCALE AS NOTED	
	DATE
DESIGNED BY:	
DRAWN BY:	
CHECKED BY:	
APPROVED BY:	

Water Boards

LEVIATHAN MINE POND WATER TREATMENT SYSTEM

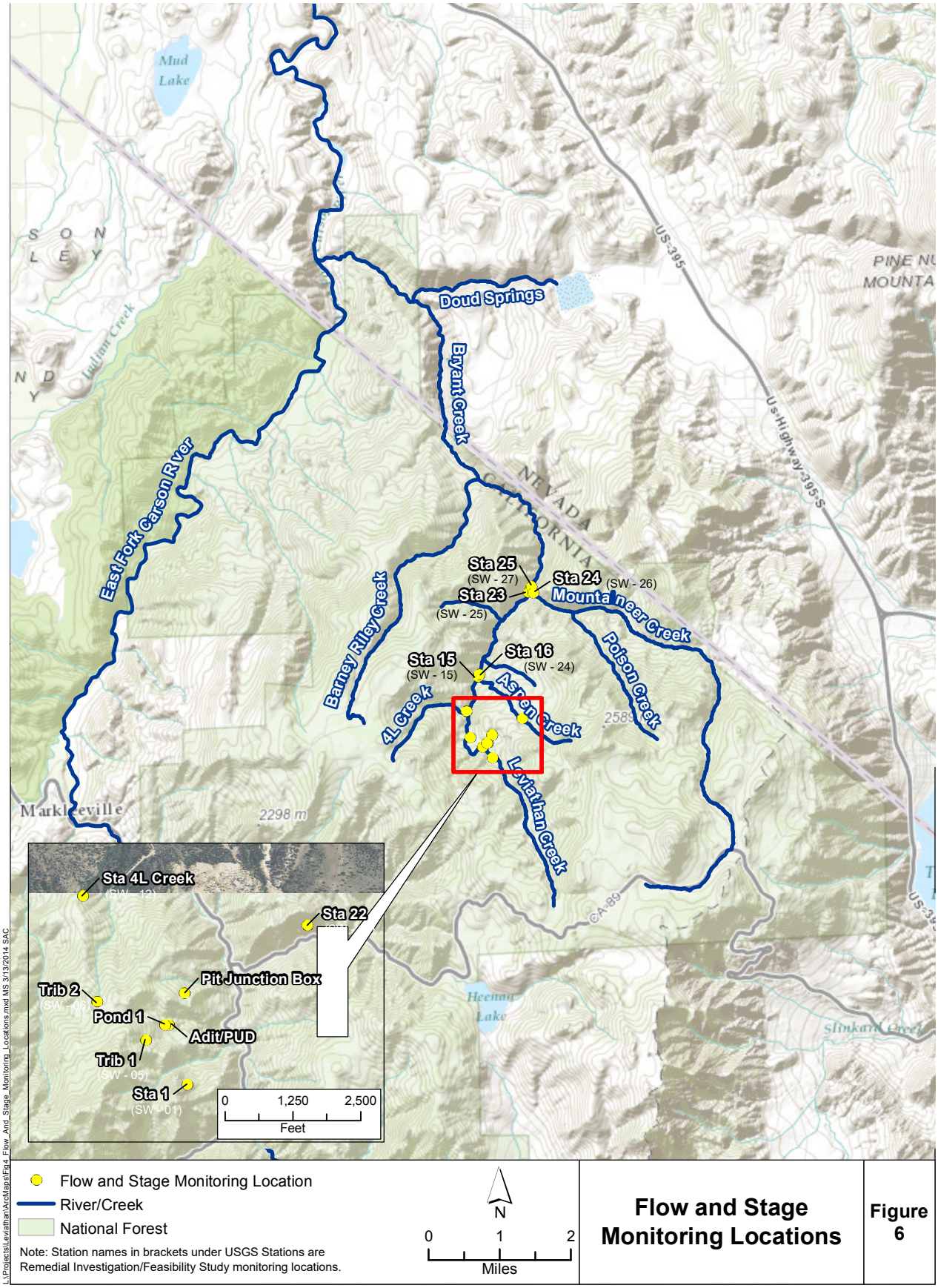
SIMPLIFIED PIPING & INSTRUMENTATION DIAGRAM

JOB NO.

PROJECT

SHEET NO.

Figure 5


Mud Lake
Doud Springs
Bryant Creek
East Fork Carson River
Barney Riley Creek
4L Creek
Sta 25
(SW - 27)
Sta 24
(SW - 26)
Sta 23
(SW - 25)
Mountaineer Creek
Sta 15
(SW - 15)
Sta 16
(SW - 24)
Poison Creek
Aspen Creek
Leviathan Creek
Markleeville
2298 m
US-395
Us Highway 395 S
NEVADA
CALIFORNIA
Sta 4L Creek
Sta 22
Pit Junction Box
Trib 2
Pond 1
Adit/PUD
Trib 1
Sta 1
0 1,250 2,500
Feet
Heenan Lake
Slinkard Creek
Flow and Stage Monitoring Location
River/Creek
National Forest
Note: Station names in brackets under USGS Stations are Remedial Investigation/Feasibility Study monitoring locations.
N
0 1 2
Miles
Flow and Stage Monitoring Locations
Figure 6
I:\Projects\Leviathan\ArcMaps\Fig4_Flow_And_Stage_Monitoring_Locations.mxd MS 3/13/2014 SAC

TABLES

Table 1: Summary of Pond Water Treatment Volumes and Consumables
Table 2: 2022 Summer Pond Water Treatment Monitoring Program
Table 3: USEPA Discharge Criteria
Table 4: 2022 Flow and Stage Monitoring Locations

TABLE 1
SUMMARY OF POND WATER TREATMENT VOLUMES AND CONSUMABLES
LEVIATHAN MINE, ALPINE COUNTY, CALIFORNIA

YEAR	DISCHARGE VOLUME (GALLONS)	SLUDGE GENERATED (TONS)	DRY LIME (TONS)	LIME UTILIZATION (mg LIME/L AMD)	DIESEL (GALLONS)	GASOLINE (GALLONS)
1999[1]	4,500,000	116	139	7403	12,609	Not Recorded
2000[1]	6,000,000	100	200	7989	13,000	Not Recorded
2001[1]	4,000,000	50	140	8389	6,500	600
2002[1]	3,800,000	50	75	4731	3,074	492
2003[1]	3,500,000	57	36.8	2520	2,625	575
2004[1]	5,900,000	91	78.4	3185	4,020	715
2005 (Spring)	530,000	--	7.2	3256	Not Recorded	Not Recorded
2005	10,000,000	916	240	5752	11,658	2,282
2006 (Spring)[2]	7,500,000	259	42.5	1358	Not Recorded	Not Recorded
2006	13,157,724	1,122	180	3279	6,294	756
2007	3,118,228	315	86	6610	3,641	646
2008	3,020,207	484	58	4603	2,037	851
2009	2,901,105	598	52	4296	4,056	708
2010	6,715,138	1,082	79	2820	4,994	609
2011 (Spring)	8,200,000	218	24	701	950	465
2011	9,804,502	1,000	198	4840	6,924	335
2012	2,842,452	324	62	5228	2,349	312
2013	2,663,709	178	47.65	4288	2,413	233
2014	814,792	156	40.46	11902	595	50
2015	2,537,261	163	78.52	7417	1100	105
2016	5,668,270	475	62.07	2625	4120	200
2017 (Spring)	14,926,250	277	60.3	968	5183	432
2017	10,954,643	2138	278.77	6099	10,007	283
2018 (Spring)[3]	920,000	427	2.65	690	493.75	29
2018	9,248,427	828	100	2592	5449	193
2019 (Spring)	4,552,000	39	12.6	663	1035	135
2019	11,790,788	1,432	170	3456	6535	185
2020	3,293,628	336	42	3056	2260	151
2021	2,888,168	277	45.6	3784	1900	195
2022	2,653,896	To be determined	41.6	3757	1412	63.5
Total	**168,401,188**	**13,508**	**2,680**	**--**	**127,234**	**11,601**

Notes:

[1] Sludge generated includes Phase 1 sludge only, Phase 2 sludge was disposed of on site and the weight is unknown.

[2] Sludge generated amount includes sludge generated from 2005 spring treatment.

[3] Sludge generated amount includes sludge generated from 2017 spring treatment.

TABLE 2
SUMMARY OF POND WATER TREATMENT MONITORING
LEVIATHAN MINE, ALPINE COUNTY, CALIFORNIA

SAMPLE LOCATION	LOCATION DESCRIPTION	ANALYSES	SCHEDULE
Influent	Sampling Port prior to Reactor 1	pH, temperature (field)	daily
		EPA-Required Discharge Criteria[1] with Additional Analytes[2]	weekly
Mid Process	Reactor 1	pH, temperature (field)	approx. every 2 hours
Mid Process	Reactor 2	pH, temperature (field)	approx. every 2 hours
Mid Process	Influent to Pit Clarifier	pH, temperature (field)	approx. every 2 hours
Effluent	Weir Box	pH, temperature (field)	approx. every 2 hours
		EPA-Required Discharge Criteria[1]	twice per week
		Additional Analytes[2]	weekly
Duplicate Samples	Effluent samples at weir box	EPA-Required Discharge Criteria[1]	minimum of 10%
Field Method Blank	Collected at Weir Box using distilled water	EPA-Required Discharge Criteria[1]	minimum of 10%
Sludge	Pit Clarifier	CAM-17[3] metals plus Al and Fe (for comparison with STLC and TTLC)[4,5] RCRA 8 Metals by TCLP (for comparison with Hazardous Waste Criteria)[6,7]	three composite samples collected once per year after treatment

Notes
1. Dissolved As, Al, Cd, Cr, Cu, Fe, Pb, Ni, Zn, total recoverable Se (off-site laboratory analysis); pH (field).
2. Dissolved Sb, Ba, Be, Ca, Co, Mg, Mn, Hg, Ag, Tl, TDS, sulfate, and V (off-site laboratory analysis). Note: Water Board is not under USEPA order to sample for Sb, Ba, Be, Hg, Ag, Tl, or V.
3. CAM-17 metals: Sb, As, Ba, Be, Cd, Cr, Co, Cu, Pb, Hg, Mo, Ni, Se, Ag, Tl, V, Zn (off-site laboratory analysis).
4. STLC is the Soluble Threshold Limit Concentration and TTLC is the Total Threshold Limit Concentration.
5. TTLC results will be reported on a dry weight basis.
6. TCLP is Toxic Characterization Leaching Procedure.
7. RCRA 8 metals As, Ba, Cd, Cr, Pb, Hg, Se, Ag, plus Al, Sb, Co, Cu, Fe, Mo, Ni, Tl, V, Zn

TABLE 3
USEPA DISCHARGE CRITERIA
LEVIATHAN MINE, ALPINE COUNTY, CALIFORNIA

Water Quality Parameter	Maximum[2]	Average[4]
pH	--	Between 6.0 – 9.0 SU[1]
Arsenic (dissolved)	0.34 mg/l	0.15 mg/l[3]
Aluminum (dissolved)	4.0 mg/l	2.0 mg/l[3]
Cadmium (dissolved)	0.009 mg/l	0.004 mg/l[3]
Chromium (dissolved)	0.97 mg/l	0.31 mg/l[3]
Copper (dissolved)	0.026 mg/l	0.016 mg/l[3]
Iron (dissolved)	2.0 mg/l	1.0 mg/l[3]
Lead (dissolved)	0.136 mg/l	0.005 mg/l[3]
Nickel (dissolved)	0.84 mg/l	0.094 mg/l[3]
Selenium (Total Recoverable)	Not Promulgated	0.005 mg/l[3]
Zinc (dissolved)	0.21 mg/l	0.21 mg/l[3]

Notes:

1. pH measurement based on 24-hour average discharge.
2. Concentrations based on a daily grab samples, each grab sample field-filtered and acid fixed promptly after collection.
3. Concentrations based on four daily grab samples, each grab sample field-filtered and acid fixed promptly after collection.
4. If the concentration detected by the contract laboratory is less than the detection limit, 1/2 the detection limit shall be used in calculating the Average concentration.

TABLE 4
FLOW AND STAGE MONITORING LOCATIONS
LEVIATHAN MINE, ALPINE COUNTY, CALIFORNIA

Station ID	Station Description	Equipment	Installation of Gaging Station
Continuous Stage Measurement and Calculated Flow			
Station 1 (10308783) [SW – 01]	Leviathan Creek above the mine	Continuous flow recorder and appurtenances, solar power supply, and telemetry.	October 1998
Pit Under Drain (PUD) (10308785)	Drainage from shallow ground water collection pipes in pit, diverted into evaporation ponds	Continuous flow recorder and appurtenances, solar power supply, and telemetry.	October 1999
Adit (10308784)	Drainage from tunnel #5 diverted into evaporation ponds	Continuous flow recorder and appurtenances, solar power supply, and telemetry.	October 1999
4L Creek (103087889) [SW – 12]	4L Creek just above confluence with Leviathan Creek	Continuous flow recorder and appurtenances, solar power supply, telemetry.	October 2003
Station 15 (10308789) [SW – 15]	Leviathan Creek, above the confluence of Leviathan and Aspen creeks	Continuous flow recorder and appurtenances, solar power supply, and telemetry.	October 1998
Station 22 (103087891) [SW – 18]	Aspen Creek above mine	Continuous flow recorder and appurtenances, solar power supply, and telemetry.	October 2003
Station 23 (10308792) [SW – 25]	Leviathan Creek above the confluence of Leviathan and Mountaineer creeks	Continuous flow recorder and appurtenances, solar power supply, and telemetry.	November 1999
Station 25 (10308794) [SW – 27]	Bryant Creek below the confluence of Leviathan and Mountaineer creeks	Continuous flow recorder and appurtenances, solar power supply, and telemetry.	October 1998
Pit Junction Box (103087855)	Storm water channel junction box in Leviathan Mine Pit	Continuous flow recorder and appurtenances, solar power supply, and telemetry.	October 2009
Un-named Tributary 1 (Upper Trib) (103087835) [SW – 05]	Storm water channel of upper tributary above Leviathan Creek	Continuous flow recorder and appurtenances, solar power supply, and telemetry.	November 2009
Un-named Tributary 2 (Lower Trib) (103087865) [SW – 08]	Storm water channel of lower tributary above Leviathan Creek	Continuous flow recorder and appurtenances, solar power supply, and telemetry.	November 2009
Continuous Stage Measurement			
Pond 1 Stage (103087853)	Water level in Pond 1	Continuous stage recorder and appurtenances, solar power supply, telemetry.	October 1999
Hand-held Flow Measurement			
Station 16 (103087898) [SW – 24]	Aspen Creek, above the confluence of Leviathan and Aspen creeks	Hand-held flow meters. Monthly flow measurements to establish relationship with STA 15.	not applicable
Station 24 [SW – 26]	Mountaineer Creek above the confluence of Leviathan and Mountaineer creeks	Hand-held flow meters. Monthly flow measurements to confirm flow recorder measurements at Station 25. (STA 25 – STA 23 = STA 24).	not applicable

Note: Monitoring Stations under USGS Stations in square brackets are Remedial Investigation/Feasibility monitoring locations.

PHOTOS

Photo 1 – June 29, 2022, Sludge stockpile and disposal activities at the pit clarifier.

Photo 2 – September 20, 2022, Vegetation removal near Pond 1.

Photo 3 – June 13, 2022, Access port for video inspection of the Channel Underdrain (CUD).

Photo 4 – July 13, 2022, Video inspection of the Channel Underdrain (CUD), image taken approximately 95.7 feet upstream from the end of the Leviathan Creek concrete channel.

Photo 5 – July 13, 2022, Repair of video inspection access port. Port was covered with a rubber sheet gasket and stainless-steel sheet. The rubber and stainless-steel sheets were secured with four heavy-duty stainless-steel band clamps.

Photo 6 – June 29, 2022, Concrete pad constructed at Pond 3 for winter/spring treatment activities.

Photo 7 – August 3, 2022, The pond water treatment system prior to any reconfiguration activities.

Photo 8 – September 20, 2022, Pond water treatment system reconfiguration activities underway, FF-1 and CL-1 removed.

Photo 9 – October 5, 2022, Pond water treatment reconfiguration activities underway, FF-1, CL-1, and portion of existing retaining wall removed. Temporary retaining wall installed near R-1.

Photo 10 – October 28, 2022, Holes discovered in Pond 1 liner.

Photo 11 – October 28, 2022, Temporary patch completed covering the three holes discovered in the Pond 1 liner.

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Photo 6 – June 29, 2022, Concrete pad constructed at Pond 3 for winter/spring treatment activities.

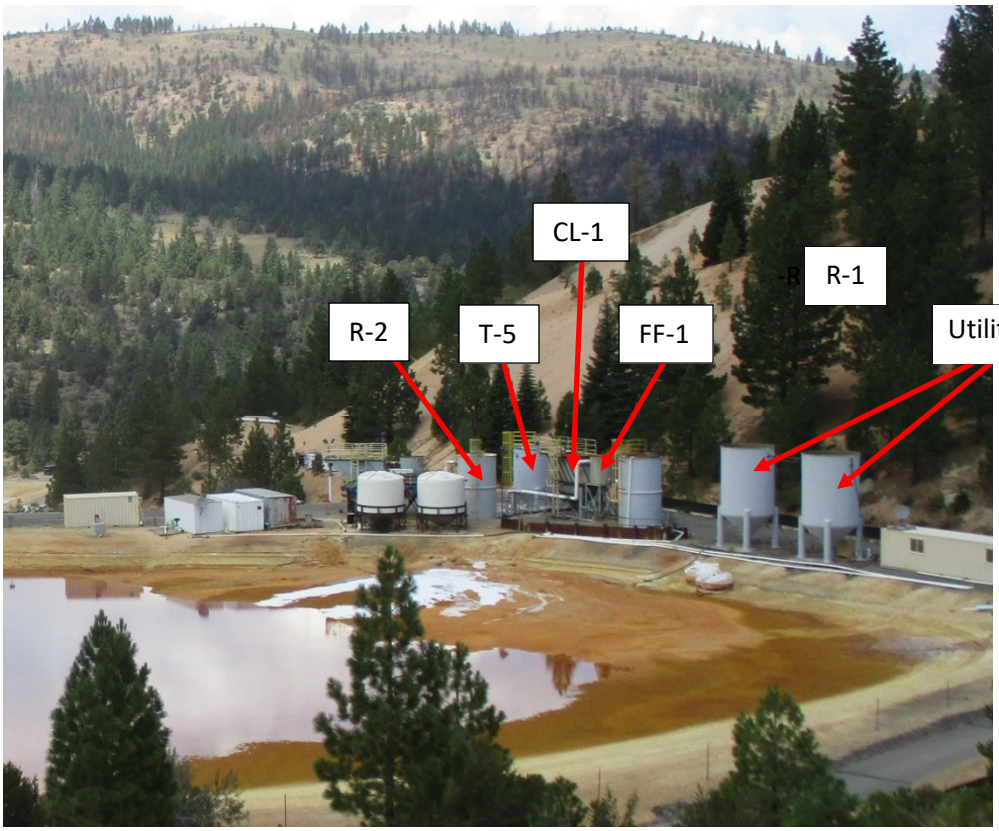

Photo 7 – August 3, 2022, The pond water treatment system prior to any reconfiguration activities.

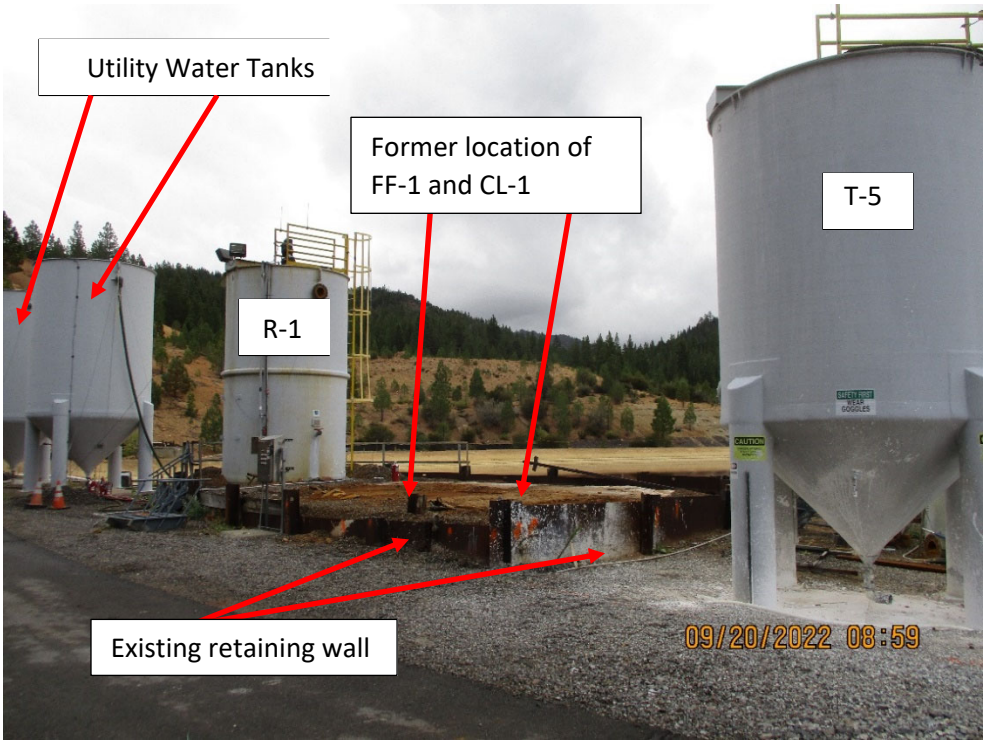

Photo 8 – September 20, 2022, Pond water treatment system reconfiguration activities underway, FF-1 and CL-1 removed.

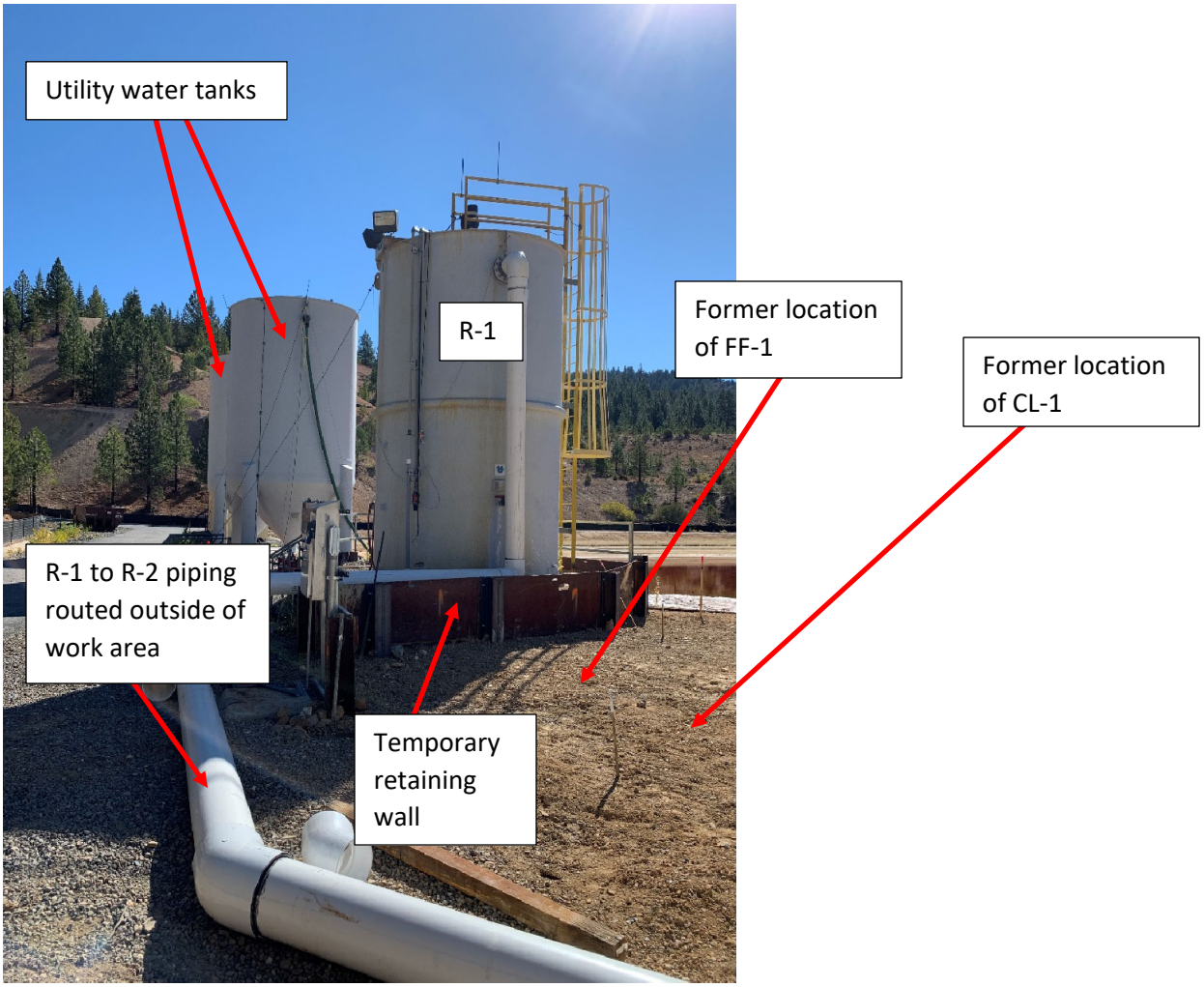

Photo 9 – October 5, 2022, Pond water treatment reconfiguration activities underway, FF-1, CL-1, and portion of existing retaining wall removed. Temporary retaining wall installed near R-1.

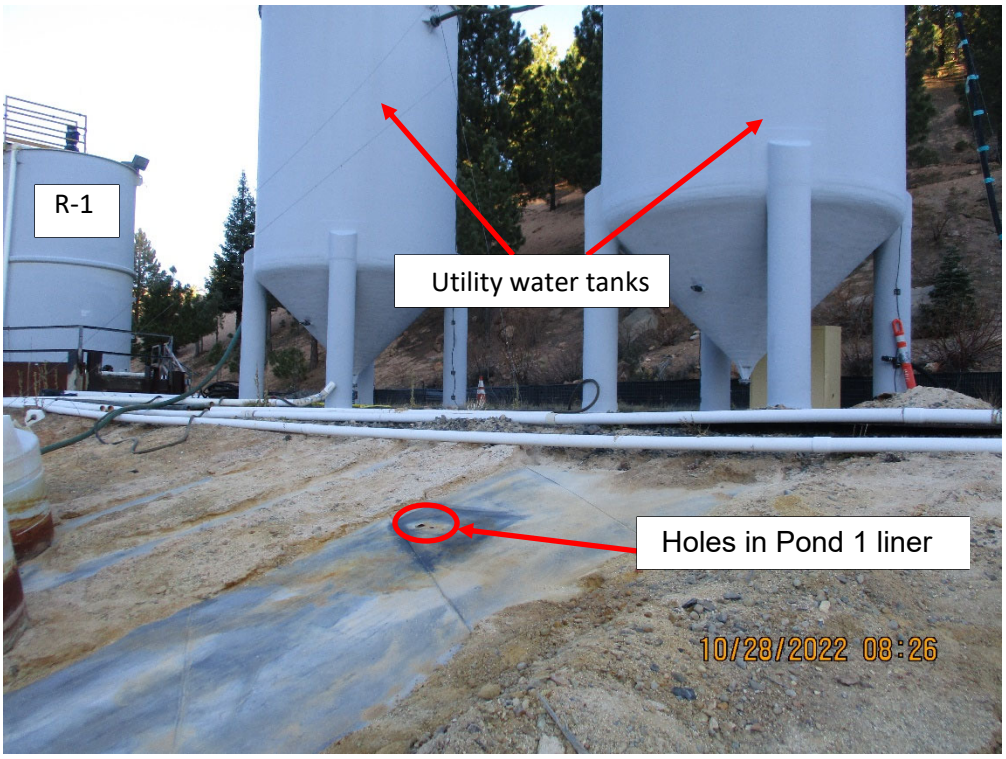

Photo 10 – October 28, 2022, Holes discovered in Pond 1 liner.

Photo 11 – October 28, 2022, Temporary patch completed covering the three holes discovered in the Pond 1 liner.

Appendix A
Data Summary for 2022 Pond Water Treatment

Table A-1: 2022 Pond Water Treatment, Daily Discharge Summary
Table A-2: 2022 Pond Water Treatment Effluent Field and Analytical Results
Table A-3: 2022 Pond Water Treatment Influent Field and Analytical Results
Table A-4: Summary of 2022 Pond Water Treatment Plant Operators' Logs
Table A-5: 2022 Pond Water Treatment Sludge Analytical Results

Table A-1
2022 Pond Water Treatment
Daily Discharge Summary

Date	Volume Discharged (Gallons)	Cumulative Discharge (Gallons)
7/8/2022	19,082	19,082
7/9/2022	93,590	112,672
7/10/2022	86,449	199,121
7/11/2022	86,449	285,570
7/12/2022	153,468	439,038
7/13/2022	134,543	573,581
7/14/2022	184,705	758,286
7/15/2022	231,873	990,159
7/16/2022	93,590	1,083,749
7/17/2022	79,645	1,163,394
7/18/2022	55,691	1,219,085
7/19/2022	61,202	1,280,287
7/20/2022	195,896	1,476,183
7/21/2022	184,705	1,660,888
7/22/2022	244,681	1,905,569
7/23/2022	143,818	2,049,387
7/24/2022	55,691	2,105,078
7/25/2022	45,591	2,150,669
7/26/2022	36,679	2,187,348
7/27/2022	45,591	2,232,939
7/28/2022	50,490	2,283,429
7/29/2022	50,490	2,333,919
7/30/2022	45,591	2,379,510
7/31/2022	36,679	2,416,189
8/1/2022	32,652	2,448,841
8/2/2022	28,902	2,477,743
8/3/2022	25,424	2,503,167
8/4/2022	22,209	2,525,376
8/5/2022	19,252	2,544,628
8/6/2022	16,545	2,561,173
8/7/2022	14,079	2,575,252
8/8/2022	14,079	2,589,331
8/9/2022	9,845	2,599,176
8/10/2022	9,845	2,609,021
8/11/2022	8,060	2,617,081
8/12/2022	6,484	2,623,565
8/13/2022	5,109	2,628,674
8/14/2022	5,109	2,633,783
8/15/2022	3,926	2,637,709
8/16/2022	2,925	2,640,634
8/17/2022	2,925	2,643,559
8/18/2022	2,925	2,646,484
8/19/2022	2,095	2,648,579
8/20/2022	2,095	2,650,674

Table A-1
2022 Pond Water Treatment
Daily Discharge Summary

Date	Volume Discharged (Gallons)	Cumulative Discharge (Gallons)
8/21/2022	1,425	2,652,099
8/22/2022	903	2,653,002
8/23/2022	517	2,653,519
8/24/2022	377	2,653,896

Table A-2
2022 Pond Water Treatment Effluent Field and Analytical Results

Sample ID	Sample Description	Sample Type	Sample Date	pH	TEMP (◦F)	Aluminum			Antimony			Arsenic			Barium			Beryllium			Cadmium			Calcium			Chromium			Cobalt			Copper			Iron			Lead			Magnesium		
USEPA Daily Maximum Discharge Criteria				6.0-9.0		4			NP			0.34			NP			NP			0.009			NP			0.97			NP			0.026			2			0.136			NP		
USEPA 4-Day Average Discharge Criteria				NP		2			NP			0.15			NP			NP			0.004			NP			0.31			NP			0.016			1			0.005			NP		
				Result	Result	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ
2223PWT001-PC	Pre-Discharge	N	7/7/2022	8.25	60.0	0.919			NA			0.00553			NA			NA			< 0.000300	U		NA			< 0.00350	U		NA			0.00119	J	J	< 0.0400	U		< 0.000500	U		NA		
2223PWT003-EFF	PWT Effluent	N	7/8/2022	6.81	62.9	< 0.0800	U		< 0.00100	U		0.00302			0.0195			< 0.000100	U		< 0.000300	U		631	D3		< 0.00350	U		0.00197			< 0.00100	U		0.0680	J	J	< 0.000500	U		51.7		
2223PWT005-EFF	PWT Effluent	N	7/12/2022	6.77	68.5	< 0.0800	U		< 0.00100	U		0.00540			0.0199			< 0.000100	U		< 0.000300	U		647	D3		< 0.00350	U		0.00167			< 0.00100	U		0.0499	J	J	< 0.000500	U		27.6		
2223PWT006-FMB	Field Method Blank	FMB	7/12/2022	NA	NA	< 0.0800	U		< 0.00100	U		< 0.00160	U		< 0.00150	U		< 0.000100	U		< 0.000300	U		0.281	J		< 0.00350	U		< 0.000500	U		< 0.00100	U		< 0.0400	U		< 0.000500	U		< 0.200	U	
2223PWT007-EFF	Duplicate	FD	7/12/2022	6.77	68.5	< 0.0800	U		< 0.00100	U		0.00485			0.0177			< 0.000100	U		< 0.000300	U		640	D3		< 0.00350	U		0.00141			< 0.00100	U		< 0.0400	U		0.000678	J	J	26.7		J
22223PWT008-EFF	PWT Effluent	N	7/14/2022	7.35	67.8	0.894			NA			0.00719		D	NA			NA			< 0.000300	U		NA			< 0.00350	U		NA			< 0.00100	U		< 0.0400	U		< 0.000500	U		NA		
2223PWT010-EFF	PWT Effluent	N	7/19/2022	6.42	70.0	0.709			< 0.0100	D1, U		< 0.0160	D1, U		0.0170	D1, J	J	< 0.00100	D1, U		< 0.00300	D1, U		608	D3		< 0.0350	D1, U		< 0.00500	D1, U		< 0.0100	D1, U		0.0632	J	J	< 0.00500	D1, U		35.2		
2223PWT011-EFF	PWT Effluent	N	7/21/2022	7.55	67.7	1.24			NA			< 0.0160	D1, U		NA			NA			< 0.00300	D1, U		NA			< 0.0350	D1, U		NA			< 0.0100	D1, U		< 0.0400	U		< 0.00500	D1, U	UJ	NA		
2223PWT013-EFF	PWT Effluent	N	7/27/2022	6.50	67.4	0.0834	J	J	< 0.00500	D1, U		0.00801	D1, J	J	0.0167	D1		< 0.00100	D1, U		< 0.00150	D1, U		551	D3		< 0.0350	D1, U		< 0.00250	D1, U		< 0.00500	D1, U		0.0715	J	J	< 0.00250	D1, U		38.2		
2223PWT014-EFF	PWT Effluent	N	7/28/2022	6.67	68.0	< 0.0800	U		NA			< 0.00800	D1, U		NA			NA			< 0.00150	D1, U		NA			< 0.0350	D1, U		NA			< 0.00500	D1, U		< 0.0400	U		< 0.00250	D1, U		NA		
2223PWT015-EFF	PWT Effluent	N	8/2/2022	6.67	65.9	< 0.0800	U		< 0.00500	D1, U		0.00958	D1, J	J	0.0197	D1		< 0.00100	D1, U		< 0.00150	D1, U		558	D3		< 0.0350	D1, U		0.00368	D1, J	J	< 0.00500	D1, U		< 0.0400	U		< 0.00250	D1, U		38.7		
2223PWT016-FMB	Field Method Blank	FMB	8/4/2022	NA	NA	< 0.0800	U		< 0.00100	U		< 0.00160	U		< 0.00150	U		< 0.000100	U		< 0.000300	U		< 0.200	U		< 0.00350	U		< 0.000500	U		< 0.00100	U		< 0.0400	U		< 0.000500	U		< 0.200	U	
2223PWT017-EFF	PWT Effluent	N	8/4/2022	6.65	65.6	< 0.0800	U		< 0.00100	U		0.00671			0.0183			< 0.000100	U		< 0.000300	U		574	D3		< 0.00350	U		0.00345			< 0.00100	U		< 0.0400	U		< 0.000500	U		40.5		
2223PWT018-EFF	Duplicate	FD	8/4/2022	6.65	65.6	< 0.0800	U		< 0.00100	U		0.00716			0.0189			< 0.000100	U		< 0.000300	U		569	D3		< 0.00350	U		0.00369			0.00165	J	J	< 0.0400	U		< 0.000500	U		40.3		
2223PWT019-EFF	PWT Effluent	N	8/9/2022	6.58	66.0	< 0.0800	U		< 0.00100	U		0.00482			0.0153			< 0.000100	U		< 0.000300	U		567	D3		< 0.00350	U		0.00260			< 0.00100	U		< 0.0400	U		< 0.000500	U		41.4		
2223PWT020-EFF	PWT Effluent	N	8/11/2022	6.65	64.5	< 0.0800	U		NA			0.00536			NA			NA			< 0.000300	U		NA			< 0.00350	U		NA			0.00133	J	J	< 0.0400	U		0.00113			NA		

SS

Sample ID	Sample Description	Sample Type	Sample Date	pH	TEMP (◦F)	Manganese			Mercury			Nickel			Selenium			Silver			Sulfate (as SO_4)			Thallium			Total Dissolved Solids			Vanadium			Zinc			Sulfur			Chloride (as Cl)			Sulfate (as SO_4) by SM4500_SO_4[1]		
USEPA Daily Maximum Discharge Criteria				6.0-9.0		NP			NP			0.84			NP			NP			NP			NP			NP			NP			0.21			NP			NP			NP		
USEPA 4-Day Average Discharge Criteria				NP		NP			NP			0.094			0.005			NP			NP			NP			NP			NP			0.21			NP			NP			NP		
				Result	Result	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ
2223PWT001-PC	Pre-Discharge	N	7/7/2022	8.25	60.0	NA			NA			0.0462			0.00176			NA			NA			NA			NA			NA			< 0.0100	U		NA			NA			NA		
2223PWT003-EFF	PWT Effluent	N	7/8/2022	6.81	62.9	0.0103			< 0.000100	Q4, U		0.0142			0.00260			< 0.000500	U		1760	D3		0.0221			2760			< 0.00400	U		< 0.0100	U		NA			NA			NA		
2223PWT005-EFF	PWT Effluent	N	7/12/2022	6.77	68.5	0.0159		J	< 0.000100	U		0.0132			0.00187		J	< 0.000500	U		1840	D3		0.0273			2780			< 0.00400	U		< 0.0100	U		NA			NA			NA		
2223PWT006-FMB	Field Method Blank	FMB	7/12/2022	NA	NA	< 0.00200	U		< 0.000100	U		< 0.00200	U		< 0.000500	U		< 0.000500	U		1.14			< 0.000100	U		130			< 0.00400	U		< 0.0100	U		NA			NA			NA		
2223PWT007-EFF	Duplicate	FD	7/12/2022	6.77	68.5	0.0633		J	< 0.000100	U		0.0119			0.00274		J	< 0.000500	U		1720	D3		0.0243			2680			< 0.00400	U		< 0.0100	U		NA			NA			NA		
22223PWT008-EFF	PWT Effluent	N	7/14/2022	7.35	67.8	NA			NA			0.0231			0.00244			NA			NA			NA			NA			NA			< 0.0100	U		NA			NA			NA		
2223PWT010-EFF	PWT Effluent	N	7/19/2022	6.42	70.0	0.0235	D1, J	J	< 0.000100	U		< 0.0200	B6, D1, U		0.00245			< 0.00500	D1, U		166[2]	D3		0.0600	D1		2540			< 0.00400	U		< 0.0100	U		NA			NA			NA		
2223PWT011-EFF	PWT Effluent	N	7/21/2022	7.55	67.7	NA			NA			0.0296	B6, D1, J	J+	0.00373	D1	J+	NA			NA			NA			NA			NA			< 0.0100	U		NA			NA			NA		
2223PWT013-EFF	PWT Effluent	N	7/27/2022	6.50	67.4	0.304	D1		< 0.000100	U		< 0.0200	D1, U		0.00243			< 0.00250	D1, U		1680	D3		0.0216	D1		2800			< 0.00400	U		< 0.0100	U		587		J	< 5.00	D3, U		1760	H	J
2223PWT014-EFF	PWT Effluent	N	7/28/2022	6.67	68.0	NA			NA			< 0.0200	D1, U		0.00342			NA			NA			NA			NA			NA			< 0.0100	U		NA			NA			NA		
2223PWT015-EFF	PWT Effluent	N	8/2/2022	6.67	65.9	0.632	D1		< 0.000100	U		0.0424	D1		0.00271	D1, J	J+	< 0.00250	D1, U		1650	D3		0.0305	D1		2370		J	< 0.00400	U		< 0.0100	U		596		J	3.37	D3		1790	H	J
2223PWT016-FMB	Field Method Blank	FMB	8/4/2022	NA	NA	0.347			< 0.000100	U		< 0.00200	U		< 0.000500	U		< 0.000500	U		< 0.50	U		< 0.000100	U		< 20.0	U		< 0.00400	U		< 0.0100	U		NA			NA			NA		
2223PWT017-EFF	PWT Effluent	N	8/4/2022	6.65	65.6	0.542		U	< 0.000100	U		0.0127			0.00247			< 0.000500	U		1620	D3		0.0287			2300			< 0.00400	U		< 0.0100	U		536		J	< 5.00	D3, U		1610	H	J
2223PWT018-EFF	Duplicate	FD	8/4/2022	6.65	65.6	0.575		U	< 0.000100	U		0.0140			0.00238			< 0.000500	U		1650	D3		0.0304			2380			< 0.00400	U		< 0.0100	U		563		J	< 5.00	D3, U		1690	H	J
2223PWT019-EFF	PWT Effluent	N	8/9/2022	6.58	66.0	0.390			< 0.000100	U		0.0112			0.00230			< 0.000500	U		1650	D3		0.0258			2390		J	< 0.00400	U		< 0.0100	U		556			3.34	D3		1670		
2223PWT020-EFF	PWT Effluent	N	8/11/2022	6.65	64.5	NA			NA			0.0138			0.00279			NA			NA			NA			NA			NA			< 0.0100	U		NA			NA			NA		

Notes:
All values reported in milligrams per liter (mg/L) except pH which are in Standard Units and temperature which are in the units specified above.
All parameters are dissolved except Selenium which is total recoverable.
FMB = field method blank sample
FD = field duplicate sample
N = normal field sample
NA = Not applicable
NP = Not promulgated
EFF = effluent
PC = pit clarifier
< = Less than the method detection limit
[1] Sulfate was analyzed for select samples using SM4500_S04 for the calculation of sulfur.
[2] Sulfate result considered an anomalous result.

Data Qualifiers (DQ) from the Laboratory:
U = The analyte was analyzed for but was not detected above the reported quantitation limit. The quantitation limit has been adjusted for any dilution or concentration of the sample.
D1 = Dillution performed due to matrix interference.
D3 = Dilution performed due to high target analyte concentration.
J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
B6 = Target analyte is detected in continuing calibration blank at or above the reporting limit. There is no impact on the reported value.
H = Sample was analyzed past holding time.
Q4 = ICV recovery is above acceptance limits.

EPA Qualifiers (EQ) from an additional QA/QC:
J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+ = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample with a potential for high bias.
UJ = The analyte was not detected and was reported less than the method detection limit. The associated numerical value is approximate.
U = The analyte was detected but qualified as not detected due to blank contamination.

Table A-3
2022 Pond Water Treatment Influent Field and Analytical Results

Sample ID	Sample Description	Sample Type	Sample Date	pH	TEMP (◦F)	Aluminum			Antimony			Arsenic			Barium			Beryllium			Cadmium			Calcium			Chromium			Cobalt			Copper			Iron			Lead			Magnesium		
				Result	Result	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ
2223PWT002-INF	PWT Influent	N	7/8/2022	2.68	66.2	364			< 0.00100	U		0.00327			0.0204			< 0.000100	U		< 0.000300	U		311			< 0.00350	U		0.00169			< 0.00100	U		324			< 0.000500	U		53.7		
2223PWT004-INF	PWT Influent	N	7/12/2022	2.24	67.7	391	D3		< 0.00100	U		2.43	D3		0.00253	J	J	0.0115	D1		0.0349			273			0.762	D3		2.31	D3		1.41	D3		349			< 0.000500	U		52.4		
2223PWT009-INF	PWT Influent	N	7/19/2022	2.26	71.7	497	D3		< 0.0100	D1, U		2.76	D1		< 0.0150	D1, U		0.0156	D1		0.0389	D1		247			0.943	D1		2.27	D1		1.50	D1		504	D3		< 0.00500	D1, U		65.9		
2223PWT012-INF	PWT Influent	N	7/27/2022	2.44	71.8	545	D3		0.00139	J	J	3.69	D3		< 0.0300	D1, U		0.0159	D1		0.0495			325			0.959	D1		3.17	D3		1.98	D3		479	D3		< 0.0100	U		71.5		

Sample ID	Sample Description	Sample Type	Sample Date	pH	TEMP (◦F)	Manganese			Mercury			Nickel			Selenium			Silver			Sulfate (as SO_4)			Thallium			Total Dissolved Solids			Vanadium			Zinc			Sulfur			Chloride (as Cl)			Sulfate (as SO_4) by SM4500_SO_4[1]		
				Result	Result	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ
2223PWT002-INF	PWT Influent	N	7/8/2022	2.68	66.2	0.0102			< 0.000100	Q4, U		0.0132		J+	0.00949	D1		< 0.000500	U		3970	D3		0.0250			5700	H2	J	0.0613			0.978			NA			NA			NA		
2223PWT004-INF	PWT Influent	N	7/12/2022	2.24	67.7	11.8	D3		< 0.000100	U		6.05	D3		0.0134	D1		< 0.000500	U		4480	D3		0.0615			7020	H2	J	0.0875			0.988			NA			NA			NA		
2223PWT009-INF	PWT Influent	N	7/19/2022	2.26	71.7	14.3	D3		< 0.000100	U		7.33	B6, D3		0.0212	D1	J+	< 0.00500	D1, U		121[2]	D3		0.0710	D1		7430	H2	J	0.122			1.32			NA			NA			NA		
2223PWT012-INF	PWT Influent	N	7/27/2022	2.44	71.8	16.6	D3		< 0.000100	U		6.90	D1		0.0245			< 0.000500	U		5350	D3		0.0193			6670	H2	J	0.147			1.37			1810		J	< 10.0	D3, U		5440	H	J

Notes:
All values reported in milligrams per liter (mg/L) except pH which are in Standard Units and temperature which are in the units specified above.
All parameters are dissolved except Selenium which is total recoverable.
N = normal field sample
< = Less than the method detection limit
INF = influent
NA = Not applicable
[1] Sulfate was analyzed for select samples using SM4500_S04 for the calculation of sulfur.
[2] Sulfate result considered an anomalous result.

Data Qualifiers (DQ) from the Laboratory:
U = The analyte was analyzed for but was not detected above the reported quantitation limit. The quantitation limit has been adjusted for any dilution or concentration of the sample.
D1 = Dillution performed due to matrix interference.
D3 = Dilution performed due to high target analyte concentration.
J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
B6 = Target analyte is detected in continuing calibration blank at or above the reporting limit. There is no impact on the reported value.
H2 = Initital analysis was within holding time. Reanalysis was past holding time.
H = Sample was analyzed past holding time.
Q4 = ICV recovery is above the acceptance limits. The reported value is estimated.

EPA Qualifiers (EQ) from an additional QA/QC:
J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+ = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample with a potential for high bias.

Table A-4
Summary of 2022
Pond Water Treatment Plant Operator's Logs

Date	Time	Influent Flowrate (gpm)	R-1 pH set point	R-1 pH	R-1 temp °F	R-2 pH set point	R-2 pH	R-2 temp °F	FF-2 pH	Pit Clarifier pH	Pit Clarifier temp °F	Discharge Weir pH	Discharge Weir temp °F
07/06/22	7:30												
07/06/22	8:30	OFFLINE											
07/06/22	9:30												
07/06/22	10:30	175	8.00	2.71	59.4	8.35	8.32	65.4	8.30	8.50	65.4	NA	NA
07/06/22	11:30	NA	8.00	2.67	60.1	8.35	8.24	65.2	8.27	8.27	66.6	NA	NA
07/06/22	12:30	176	8.00	2.67	62.2	8.35	8.32	66.1	8.37	8.42	67.8	NA	NA
07/06/22	13:30	NA	8.00	2.66	62.7	8.35	8.38	67.6	8.40	8.36	69.0	NA	NA
07/06/22	14:30	175	8.00	2.68	64.4	8.35	8.30	69.5	8.32	8.33	69.9	NA	NA
07/06/22	15:30	NA	8.00	2.67	65.8	8.35	8.26	70.6	8.34	8.32	70.9	NA	NA
07/06/22	16:30	174	8.00	2.68	66.2	8.35	8.26	71.8	8.34	8.37	71.9	NA	NA
07/06/22	17:30	NA	8.00	2.67	67.5	8.35	8.30	72.5	8.35	8.36	72.8	NA	NA
07/06/22	18:30	ND	8.00	ND	ND	8.35	8.24	73.0	8.32	8.39	72.0	NA	NA
07/06/22	19:30	NA	8.00	2.69	67.7	8.35	8.24	73.0	8.32	8.39	72.0	NA	NA
07/06/22	20:30	174	8.00	2.68	67.8	8.35	8.26	73.3	8.31	8.47	71.2	NA	NA
07/06/22	21:30	NA	8.00	2.68	67.5	8.35	8.26	72.8	8.33	8.47	70.5	NA	NA
07/06/22	22:30	175	8.00	2.67	65.8	8.35	8.29	72.1	8.32	8.44	70.0	NA	NA
07/06/22	23:30	NA	8.00	2.66	64.6	8.35	8.20	71.1	8.25	8.45	69.6	NA	NA
07/07/22	0:30	174	8.00	2.67	63.9	8.35	8.25	69.9	8.37	8.54	67.5	NA	NA
07/07/22	1:30	NA	8.00	2.67	63.2	8.35	8.32	69.2	8.30	8.53	67.6	NA	NA
07/07/22	2:30	174	8.00	2.66	62.5	8.35	8.27	68.3	8.26	8.50	66.9	NA	NA
07/07/22	3:30	NA	8.00	2.65	61.3	8.35	8.27	67.3	8.25	8.28	64.5	NA	NA
07/07/22	4:30	175	8.00	2.64	60.1	8.35	8.34	66.4	8.32	8.35	65.3	NA	NA
07/07/22	5:30	NA	8.00	2.65	59.4	8.35	8.32	64.7	8.31	8.34	64.0	NA	NA
07/07/22	6:30	175	8.00	2.64	58.2	8.35	8.27	64.0	8.30	8.31	63.0	NA	NA
07/07/22	7:30	NA	8.00	2.64	56.8	8.35	8.26	63.3	8.29	8.50	62.3	NA	NA
07/07/22	8:30	175	8.00	2.63	56.5	8.35	8.26	62.3	8.31	8.26	64.2	NA	NA
07/07/22	9:30												
07/07/22	10:30	OFFLINE											
07/07/22	11:30	NA	8.00	2.64	59.6	8.33	8.30	64.5	8.26	8.32	63.5	NA	NA
07/07/22	12:30	175	8.00	2.65	60.8	8.33	8.31	65.6	8.27	8.32	62.9	NA	NA
07/07/22	13:30	NA	8.00	2.66	63.2	8.33	8.53	67.1	8.32	8.32	67.7	NA	NA
07/07/22	14:30	174	8.00	2.67	65.6	8.33	8.10	69.7	8.35	8.30	69.9	NA	NA
07/07/22	15:30	NA	8.00	2.67	67.7	8.33	8.26	71.6	8.31	8.27	71.6	NA	NA
07/07/22	16:30	174	8.00	2.68	68.4	8.33	8.12	73.3	8.36	8.31	73.1	NA	NA
07/07/22	17:30	NA	8.00	2.70	68.9	8.33	8.25	75.9	8.35	8.29	73.8	NA	NA
07/07/22	18:30	173	8.00	2.68	68.4	8.33	8.15	74.2	8.32	8.33	73.6	NA	NA
07/07/22	19:30	NA	8.00	2.68	68.9	8.35	8.10	72.7	8.31	8.25	73.7	NA	NA
07/07/22	20:30	174	8.00	2.75	66.5	8.35	8.29	75.2	8.32	8.39	73.0	NA	NA
07/07/22	21:30	NA	8.00	2.67	67.7	8.35	8.10	73.5	8.35	8.41	72.8	NA	NA
07/07/22	22:30	175	8.00	2.62	66.8	8.35	8.12	73.8	8.32	8.45	72.0	NA	NA
07/07/22	23:30	NA	8.00	2.66	65.6	8.35	8.06	71.1	8.33	8.46	69.9	NA	NA
07/08/22	0:30	174	8.00	2.65	64.4	8.35	8.39	70.9	8.31	8.47	69.6	NA	NA
07/08/22	1:30	NA	8.00	2.64	63.2	8.35	8.22	69.5	8.36	8.44	68.7	NA	NA
07/08/22	2:30	175	8.00	2.64	62.0	8.35	8.12	68.0	8.32	8.45	67.8	NA	NA
07/08/22	3:30	NA	8.00	2.64	61.1	8.35	8.30	67.1	8.36	8.42	65.8	NA	NA
07/08/22	4:30	175	8.00	2.64	59.4	8.35	8.29	65.9	8.33	8.42	64.5	NA	NA
07/08/22	5:30	NA	8.00	2.64	58.2	8.35	8.51	64.0	8.32	8.38	63.0	NA	NA
07/08/22	6:30	175	8.00	2.63	57.7	8.35	8.19	63.3	8.35	8.38	61.8	NA	NA
07/08/22	7:30												
07/08/22	8:30	OFFLINE											
07/08/22	9:30												
07/08/22	10:30	175	8.00	2.65	58.2	8.38	8.36	63.3	8.25	8.46	70.1	NA	NA
07/08/22	11:30	NA	8.00	2.64	59.2	8.38	8.25	64.0	8.31	8.34	64.5	6.81	62.4
07/08/22	12:30	175	8.00	2.64	61.5	8.38	8.10	65.4	8.33	8.40	66.7	6.70	65.3
07/08/22	13:30	NA	8.00	3.10	62.7	8.38	8.37	67.0	8.45	8.56	68.0	6.69	66.8
07/08/22	14:30	175	8.00	3.48	65.1	8.38	8.25	69.7	8.32	8.38	69.2	6.67	66.1
07/08/22	15:30	NA	8.00	3.53	67.0	8.38	8.68	69.9	8.38	8.39	71.0	6.55	68.8
07/08/22	16:30	174	8.00	3.64	68.0	8.38	8.34	72.1	8.37	8.42	71.2	6.61	69.7
07/08/22	17:30	NA	8.00	3.42	68.7	8.35	8.47	73.5	8.46	8.45	72.5	6.69	70.4
07/08/22	18:30	174	8.00	3.32	68.9	8.35	8.38	73.7	8.43	8.53	72.5	6.69	70.7
07/08/22	19:30	NA	8.00	3.25	68.2	8.38	8.22	74.0	8.40	8.54	72.8	6.56	70.5
07/08/22	20:30	174	8.00	3.23	68.0	8.38	8.22	73.0	8.37	8.56	72.1	6.57	68.9
07/08/22	21:30	NA	8.00	3.21	66.3	8.38	8.37	72.1	8.42	8.57	71.4	6.90	69.5
07/08/22	22:30	174	8.00	3.18	65.1	8.38	8.37	71.1	8.39	8.52	70.1	6.57	69.2
07/08/22	23:30	NA	8.00	3.19	64.6	8.38	8.57	70.6	8.42	8.61	69.3	6.88	68.7
07/09/22	0:30	174	8.00	3.20	63.4	8.38	8.37	69.9	8.41	8.51	69.2	6.64	69.1
07/09/22	1:30	NA	8.00	3.13	63.0	8.38	8.28	68.5	8.38	8.57	68.1	6.95	67.9
07/09/22	2:30	175	8.00	3.17	62.2	8.38	8.54	68.3	8.39	8.57	67.0	6.78	67.3
07/09/22	3:30	NA	8.00	3.16	61.5	8.38	8.32	67.3	8.31	8.50	66.5	6.85	66.8
07/09/22	4:30	175	8.00	3.17	60.8	8.38	8.39	66.6	8.32	8.49	65.7	6.75	66.4
07/09/22	5:30	NA	8.00	3.17	57.8	8.38	8.13	65.6	8.33	8.52	64.7	6.90	66.0
07/09/22	6:30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
07/11/22	7:30												
07/11/22	8:30	OFFLINE											
07/11/22	9:30	175	8.00	3.28	59.2	8.35	8.66	63.0	8.50	8.27	65.2	7.45	67.1

Table A-4
Summary of 2022
Pond Water Treatment Plant Operator's Logs

Date	Time	Influent Flowrate (gpm)	R-1 pH set point	R-1 pH	R-1 temp °F	R-2 pH set point	R-2 pH	R-2 temp °F	FF-2 pH	Pit Clarifier pH	Pit Clarifier temp °F	Discharge Weir pH	Discharge Weir temp °F
07/11/22	10:30	175	8.00	3.58	59.9	8.35	8.35	66.1	8.29	8.31	65.0	6.90	67.4
07/11/22	11:30	NA	8.00	3.39	61.8	8.35	8.73	67.1	8.31	8.31	66.1	6.76	67.9
07/11/22	12:30	175	8.00	3.40	64.1	8.35	8.50	67.8	8.37	8.30	68.0	6.80	68.9
07/11/22	13:30	NA	8.00	3.39	66.1	8.35	8.29	70.4	8.26	8.23	70.1	6.98	70.0
07/11/22	14:30	174	8.00	3.31	67.5	8.35	8.75	71.8	8.33	8.22	71.7	6.80	72.3
07/11/22	15:30	NA	8.00	3.32	68.4	8.35	8.31	73.3	8.37	8.24	72.9	6.76	73.8
07/11/22	16:30	173	8.00	3.31	69.9	8.35	8.29	74.2	8.40	8.26	74.8	6.71	75.0
07/11/22	17:30	NA	8.00	3.33	70.0	8.35	8.40	75.4	8.41	8.30	75.1	6.76	76.0
07/11/22	18:30	173	8.00	3.36	71.1	8.35	8.13	75.3	8.37	8.20	74.8	6.74	75.8
07/11/22	19:30	NA	8.00	3.36	70.8	8.35	8.29	75.9	8.38	8.36	75.2	6.69	75.5
07/11/22	20:30	174	8.00	3.30	70.8	8.35	8.25	75.6	8.41	8.36	75.2	6.50	75.2
07/11/22	21:30	NA	8.00	3.36	70.1	8.35	8.20	74.5	8.40	8.33	75.1	6.79	74.6
07/11/22	22:30	173	8.00	3.30	69.6	8.35	8.29	75.4	8.41	8.38	74.4	6.84	73.7
07/11/22	23:30	NA	8.00	3.30	68.2	8.35	8.52	74.7	8.40	8.36	73.5	6.81	73.2
07/12/22	0:30	173	8.00	3.31	67.5	8.35	8.51	73.3	8.39	8.44	72.2	6.82	72.2
07/12/22	1:30	NA	8.00	3.29	66.1	8.35	8.27	72.1	8.38	8.37	71.2	6.90	71.1
07/12/22	2:30	173	8.00	3.32	64.9	8.35	8.13	71.1	8.39	8.41	70.0	6.52	71.1
07/12/22	3:30	NA	8.00	3.32	63.7	8.35	8.48	69.9	8.38	8.31	68.8	6.81	70.6
07/12/22	4:30	173	8.00	3.32	62.5	8.35	8.45	68.5	8.39	8.36	67.6	6.64	69.8
07/12/22	5:30	NA	8.00	3.30	61.5	8.35	8.11	67.3	8.39	8.32	66.7	6.66	69.3
07/12/22	6:30	173	8.00	3.31	60.0	8.35	8.16	64.0	8.40	8.32	65.7	6.66	68.6
07/12/22	7:30	NA	8.00	3.29	59.6	8.35	8.38	65.4	8.38	8.20	65.1	6.80	68.0
07/12/22	8:30	173	8.00	3.36	59.2	8.35	8.72	64.9	8.39	8.19	65.2	6.82	68.1
07/12/22	9:30	NA	8.00	3.35	59.9	8.35	8.62	65.2	8.37	8.17	65.7	6.77	68.5
07/12/22	10:30	173	8.00	3.33	61.5	8.35	8.48	65.6	8.38	8.16	66.9	6.74	69.0
07/12/22	11:30	NA	8.00	3.34	62.7	8.35	8.15	66.6	8.40	8.28	68.3	6.63	69.7
07/12/22	12:30	173	8.00	3.33	64.9	8.35	8.27	69.0	8.42	8.35	69.6	6.65	70.7
07/12/22	13:30	NA	8.00	3.32	66.1	8.35	8.56	70.2	8.32	8.42	70.7	6.58	71.5
07/12/22	14:30	173	8.00	3.31	67.5	8.32	8.30	71.6	8.41	8.22	71.2	6.77	72.6
07/12/22	15:30	NA	8.00	3.30	68.7	8.32	8.54	73.3	8.39	8.27	72.6	6.88	73.4
07/12/22	16:30	172	8.00	3.30	70.3	8.32	8.46	74.7	8.39	8.26	74.3	6.76	74.2
07/12/22	17:30	NA	8.00	3.31	71.3	8.32	8.53	75.6	8.40	8.31	74.7	6.74	74.9
07/12/22	18:30	172	8.00	3.30	71.3	8.32	8.62	76.4	8.32	8.28	75.3	6.76	75.1
07/12/22	19:30	NA	8.00	3.34	71.5	8.35	8.23	76.8	8.36	8.44	76.3	6.53	74.6
07/12/22	20:30	171	8.00	3.29	71.0	8.35	8.15	77.1	8.36	8.44	75.9	6.52	74.6
07/12/22	21:30	NA	8.00	3.27	70.3	8.35	8.46	75.9	8.39	8.42	75.4	6.61	73.7
07/12/22	22:30	172	8.00	3.24	69.4	8.35	8.58	74.9	8.39	8.45	74.2	6.61	73.1
07/12/22	23:30	NA	8.00	3.25	68.7	8.35	8.40	73.0	8.44	8.43	73.5	6.54	72.6
07/13/22	0:30	172	8.00	3.24	67.2	8.35	8.10	73.3	8.32	8.45	72.3	6.55	71.9
07/13/22	1:30	NA	8.00	3.22	66.1	8.35	8.31	72.3	8.37	8.37	71.3	6.58	71.4
07/13/22	2:30	172	8.00	3.20	65.1	8.35	8.21	70.9	8.38	8.47	70.3	6.32	70.9
07/13/22	3:30	NA	8.00	2.93	64.1	8.35	8.36	69.7	8.38	8.49	69.5	6.41	70.4
07/13/22	4:30	171	8.00	2.78	63.0	8.35	8.47	69.5	8.38	8.46	68.4	6.45	70.1
07/13/22	5:30	NA	8.00	2.54	61.8	8.35	8.29	68.0	8.36	8.43	67.3	6.44	69.5
07/13/22	6:30	172	8.00	2.49	60.6	8.35	8.15	66.6	8.34	8.43	66.0	6.53	69.2
07/13/22	7:30	NA	8.00	2.80	59.2	8.32	8.05	66.1	8.35	8.22	65.6	6.89	68.4
07/13/22	8:30	172	8.00	3.16	59.4	8.32	8.32	65.2	8.40	8.27	65.8	6.80	68.8
07/13/22	9:30	NA	8.00	3.31	59.4	8.32	8.35	64.7	8.41	8.27	65.5	6.73	68.5
07/13/22	10:30	172	8.00	3.39	60.8	8.32	8.27	65.7	8.42	8.28	66.1	6.63	69.1
07/13/22	11:30	NA	8.00	3.44	62.5	8.32	8.19	67.1	8.43	8.20	67.7	6.65	69.5
07/13/22	12:30	171	8.00	3.44	65.1	8.32	8.21	69.2	8.34	8.24	69.2	6.69	70.2
07/13/22	13:30	NA	8.00	3.42	67.0	8.32	8.23	71.1	8.38	8.28	70.2	6.83	71.1
07/13/22	14:30	171	8.00	3.47	69.1	8.32	8.33	73.3	8.40	8.26	72.8	6.59	72.0
07/13/22	15:30	NA	8.00	3.42	73.9	8.32	8.20	75.2	8.39	8.20	73.8	6.47	72.8
07/13/22	16:30	170	8.00	3.41	72.2	8.32	8.48	76.6	8.39	8.28	73.2	6.70	73.0
07/13/22	17:30	NA	8.00	3.41	73.2	8.32	8.49	77.5	8.38	8.18	75.8	6.50	73.5
07/13/22	18:30	170	8.00	3.38	73.7	8.32	8.29	78.0	8.32	8.20	76.1	6.41	73.8
07/13/22	19:30	NA	8.00	3.33	73.0	8.32	8.19	78.3	8.33	8.23	77.7	6.25	73.6
07/13/22	20:30	170	8.00	3.34	71.5	8.32	8.22	77.8	8.34	8.30	76.9	6.34	73.2
07/13/22	21:30	NA	8.00	3.32	70.3	8.32	8.04	76.8	8.32	8.26	75.9	6.31	72.0
07/13/22	22:30	171	8.00	3.30	69.6	8.32	8.46	75.2	8.30	8.25	74.1	6.26	71.1
07/13/22	23:30	NA	8.00	3.22	68.2	8.32	8.18	74.2	8.33	8.23	72.4	6.36	71.4
07/14/22	0:30	171	8.00	3.29	66.3	8.32	8.16	72.8	8.32	8.30	71.8	6.33	70.9
07/14/22	1:30	NA	8.00	3.28	64.1	8.32	8.39	71.1	8.28	8.33	69.9	6.35	69.8
07/14/22	2:30	172	8.00	3.27	62.5	8.32	8.16	69.0	8.26	8.21	68.3	6.33	70.1
07/14/22	3:30	NA	8.00	3.26	61.1	8.32	8.41	67.1	8.26	8.34	66.8	6.37	69.1
07/14/22	4:30	172	8.00	3.26	59.2	8.32	8.11	65.6	8.25	8.32	66.5	6.34	68.8
07/14/22	5:30	NA	8.00	3.25	57.5	8.32	8.46	64.0	8.24	8.34	65.0	6.35	67.4
07/14/22	6:30	172	8.00	3.24	56.1	8.32	8.24	61.4	8.25	8.33	64.4	6.33	66.5
07/14/22	7:30	NA	8.00	3.25	55.5	8.32	8.30	61.1	8.24	8.28	62.1	7.82	64.7
07/14/22	8:30	172	8.00	3.25	54.6	8.32	8.49	60.7	8.24	8.20	61.9	7.71	67.2
07/14/22	9:30	NA	8.00	3.16	55.2	8.32	8.29	60.4	8.24	8.13	62.6	7.35	67.8
07/14/22	10:30	172	8.00	3.25	57.7	8.32	8.30	61.1	8.25	8.18	63.8	7.17	68.4
07/14/22	11:30	NA	8.00	3.23	58.7	8.32	8.36	63.7	8.28	8.27	65.2	7.16	69.1
07/14/22	12:30	173	8.00	3.24	60.3	8.32	8.38	64.9	8.26	8.34	66.5	7.68	70.4

Table A-4
Summary of 2022
Pond Water Treatment Plant Operator's Logs

Date	Time	Influent Flowrate (gpm)	R-1 pH set point	R-1 pH	R-1 temp °F	R-2 pH set point	R-2 pH	R-2 temp °F	FF-2 pH	Pit Clarifier pH	Pit Clarifier temp °F	Discharge Weir pH	Discharge Weir temp °F
07/14/22	13:30	NA	8.00	3.21	63.9	8.32	8.55	67.6	8.28	8.19	69.1	7.49	72.0
07/14/22	14:30	172	8.00	3.20	68.2	8.32	8.45	70.4	8.27	8.17	70.9	7.51	74.2
07/14/22	15:30	NA	8.00	3.19	69.4	8.32	8.31	72.5	8.28	8.15	72.9	7.47	75.6
07/14/22	16:30	171	8.00	3.16	70.1	8.32	8.42	74.5	8.26	8.15	73.5	7.44	78.0
07/14/22	17:30	NA	8.00	3.19	71.5	8.32	8.37	75.6	8.30	8.19	73.8	7.42	75.8
07/14/22	18:30	171	8.00	3.18	71.3	8.32	8.09	76.2	8.39	8.20	75.3	7.34	73.7
07/14/22	19:30	NA	8.00	3.14	71.3	8.32	8.33	76.7	8.40	8.47	76.3	7.47	72.8
07/14/22	20:30	171	8.00	3.11	70.8	8.32	8.30	76.1	8.41	8.41	76.0	7.29	72.4
07/14/22	21:30	NA	8.00	3.13	70.1	8.32	8.20	75.9	8.36	8.42	75.8	7.33	71.6
07/14/22	22:30	171	8.00	3.11	69.1	8.32	8.38	75.2	8.33	8.45	75.5	7.36	70.6
07/14/22	23:30	NA	8.00	3.12	67.7	8.32	8.12	73.0	8.39	8.38	73.7	7.35	71.0
07/15/22	0:30	171	8.00	3.20	67.2	8.32	8.55	73.3	8.39	8.36	73.4	7.38	70.5
07/15/22	1:30	NA	8.00	3.11	66.3	8.32	8.11	72.1	8.37	8.24	72.3	7.22	70.8
07/15/22	2:30	171	8.00	3.12	65.3	8.32	8.34	71.6	8.33	8.42	71.4	7.64	70.0
07/15/22	3:30	NA	8.00	3.11	64.9	8.32	8.10	70.6	8.37	8.40	70.2	7.45	69.6
07/15/22	4:30	171	8.00	3.12	63.9	8.32	8.36	69.7	8.35	8.24	69.2	7.49	69.4
07/15/22	5:30	NA	8.00	3.11	62.5	8.32	8.27	68.7	8.35	8.11	68.2	7.55	68.9
07/15/22	6:30	172	8.00	3.12	62.0	8.32	8.70	66.4	8.37	8.38	74.5	7.61	68.4
07/15/22	7:30	NA	8.00	3.10	61.3	8.32	8.25	67.6	8.36	8.14	67.2	7.47	68.6
07/15/22	8:30	173	8.00	3.10	60.6	8.32	8.32	66.8	8.36	8.19	67.4	7.50	68.4
07/15/22	9:30	NA	8.00	3.11	61.3	8.32	8.14	66.6	8.36	8.19	67.8	7.47	69.0
07/15/22	10:30	173	8.00	3.08	62.2	8.32	8.41	67.8	8.37	8.16	68.5	7.45	69.0
07/15/22	11:30	NA	8.00	3.09	64.4	8.32	8.28	68.7	8.39	8.14	69.2	7.42	71.2
07/15/22	12:30	172	8.00	3.11	64.6	8.32	8.32	70.6	8.42	8.16	71.8	7.34	72.3
07/15/22	13:30	NA	8.00	3.10	68.2	8.32	8.00	72.3	8.46	8.20	72.4	7.37	72.8
07/15/22	14:30	172	8.00	3.09	69.9	8.32	8.43	73.8	8.39	8.16	73.2	7.35	73.3
07/15/22	15:30	OFFLINE											
07/15/22	16:30												
07/15/22	17:30												
07/15/22	18:30												
07/18/22	7:30												
07/18/22	8:30												
07/18/22	9:30												
07/18/22	10:30												
07/18/22	11:30	NA	8.00	2.91	64.6	8.32	8.28	71.1	8.14	7.97	69.2	6.42	69.0
07/18/22	12:30	173	8.00	2.94	65.3	8.40	8.49	70.9	8.21	8.01	70.2	6.29	70.1
07/18/22	13:30	NA	8.00	2.95	66.5	8.40	8.51	71.6	8.23	8.04	71.3	6.43	70.2
07/18/22	14:30	173	8.00	2.95	69.1	8.40	8.32	72.8	8.21	8.03	72.8	6.44	71.2
07/18/22	15:30	NA	8.00	2.96	70.6	8.50	8.30	75.2	8.32	8.14	74.2	6.40	71.0
07/18/22	16:30	173	8.00	2.95	72.5	8.50	8.29	76.8	8.34	8.14	75.4	6.51	71.2
07/18/22	17:30	NA	8.00	2.94	73.2	8.50	8.32	75.8	8.35	8.16	75.3	6.41	71.5
07/18/22	18:30	172	8.00	2.96	73.7	8.50	8.37	79.0	8.46	8.24	76.7	6.46	71.7
07/18/22	19:30	NA	8.00	2.97	73.7	8.40	8.17	79.0	8.38	8.23	78.0	6.31	72.0
07/18/22	20:30	172	8.00	2.98	72.5	8.40	8.32	78.3	8.35	8.19	77.7	6.35	72.0
07/18/22	21:30	NA	8.00	2.95	73.7	8.40	8.33	78.0	8.34	8.20	77.0	6.21	71.0
07/18/22	22:30	173	8.00	2.96	69.9	8.40	8.38	76.6	8.37	8.19	75.9	6.19	71.9
07/18/22	23:30	NA	8.00	2.96	69.4	8.40	8.38	75.9	8.34	8.20	73.8	6.31	71.8
07/19/22	0:30	173	8.00	2.63	68.7	8.40	8.31	74.9	8.35	8.21	73.5	6.33	71.2
07/19/22	1:30	NA	8.00	2.46	67.0	8.40	8.14	73.5	8.36	8.23	73.1	6.32	69.8
07/19/22	2:30	173	8.00	2.55	66.5	8.40	8.33	72.8	8.36	8.20	72.8	6.28	68.5
07/19/22	3:30	NA	8.00	2.40	62.4	8.40	8.25	71.4	8.27	8.18	70.7	6.35	70.4
07/19/22	4:30	173	8.00	2.39	63.2	8.40	8.30	70.2	8.29	8.30	69.9	7.16	71.3
07/19/22	5:30	NA	8.00	2.47	62.8	8.40	8.34	70.0	8.35	8.23	69.4	6.37	70.0
07/19/22	6:30	173	8.00	2.68	62.0	8.40	8.39	68.7	8.32	8.15	68.0	6.18	70.0
07/19/22	7:30	NA	8.00	2.99	61.1	8.40	8.32	67.6	8.36	8.14	66.5	6.90	69.6
07/19/22	8:30	172	8.00	3.03	61.3	8.40	8.30	67.1	8.37	8.15	67.4	6.54	69.4
07/19/22	9:30	NA	8.00	3.05	61.8	8.40	8.37	67.6	8.38	8.15	67.9	6.46	69.6
07/19/22	10:30	173	8.00	3.05	63.0	8.40	8.37	68.5	8.41	8.15	68.5	6.42	70.0
07/19/22	11:30	NA	8.00	3.04	63.9	8.40	8.44	68.7	8.44	8.23	69.3	6.41	70.1
07/19/22	12:30	173	8.00	3.04	67.8	8.40	8.34	70.2	8.40	8.20	71.5	6.47	70.7
07/19/22	13:30	NA	8.00	3.04	70.1	8.40	8.26	74.2	8.42	8.23	73.0	6.46	71.0
07/19/22	14:30	172	8.00	3.01	70.8	8.40	8.31	74.7	8.43	8.21	75.1	6.55	71.5
07/19/22	15:30	NA	8.00	3.01	71.8	8.40	8.33	77.1	8.40	8.20	76.2	6.57	72.0
07/19/22	16:30	172	8.00	3.01	73.7	8.40	8.27	78.5	8.41	8.27	77.5	6.47	72.7
07/19/22	17:30	NA	8.00	3.02	74.9	8.40	8.36	79.4	8.43	8.23	78.0	6.46	73.2
07/19/22	18:30	171	8.00	3.00	74.9	8.40	8.31	80.4	8.36	8.26	78.3	6.50	73.5
07/19/22	19:30	NA	8.00	2.99	74.9	8.40	8.31	80.4	8.34	8.25	79.1	7.01	73.3
07/19/22	20:30	172	8.00	2.99	73.7	8.40	8.49	79.9	8.33	8.34	76.9	7.26	73.4
07/19/22	21:30	NA	8.00	2.99	72.5	8.40	8.33	79.7	8.37	8.27	77.7	7.31	73.0
07/19/22	22:30	172	8.00	2.98	71.5	8.40	8.34	78.5	8.31	8.26	76.1	7.41	72.1
07/19/22	23:30	NA	8.00	2.60	69.6	8.40	8.28	76.1	8.35	8.17	74.8	7.43	71.6
07/20/22	0:30	172	8.00	2.46	68.0	8.40	8.12	74.9	8.20	8.24	73.7	7.61	71.5
07/20/22	1:30	NA	8.00	2.40	66.5	8.55	8.56	73.3	8.36	8.20	72.5	7.47	71.0
07/20/22	2:30	173	8.00	2.37	65.6	8.55	8.43	72.5	8.40	8.23	72.0	7.23	71.0
07/20/22	3:30	NA	8.00	2.36	64.4	8.55	8.50	71.1	8.41	8.32	71.6	7.37	69.8

Table A-4
Summary of 2022
Pond Water Treatment Plant Operator's Logs

Date	Time	Influent Flowrate (gpm)	R-1 pH set point	R-1 pH	R-1 temp °F	R-2 pH set point	R-2 pH	R-2 temp °F	FF-2 pH	Pit Clarifier pH	Pit Clarifier temp °F	Discharge Weir pH	Discharge Weir temp °F
07/20/22	4:30	173	8.00	2.35	63.2	8.55	8.27	70.2	8.40	8.30	71.2	7.41	69.1
07/20/22	5:30	NA	8.00	2.34	62.2	8.55	8.37	69.0	8.44	8.25	68.4	7.50	69.2
07/20/22	6:30	173	8.00	2.35	61.3	8.55	8.31	68.3	8.41	8.28	68.5	7.52	69.2
07/20/22	7:30	NA	8.00	2.34	60.3	8.55	8.66	67.6	8.46	8.25	67.0	7.61	68.0
07/20/22	8:30	160	8.00	2.80	59.9	8.40	8.33	66.7	8.33	8.17	66.8	7.66	69.0
07/20/22	9:30	LIME CLOG				8.40	4.22	66.4	5.44	EFFLUENT OFF		ND	ND
07/20/22	10:30	162	8.00	2.99	61.5	8.40	8.31	67.1	8.34	8.09	68.4	7.29	71.3
07/20/22	11:30	NA	8.00	3.11	63.2	8.40	8.22	67.8	8.35	8.11	69.3	7.36	72.2
07/20/22	12:30	162	8.00	3.11	64.4	8.40	8.56	69.7	8.36	8.13	70.5	7.48	72.6
07/20/22	13:30	NA	8.00	3.12	66.3	8.40	8.30	71.8	8.37	8.16	71.6	7.45	73.8
07/20/22	14:30	161	8.00	3.11	68.4	8.40	8.55	73.0	8.40	8.18	73.8	7.49	74.4
07/20/22	15:30	NA	8.00	3.11	70.6	8.40	8.14	75.4	8.39	8.20	74.9	7.40	75.5
07/20/22	16:30	160	8.00	3.10	72.2	8.40	8.30	76.4	8.36	8.16	75.2	7.39	75.5
07/20/22	17:30	NA	8.00	3.11	73.2	8.40	8.29	78.0	8.39	8.13	76.7	7.41	75.1
07/20/22	18:30	160	8.00	3.09	73.2	8.40	8.28	79.0	8.39	8.18	76.5	7.44	74.7
07/20/22	19:30	NA	8.00	3.08	73.2	8.40	8.35	78.5	8.41	8.28	77.4	7.35	74.3
07/20/22	20:30	160	8.00	3.07	72.8	8.40	8.24	78.4	8.44	8.27	77.2	7.38	73.5
07/20/22	21:30	NA	8.00	3.08	70.8	8.40	8.30	77.3	8.50	8.28	75.9	7.34	72.8
07/20/22	22:30	160	8.00	3.07	69.8	8.40	8.24	76.1	8.46	8.42	74.9	7.45	72.1
07/20/22	23:30	NA	8.00	3.07	68.0	8.40	8.38	74.7	8.49	8.39	73.5	7.45	71.4
07/21/22	0:30	160	8.00	3.05	66.3	8.40	8.21	73.0	8.34	8.28	72.0	7.30	70.8
07/21/22	1:30	NA	8.00	3.07	65.1	8.40	8.18	71.6	8.37	8.28	71.1	7.35	70.6
07/21/22	2:30	160	8.00	3.06	63.4	8.40	8.26	70.4	8.42	8.23	69.7	7.48	69.7
07/21/22	3:30	NA	8.00	3.04	62.5	8.40	8.31	69.0	8.41	8.32	68.4	7.50	69.2
07/21/22	4:30	161	8.00	3.07	61.1	8.40	8.36	67.3	8.39	8.27	67.1	7.37	68.8
07/21/22	5:30	NA	8.00	3.09	59.7	8.40	8.29	66.4	8.39	8.24	65.8	7.47	68.3
07/21/22	6:30	159	8.00	3.08	58.7	8.40	8.27	65.1	8.36	8.23	65.1	7.76	68.8
07/21/22	7:30	NA	8.00	3.17	57.5	8.40	8.28	64.0	8.35	8.15	63.7	7.55	67.7
07/21/22	8:30	159	8.00	3.10	56.8	8.40	8.36	63.6	8.30	8.07	63.8	7.59	68.0
07/21/22	9:30	NA	8.00	3.10	57.5	8.40	8.39	63.0	8.35	8.15	63.9	6.72	69.6
07/21/22	10:30	160	8.00	3.11	58.4	8.40	8.64	63.5	8.32	8.22	64.5	6.73	69.0
07/21/22	11:30	NA	8.00	3.11	60.3	8.40	8.39	65.2	8.36	8.21	65.0	6.70	70.1
07/21/22	12:30	159	8.00	3.09	63.4	8.40	8.51	67.8	8.41	8.23	68.2	6.67	70.6
07/21/22	13:30	NA	8.00	3.08	65.8	8.40	8.42	69.7	8.42	8.25	70.5	6.65	71.6
07/21/22	14:30	159	8.00	3.12	66.8	8.40	8.41	71.6	8.42	8.18	71.6	6.58	71.8
07/21/22	15:30	NA	8.00	3.06	68.4	8.40	8.33	73.0	8.43	8.18	73.7	7.47	74.5
07/21/22	16:30	158	8.00	3.05	69.9	8.40	8.47	75.2	8.43	8.18	74.2	7.46	75.8
07/21/22	17:30	NA	8.00	3.06	71.8	8.40	8.33	76.4	8.46	8.18	74.5	7.46	75.2
07/21/22	18:30	158	8.00	3.06	72.2	8.40	8.30	77.3	8.45	8.13	74.7	7.43	74.8
07/21/22	19:30	NA	8.00	3.05	72.2	8.40	8.29	77.8	8.47	8.18	76.9	7.40	73.5
07/21/22	20:30	158	8.00	3.04	71.3	8.40	8.28	77.5	8.47	8.15	77.0	7.08	72.5
07/21/22	21:30	NA	8.00	3.06	70.8	8.40	8.39	76.8	8.48	8.18	75.7	7.31	70.9
07/21/22	22:30	158	8.00	3.06	68.2	8.40	8.49	75.9	8.46	8.17	74.5	7.25	71.1
07/21/22	23:30	NA	8.00	3.07	67.7	8.40	8.34	74.5	8.47	8.18	73.3	7.31	70.2
07/22/22	0:30	158	8.00	3.05	66.1	8.40	8.28	72.9	8.41	8.15	72.2	7.45	69.8
07/22/22	1:30	NA	8.00	3.04	64.9	8.40	8.24	71.8	8.39	8.15	70.9	7.52	69.5
07/22/22	2:30	158	8.00	3.04	63.7	8.40	8.26	70.2	8.40	8.14	69.8	7.41	69.4
07/22/22	3:30	NA	8.00	3.04	62.5	8.40	8.35	69.0	8.43	8.18	69.8	7.44	68.8
07/22/22	4:30	158	8.00	3.04	61.1	8.40	8.42	68.1	8.44	8.14	67.2	7.38	68.7
07/22/22	5:30	NA	8.00	2.70	59.9	8.40	8.39	66.6	8.45	8.13	66.2	7.37	67.2
07/22/22	6:30	160	8.00	2.70	58.4	8.40	8.39	65.6	8.41	8.15	66.0	7.38	66.9
07/22/22	7:30	NA	8.00	2.85	57.5	8.40	8.42	64.2	8.46	8.17	63.7	7.77	66.3
07/22/22	8:30	160	8.00	2.97	56.8	8.40	8.51	63.3	8.38	8.18	64.7	7.67	67.8
07/22/22	9:30	NA	8.00	3.01	57.1	8.40	8.28	63.3	8.39	8.13	64.3	7.59	67.6
07/22/22	10:30	161	8.00	3.04	58.0	8.40	8.23	64.5	8.45	8.14	64.8	7.51	69.3
07/22/22	11:30	NA	8.00	3.04	59.2	8.40	8.43	64.9	8.45	8.12	64.7	7.54	69.4
07/22/22	12:30	161	8.00	3.06	61.1	8.40	8.32	65.3	8.46	8.13	65.6	7.62	69.7
07/22/22	13:30	NA	8.00	3.04	63.2	8.40	8.36	67.6	8.45	8.16	66.8	7.42	71.0
07/22/22	14:30	160	8.00	3.03	65.1	8.40	8.37	69.9	8.46	8.14	69.9	7.34	71.8
07/22/22	15:30	NA	8.00	3.05	66.3	8.40	8.15	71.4	8.38	8.16	70.8	7.64	72.5
07/22/22	16:30	159	8.00	3.02	68.2	8.40	8.31	73.0	8.42	8.18	72.0	7.64	73.2
07/22/22	17:30	NA	8.00	3.02	68.9	8.40	8.28	74.2	8.42	8.21	73.2	7.61	73.0
07/22/22	18:30	159	8.00	2.76	69.6	8.40	8.40	75.2	8.30	8.18	73.0	7.49	73.2
07/22/22	19:30	NA	8.00	2.97	69.4	8.40	8.34	74.9	8.35	8.28	74.5	7.44	72.3
07/22/22	20:30	159	8.00	3.04	69.1	8.40	8.38	74.9	8.36	8.28	73.4	7.45	71.9
07/22/22	21:30	NA	8.00	3.07	68.0	8.40	8.37	74.5	8.35	8.24	73.7	7.43	70.5
07/22/22	22:30	159	8.00	3.08	67.7	8.40	8.33	73.3	8.38	8.20	71.6	7.58	70.3
07/22/22	23:30	NA	8.00	3.09	65.3	8.40	8.23	72.5	8.34	8.23	71.7	7.45	69.3
07/23/22	0:30	158	8.00	3.09	64.4	8.40	8.32	71.1	8.35	8.26	70.3	7.45	68.7
07/23/22	1:30	NA	8.00	3.11	62.0	8.40	8.25	69.2	8.35	8.24	69.5	7.46	68.2
07/23/22	2:30	159	8.00	3.10	60.3	8.40	8.30	67.8	8.32	8.27	67.2	7.49	67.2
07/23/22	3:30	NA	8.00	3.12	59.2	8.40	8.35	66.1	8.34	8.26	65.4	7.54	66.5
07/23/22	4:30	160	8.00	2.99	57.5	8.40	8.34	64.7	8.35	8.27	64.3	7.59	66.4
07/23/22	5:30	NA	8.00	2.97	56.8	8.40	8.35	64.0	8.30	8.27	64.1	7.58	66.3
07/23/22	6:30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Table A-4
Summary of 2022
Pond Water Treatment Plant Operator's Logs

Date	Time	Influent Flowrate (gpm)	R-1 pH set point	R-1 pH	R-1 temp °F	R-2 pH set point	R-2 pH	R-2 temp °F	FF-2 pH	Pit Clarifier pH	Pit Clarifier temp °F	Discharge Weir pH	Discharge Weir temp °F
07/26/22	7:30	OFFLINE											
07/26/22	8:30												
07/26/22	9:30	LIME CLOG											
07/26/22	10:30	159	8.00	2.42	60.1	8.40	8.24	65.4	8.24	7.77	66.2	6.47	68.5
07/26/22	11:30	NA	8.00	2.41	59.9	8.40	8.24	66.6	8.31	8.28	67.0	6.50	68.7
07/26/22	12:30	152	8.00	2.52	60.6	8.40	8.30	66.8	8.36	8.33	66.8	6.52	68.4
07/26/22	13:30	NA	8.00	2.80	61.5	8.40	8.56	67.3	8.38	8.34	67.4	6.54	68.3
07/26/22	14:30	151	8.00	2.95	61.5	8.40	8.48	67.8	8.40	8.33	68.5	6.46	68.8
07/26/22	15:30	NA	8.00	2.99	63.7	8.40	8.40	68.7	8.60	8.34	69.2	6.48	69.3
07/26/22	16:30	142	8.00	2.57	64.9	8.40	8.57	69.7	8.36	8.28	70.0	6.48	68.6
07/26/22	17:30	NA	8.00	2.67	65.8	8.40	8.28	70.9	8.21	8.18	70.0	6.48	68.6
07/26/22	18:30	148	8.00	2.92	66.1	8.40	8.51	72.3	8.36	8.30	71.2	6.43	68.6
07/26/22	19:30	NA	8.00	3.09	66.3	8.40	8.48	72.1	8.33	8.31	71.4	6.43	68.1
07/26/22	20:30	149	8.00	3.20	65.6	8.40	8.38	71.4	8.35	8.36	70.5	6.30	68.3
07/26/22	21:30	NA	8.00	3.23	65.1	8.40	8.31	71.1	8.35	8.29	71.0	6.35	68.3
07/26/22	22:30	150	8.00	3.26	64.4	8.40	8.34	71.1	8.35	8.32	70.1	6.32	68.2
07/26/22	23:30	NA	8.00	3.27	63.7	8.40	8.28	70.4	8.31	8.30	69.7	6.29	68.2
07/27/22	0:30	150	8.00	3.28	62.5	8.40	8.39	69.3	8.27	8.29	69.4	6.29	68.1
07/27/22	1:30	OFFLINE											
07/27/22	2:30												
07/27/22	3:30												
07/27/22	4:30												
07/27/22	5:30												
07/27/22	6:30												
07/27/22	7:30												
07/27/22	8:30	155	8.00	2.98	58.7	8.40	8.29	66.4	8.55	8.54	66.8	6.56	67.4
07/27/22	9:30	NA	8.00	3.18	57.5	8.40	8.47	64.7	8.35	8.30	65.8	6.52	67.6
07/27/22	10:30	154	8.00	3.29	58.4	8.40	8.42	64.2	8.31	8.28	65.4	6.50	67.4
07/27/22	11:30	NA	8.00	3.33	58.9	8.40	8.52	64.7	8.34	8.28	66.2	6.52	68.2
07/27/22	12:30	154	8.00	3.34	60.6	8.40	8.28	65.6	8.34	8.32	67.5	6.54	68.4
07/27/22	13:30	NA	8.00	3.36	63.2	8.40	8.20	68.8	8.36	6.30	68.8	6.62	68.1
07/27/22	14:30	153	8.00	3.36	65.8	8.40	8.31	69.7	8.37	8.31	70.0	6.50	69.2
07/27/22	15:30	NA	8.00	3.35	67.2	8.40	8.34	71.8	8.38	8.35	70.2	6.55	69.0
07/27/22	16:30	145	8.00	3.38	69.1	8.40	8.54	72.5	8.40	8.28	72.8	6.58	69.0
07/27/22	17:30	NA	8.00	3.43	70.3	8.40	8.56	75.2	8.41	8.35	74.2	6.51	69.3
07/27/22	18:30	137	8.00	3.83	72.7	8.40	8.16	76.1	8.45	8.36	75.7	6.50	69.7
07/28/22	7:30	NA	8.00	3.76	54.6	8.40	8.30	73.5	8.34	8.26	71.6	6.70	67.7
07/28/22	8:30	143	8.00	OFFLINE		8.40	8.27	68.5	8.21	8.16	68.7	6.67	68.0
07/28/22	9:30	NA	8.00			8.40	8.35	65.2	8.22	8.20	65.6	6.62	68.0
07/28/22	10:30	167	8.00			8.40	8.21	64.5	8.21	8.18	65.3	6.66	68.5
07/28/22	11:30	NA	8.00			8.50	8.33	65.2	8.40	8.30	66.1	6.64	68.7
07/28/22	12:30	132	8.00			8.50	8.36	67.1	8.51	8.27	68.3	6.55	69.4
07/28/22	13:30	SHUT DOWN - END OF OPERATIONS											

NA = Not applicable
ND = No Data

Table A-5
2022 Pond Water Treatment Sludge Analytical Results

Regulatory Criteria	Date	Percent Solids	Aluminum			Antimony			Arsenic			Barium			Beryllium			Cadmium			Chromium			Cobalt			Copper			Iron			Lead			Mercury			Molybdenum			Nickel			Selenium			Silver			Thallium			Vanadium			Zinc		
TTLC (mg/kg)		NP	NP			500			500			10000			75			100			2500			8000			2500			NP			1000			20			3500			2000			100			500			700			2400			5000		
STLC (mg/L)		NP	NP			15			5			100			0.75			1			5			80			25			NP			5			0.2			350			20			1			5			7			24			250		
Sample ID and Testing Procedure		**Percent Solids**	**Result**	**DQ**	**EQ**	**Result**	**DQ**	**EQ**	**Result**	**DQ**	**EQ**	**Result**	**DQ**	**EQ**	**Result**	**DQ**	**EQ**	**Result**	**DQ**	**EQ**	**Result**	**DQ**	**EQ**	**Result**	**DQ**	**EQ**	**Result**	**DQ**	**EQ**	**Result**	**DQ**	**EQ**	**Result**	**DQ**	**EQ**	**Result**	**DQ**	**EQ**	**Result**	**DQ**	**EQ**	**Result**	**DQ**	**EQ**	**Result**	**DQ**	**EQ**	**Result**	**DQ**	**EQ**	**Result**	**DQ**	**EQ**	**Result**	**DQ**	**EQ**	**Result**	**DQ**	**EQ**
2223PWT022-PC-A (18 inch depth)	9/27/2022	15.8																																																							
TTLC (mg/kg dry)			71300			< 10.8	ND		520			6.07			2.44			4.72			172			418			256			75100			< 2.16	ND		< 0.0630	ND		< 6.49	ND		1130			< 2.16	ND		< 1.08	ND		< 10.8	ND		23.4			219		
STLC (mg/L)			223			< 0.500	ND		< 0.100	ND		< 0.0500	ND		0.0180	J	J	< 0.0100	ND		0.736			2.62			1.10			174			< 0.100	ND		< 0.00100	ND		< 0.0500	ND		6.32			< 0.175	ND		< 0.0500	ND		< 1.00	ND		< 0.0500	ND		1.23		
TCLP (mg/L)			16.5			< 0.500	ND		< 0.100	ND		< 0.0500	ND		< 0.0100	ND		< 0.0100	ND		< 0.0250	ND		0.779			< 0.0500	ND		< 1.00	ND		< 0.100	ND		< 0.00100	ND		< 0.0500	ND		3.60			< 0.175	ND		< 0.0500	ND		< 1.00	ND		< 0.0500	ND		0.381		
2223PWT022-PC-B (24 inch depth)	9/27/2022	11.4																																																							
TTLC (mg/kg dry)			82900			< 15.0	ND		447			12.2			2.84			5.79			180			481			278			79400			< 3.00	ND		< 0.0860	ND		< 8.99	ND		1300			< 3.00	ND		< 1.50	ND		< 15.0	ND		21.5			277		
STLC (mg/L)			217			< 0.500	ND		< 0.100	ND		0.0513	J	J	0.0174	J	J	< 0.0100	ND		0.721			2.43			1.02			245			< 0.100	ND		< 0.00100	ND		< 0.0500	ND		5.72			< 0.175	ND		< 0.0500	ND		< 1.00	ND		0.0556	J	J	1.19		
TCLP (mg/L)			11.4			< 0.500	ND		< 0.100	ND		< 0.0500	ND		< 0.0100	ND		< 0.0100	ND		< 0.0250	ND		0.635			< 0.0500	ND		< 1.00	ND		< 0.100	ND		< 0.00100	ND		< 0.0500	ND		2.72			< 0.175	ND		< 0.0500	ND		< 1.00	ND		< 0.0500	ND		< 0.100	ND	
2223PWT022-PC-C (21 inch depth)	9/27/2022	12.8																																																						
TTLC (mg/kg dry)			82000			< 14.9	ND		535		J	5.85			2.75		J	5.39			188		J	471			285		J	85200		J-	< 2.98	ND		< 0.0736	ND		< 8.93	ND		1270			< 2.98	ND		< 1.49	ND		< 14.9	ND	UJ	23.0			253		
STLC (mg/L)			206			< 0.500	ND		< 0.100	ND		< 0.0500	ND		0.0158	J	J	< 0.0100	ND		0.620			2.41			0.968			132			< 0.100	ND		< 0.00100	ND		< 0.0500	ND		5.78			< 0.175	ND		< 0.0500	ND		< 1.00	ND		< 0.0500	ND		1.17		
TCLP (mg/L)			23.4			< 0.500	ND		< 0.100	ND		< 0.0500	ND		< 0.0100	ND		< 0.0100	ND		0.0565			0.979			< 0.0500	ND		< 1.00	ND		< 0.100	ND		< 0.00100	ND		< 0.0500	ND		3.73			< 0.175	ND		< 0.0500	ND		< 1.00	ND		< 0.0500	ND		0.231		

Notes:

Sludge samples represent a homogenized section through the entire sludge blanket thickenss.
TTLC - Total Threshold Limit Concentration
STLC - Soluble Threshold Limit Concentration
TCLP - Toxicity Characteristic Leaching Procedure
NP - Not Promulgated
mg/kg = milligrams per kilogram
mg/L = milligrams per liter

Data Qualifiers (DQ) from the Laboratory:

ND = Not detected at or above adjusted sample detection limit
J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

EPA Qualifiers (EQ) from an additional QA/QC:

J- = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample with potential low bias.
UJ = The analyte was not detected and was reported less than the method detection limit. The associated numerical value is approximate.
J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

Appendices B and D (available upon request)

Appendix B – 2022 Pond Water Treatment Data

Laboratory Reports (PDF format)
Analytical Laboratory Electronic Data Deliverable Files (Microsoft Excel format)

Appendix D – 2022 Water Year USGS Flow and Stage Annual Data Reports

Appendix C
AECOM: Leviathan Mine Pond Water Treatment, 2022 Data Summary Report

Attachment 4 – Data Quality Summary (PDF format)

AECOM

Mr. Taylor Zentner
Lahontan Regional Water Quality Control Board

ATTACHMENT 4

Data Quality Summary

DATA QUALITY SUMMARY

The analytical results for the compliance water samples collected at the Leviathan Mine Site are valid and useable with some data qualifications (Table 4-1). Compliance samples were collected from 07 July through 11 August 2022 (Table 4-2 and Table 4-3). Sludge samples were collected on 27 September 2022 (Table 4-4). All samples were analyzed by Microbac Laboratory located in Marietta, Ohio. The following samples were analyzed:

- One pre-discharge pit clarifier sample was collected on 07 July 2022 and analyzed for the Environmental Protection Agency (EPA)-required discharge criteria analytes.

- Four influent samples were collected from 8 July through 27 July 2022 and analyzed for EPA-required discharge criteria and additional analytes per the Lahontan Water Board, *Sampling and Analysis Plan (SAP) for Leviathan Mine Site, Pond Water Treatment*, May 2022.

- Eleven effluent samples, two field duplicate (FD) samples, and two field method blank (FMB) samples were collected from 08 July through 11 August 2022. The effluent samples were collected twice-weekly and analyzed for both the EPA-required discharge criteria analytes and additional analytes (required once per week).

- Three sludge samples were collected from the pit clarifier on 27 September 2022 and analyzed for total threshold limit concentration (TTLC) metals by Methods SW6010B/SW6020/SW7471A, toxicity characteristic leaching procedure (TCLP) metals by Methods SW6010B/7470A for disposal purposes, and soluble threshold limit concentration (STLC) metals by Methods SW6010B/7470A.

Non-detect effluent samples collected during weeks 3 through 5 had reporting limits that exceeded the reporting limits specified in the SAP. These samples required dilutions due to matrix interferences. In an effort to determine matrix interferences, the following samples were chosen to be re-analyzed for chloride and sulfur: 2223PWT012-INF, 2223PWT013-EFF, 2223PWT015-EFF, 2223PWT017-EFF, 2223PWT018-EFF, and 2223PWT019-EFF. Although sulfur was detected in all samples, some of these had more elevated concentrations of sulfur and the lab believes that this additional amount is enough to have contributed to matrix interferences for metals samples.

The quality control sample results indicate good accuracy and precision for the sampling and analysis procedures. All samples were assessed and validated according to the promulgated methods and laboratory accuracy and precision limits.

All analytical results can be used as reported with any constraints noted by the qualified EPA data flags. There are no rejected data results. However, data results qualified with a “J” should be interpreted as an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample (a “+” or “-” indicates a potential bias). Data results flagged “UJ” are not detected and are reported less than the method detection limit , the associated numerical value is approximate, and data results flagged “U” should be considered not detected because the detection is attributed to external contamination. Table 4-1 summarizes all qualified results for 2022 sampling events.

For the 2022 sampling events, a total of 56 normal and field duplicate sample results (not including field method blanks) are qualified as estimated concentrations, estimated non-detect results or qualified as not detected. These data are summarized by method in the following text.

For the water samples, the following results are qualified:

- **Sulfur by calculation through sulfate by SM4500** – Five results each for sulfur and sulfate are qualified as estimated concentrations (J) because the samples were analyzed past the method specified holding times.
- **Metals by 200.7** – Six results are qualified as estimated concentrations (J) only because the analytes were detected between the reporting limit (RL) and method detection limit (MDL). These results do not indicate a data quality issue.
- **Metals by 200.8 –** Twenty-three results are qualified. Eleven results are qualified as estimated concentrations (J) because the analytes were detected between the RL and MDL. Four results are qualified as estimated concentrations (J) for field duplicate imprecision. Three results are qualified as estimated concentrations with potential high bias (J+) because they are associated with blank contamination [two analytes associated with continuing calibration blank contamination and one analyte associated with method blank (MB) contamination]. The analyte associated with the MB contamination is also reported between the RL and MDL. Two samples are qualified as estimated concentrations with potential high bias (J+) because of a high continuing calibration verification (CCV) recovery; one of these analytes was detected between the RL and MDL. One analyte is qualified as estimated non-detect (UJ) because of a low CCV recovery. Two results are qualified as not-detected concentrations (U) because the results have similar concentrations detected in the field blank. These two results are also associated with a matrix spike recovery that exceeded the laboratory limits and laboratory duplicate imprecision.
- **Total Dissolved Solids by SM2540C –** Six samples are qualified as estimated concentrations (J). Four samples are qualified because they were analyzed past the method specified holding time. Two other samples are qualified for laboratory control sample duplicate imprecision.

For the sludge samples, the following results are qualified:

- **Metals by SW6010B –** Five soluble threshold limit concentration (STLC) metal results are qualified as estimated concentrations (J) only because they were detected between the RL and MDL; and
- **Metals by SW6010C –** Six results are qualified. Four results are qualified as estimated concentrations (J) and one result (not detected) is qualified for an estimated reporting limit (UJ) because they are associated with serial dilutions did not meet method criteria. One result is qualified as an estimated concentration with potential low bias (J-) because of a low analytical spike recovery.

Table 4-1
Qualified Results for 2022 Sampling Events

SAMPLE ID	SAMPLE DATE	CHEMICAL NAME	RESULT	EPA Flag	Reason	RL	MDL
Calculation using SM4500 (mg/L)							
2223PWT012-INF	7/27/2022	Sulfur	1810	J	4A	333	167
2223PWT013-EFF	7/27/2022	Sulfur	587	J	4A	125	62.5
2223PWT015-EFF	8/2/2022	Sulfur	596	J	4A	125	62.5
2223PWT017-EFF	8/4/2022	Sulfur	536	J	4A	125	62.5
2223PWT018-EFF	8/4/2022	Sulfur	563	J	4A	125	62.5
E200.7 (mg/L)							
2223PWT003-EFF	7/8/2022	Iron	0.068	J	6G	0.08	0.04
2223PWT005-EFF	7/12/2022	Iron	0.0499	J	6G	0.08	0.04
2223PWT007-EFF	7/12/2022	Magnesium	26.7	J	6A	0.4	0.2
2223PWT010-EFF	7/19/2022	Iron	0.0632	J	6G	0.08	0.04
2223PWT013-EFF	7/27/2022	Aluminum	0.0834	J	6G	0.16	0.08
2223PWT013-EFF	7/27/2022	Iron	0.0715	J	6G	0.08	0.04
E200.8 (mg/L)							
2223PWT001-PC	7/7/2022	Copper	0.00119	J	6G	0.002	0.001
2223PWT002-INF	7/8/2022	Nickel	0.0132	J+	1F	0.004	0.002
2223PWT004-INF	7/12/2022	Barium	0.00253	J	6G	0.003	0.0015
2223PWT005-EFF	7/12/2022	Manganese	0.0159	J	3D	0.004	0.002
2223PWT005-EFF	7/12/2022	Total Selenium	0.00187	J	3D	0.001	0.0005
2223PWT007-EFF	7/12/2022	Lead	0.000678	J	6G	0.001	0.0005
2223PWT007-EFF	7/12/2022	Manganese	0.0633	J	3D	0.004	0.002
2223PWT007-EFF	7/12/2022	Total Selenium	0.00274	J	3D	0.001	0.0005
2223PWT009-INF	7/19/2022	Total Selenium	0.0212	J+	1F	0.005	0.0025
2223PWT010-EFF	7/19/2022	Manganese	0.0235	J	6G	0.04	0.02
2223PWT010-EFF	7/19/2022	Barium	0.0170	J	6G	0.03	0.015
2223PWT011-EFF	7/21/2022	Lead	<0.00500	UJ	5B-	0.01	0.005
2223PWT011-EFF	7/21/2022	Nickel	0.0296	J+	5B+,6G	0.04	0.02
2223PWT011-EFF	7/21/2022	Total Selenium	0.00373	J+	5B+	0.002	0.001
2223PWT012-INF	7/27/2022	Antimony	0.00139	J	6G	0.002	0.001
2223PWT013-EFF	7/27/2022	Arsenic	0.00801	J	6G	0.0125	0.008
2223PWT015-EFF	8/2/2022	Arsenic	0.00958	J	6G	0.0125	0.008
2223PWT015-EFF	8/2/2022	Cobalt	0.00368	J	6G	0.005	0.0025
2223PWT015-EFF	8/2/2022	Total Selenium	0.00271	J+	6G,1A	0.005	0.0025
2223PWT017-EFF	8/4/2022	Manganese	0.542	U	1G,2B,3C	0.004	0.002
2223PWT018-EFF	8/4/2022	Manganese	0.575	U	1G,2B,3C	0.004	0.002
2223PWT018-EFF	8/4/2022	Copper	0.00165	J	6G	0.002	0.001
2223PWT020-EFF	8/11/2022	Copper	0.00133	J	6G	0.002	0.001
SM2540C (mg/L)							
2223PWT002-INF	7/8/2022	Total dissolved solids	5700	J	4A	50	50
2223PWT004-INF	7/12/2022	Total dissolved solids	7020	J	4A	50	50
2223PWT009-INF	7/19/2022	Total dissolved solids	7430	J	4A	50	50
2223PWT012-INF	7/27/2022	Total dissolved solids	6670	J	4A	100	100
2223PWT015-EFF	8/2/2022	Total dissolved solids	2370	J	3B	20	20
2223PWT019-EFF	8/9/2022	Total dissolved solids	2390	J	3B	20	20
SM4500 (mg/L)							
2223PWT012-INF	7/27/2022	Sulfate (as SO4) by SM4500	5440	J	4A	1000	500
2223PWT013-EFF	7/27/2022	Sulfate (as SO4) by SM4500	1760	J	4A	375	188
2223PWT015-EFF	8/2/2022	Sulfate (as SO4) by SM4500	1790	J	4A	375	188
2223PWT017-EFF	8/4/2022	Sulfate (as SO4) by SM4500	1610	J	4A	375	188
2223PWT018-EFF	8/4/2022	Sulfate (as SO4) by SM4500	1690	J	4A	375	188
STLC SW6010B (mg/L)							
2223PWT022-PC-B	9/27/2022	Barium	0.0513	J	6G	0.1	0.05
2223PWT022-PC-A	9/27/2022	Beryllium	0.0180	J	6G	0.02	0.01
2223PWT022-PC-B	9/27/2022	Beryllium	0.0174	J	6G	0.02	0.01
2223PWT022-PC-C	9/27/2022	Beryllium	0.0158	J	6G	0.02	0.01
2223PWT022-PC-B	9/27/2022	Vanadium	0.0556	J	6G	0.1	0.05
TTLC SW6010C (mg/kg)							
2223PWT022-PC-C	9/27/2022	Arsenic	535	J	6A	5.96	2.98
2223PWT022-PC-C	9/27/2022	Beryllium	2.75	J	6A	0.596	0.298
2223PWT022-PC-C	9/27/2022	Chromium	188	J	6A	1.49	0.744
2223PWT022-PC-C	9/27/2022	Copper	285	J	6A	5.96	2.98
2223PWT022-PC-C	9/27/2022	Iron	85200	J-	2E-	59.6	29.8
2223PWT022-PC-C	9/27/2022	Thallium	<14.9	UJ	6A	29.8	14.9

EPA Qualifiers (EQ) from an additional QA/QC

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J- = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample with a potential for low bias.
J+ = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample with a potential for high bias.
UJ = The analyte was not detected and was reported less than the method detection limit. The associated numerical value is approximate.
U = The analyte was detected but is qualified as not detected due to blank contamination.

Reason Codes

1A = Method blank contamination
1F = Continuing calibration blank contamination
1G = Field blank contamination
2B = Matrix spike recovery exceeds laboratory limits
2E- = Low annalytical spike recovery
3B = Matrix spike duplicate imprecision
3C = Laboratory duplicate imprecision
3D = Field duplicate imprecision
4A = Holding time exceeded
5B- = Low continuing calibration recovery
5B+ = High continuing calibration recovery
6A = Serial dilution did not meet method criteria
6G = Detected between the reporting limit and method detection limit

Table 4-2
2022 Pond Water Treatment Influent Analytical Results

			Analyte	Aluminum			Antimony			Arsenic			Barium			Beryllium			Cadmium			Calcium			Chromium			Cobalt			Copper			Iron			Lead			Magnesium			Manganese		
Sample ID	Sample Description	Sample Type	Sample Date	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ
2223PWT002-INF	PWT Influent	N	7/8/2022	364			< 0.00100	U		0.00327			0.0204			< 0.000100	U		< 0.000300	U		311			< 0.00350	U		0.00169			< 0.00100	U		324			< 0.000500	U		53.7			0.0102		
2223PWT004-INF	PWT Influent	N	7/12/2022	391	D3		< 0.00100	U		2.43	D3		0.00253	J	J	0.0115	D1		0.0349			273			0.762	D3		2.31	D3		1.41	D3		349			< 0.000500	U		52.4			11.8	D3	
2223PWT009-INF	PWT Influent	N	7/19/2022	497	D3		< 0.0100	D1, U		2.76	D1		< 0.0150	D1, U		0.0156	D1		0.0389	D1		247			0.943	D1		2.27	D1		1.50	D1		504	D3		< 0.00500	D1, U		65.9			14.3	D3	
2223PWT012-INF	PWT Influent	N	7/27/2022	545	D3		0.00139	J	J	3.69	D3		< 0.0300	D1, U		0.0159	D1		0.0495			325			0.959	D1		3.17	D3		1.98	D3		479	D3		< 0.0100	U		71.5			16.6	D3	

			Analyte	Mercury			Nickel			Selenium			Silver			Sulfate (as SO4)			Thallium			Total dissolved solids			Vanadium			Zinc			Sulfur			Chloride (as Cl)			Sulfate (as SO4)* by SM4500_S04		
Sample ID	Sample Description	Sample Type	Sample Date	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ
2223PWT002-INF	PWT Influent	N	7/8/2022	< 0.000100	Q4, U		0.0132		J+	0.00949	D1		< 0.000500	U		3970	D3		0.0250			5700	H2	J	0.0613			0.978			NA			NA			NA		
2223PWT004-INF	PWT Influent	N	7/12/2022	< 0.000100	U		6.05	D3		0.0134	D1		< 0.000500	U		4480	D3		0.0615			7020	H2	J	0.0875			0.988			NA			NA			NA		
2223PWT009-INF	PWT Influent	N	7/19/2022	< 0.000100	U		7.33	B6, D3		0.0212	D1	J+	< 0.00500	D1, U		121	D3		0.0710	D1		7430	H2	J	0.122			1.32			NA			NA			NA		
2223PWT012-INF	PWT Influent	N	7/27/2022	< 0.000100	U		6.90	D1		0.0245			< 0.000500	U		5350	D3		0.0193			6670	H2	J	0.147			1.37			1810		J	< 10.0	D3, U		5440	H	J

* Sulfate was analyzed for select samples using SM4500_S04 for the calculation of sulfur.

Notes:
All values reported in milligrams per liter (mg/L). All parameters are dissolved except Selenium which is total recoverable.

< = Less than the method detection limit
INF = influent
N = normal field sample
NA = Not applicable

EPA Qualifiers (EQ) from an additional QA/QC
J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+ = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample with a potential for high bias.

Data Qualifiers (DQ) from the Laboratory:
U = The analyte was analyzed for but was not detected above the reported quantitation limit. The quantitation limit has been adjusted for any dilution or concentration of the sample.
D1 = Dillution performed due to matrix interference.
D3 = Dilution performed due to high target analyte concentration.
J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
B6 = Target analyte is detected in continuing calibration blank at or above the reporting limit. There is no impact on the reported value.
H2 = Inititial analysis was within holding time. Reanalysis was past holding time.
H = Sample was analyzed past holding time.
Q4 = ICV recovery is above the acceptance limits. The reported value is estimated.

Table 4-3
2022 Pond Water Treatment Effluent Analytical Results

			Analyte	Aluminum			Antimony			Arsenic			Barium			Beryllium			Cadmium			Calcium			Chromium			Cobalt			Copper			Iron			Lead			Magnesium			Manganese		
			USEPA DailyDischarge	4						0.34									0.0009						0.97						0.026			2.0			0.136								
			USEPA 4DayDischarge	2						0.15									0.004						0.31						0.016			1.0			0.005								
Sample ID	Sample Description	Sample Type	Sample Date	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ
2223PWT001-PC	Pre-Discharge	N	7/7/2022	0.919			NA			0.00553			NA			NA			< 0.000300	U		NA			< 0.00350	U		NA			0.00119	J	J	< 0.0400	U		< 0.000500	U		NA			NA		
2223PWT003-EFF	PWT Effluent	N	7/8/2022	< 0.0800	U		< 0.00100	U		0.00302			0.0195			< 0.000100	U		< 0.000300	U		631	D3		< 0.00350	U		0.00197			< 0.00100	U		0.0680	J	J	< 0.000500	U		51.7			0.0103		
2223PWT005-EFF	PWT Effluent	N	7/12/2022	< 0.0800	U		< 0.00100	U		0.00540			0.0199			< 0.000100	U		< 0.000300	U		647	D3		< 0.00350	U		0.00167			< 0.00100	U		0.0499	J	J	< 0.000500	U		27.6			0.0159		J
2223PWT006-FMB	Field Method Blank	FMB	7/12/2022	< 0.0800	U		< 0.00100	U		< 0.00160	U		< 0.00150	U		< 0.000100	U		< 0.000300	U		0.281	J		< 0.00350	U		< 0.000500	U		< 0.00100	U		< 0.0400	U		< 0.000500	U		< 0.200	U		< 0.00200	U	
2223PWT007-EFF	Duplicate	FD	7/12/2022	< 0.0800	U		< 0.00100	U		0.00485			0.0177			< 0.000100	U		< 0.000300	U		640	D3		< 0.00350	U		0.00141			< 0.00100	U		< 0.0400	U		0.000678	J	J	26.7		J	0.0633		J
22223PWT008-EFF	PWT Effluent	N	7/14/2022	0.894			NA			0.00719			NA			NA			< 0.000300	U		NA			< 0.00350	U		NA			< 0.00100	U		< 0.0400	U		< 0.000500	U		NA			NA		
2223PWT010-EFF	PWT Effluent	N	7/19/2022	0.709			< 0.0100	D1, U		< 0.0160	D1, U		0.0170	D1, J	J	< 0.00100	D1, U		< 0.00300	D1, U		608	D3		< 0.0350	D1, U		< 0.00500	D1, U		< 0.0100	D1, U		0.0632	J	J	< 0.00500	D1, U		35.2			0.0235	D1, J	J
2223PWT011-EFF	PWT Effluent	N	7/21/2022	1.24			NA			< 0.0160	D1, U		NA			NA			< 0.00300	D1, U		NA			< 0.0350	D1, U		NA			< 0.0100	D1, U		< 0.0400	U		< 0.00500	D1, U	UJ	NA			NA		
2223PWT013-EFF	PWT Effluent	N	7/27/2022	0.0834	J	J	< 0.00500	D1, U		0.00801	D1, J	J	0.0167	D1		< 0.00100	D1, U		< 0.00150	D1, U		551	D3		< 0.0350	D1, U		< 0.00250	D1, U		< 0.00500	D1, U		0.0715	J	J	< 0.00250	D1, U		38.2			0.304	D1	
2223PWT014-EFF	PWT Effluent	N	7/28/2022	< 0.0800	U		NA			< 0.00800	D1, U		NA			NA			< 0.00150	D1, U		NA			< 0.0350	D1, U		NA			< 0.00500	D1, U		< 0.0400	U		< 0.00250	D1, U		NA			NA		
2223PWT015-EFF	PWT Effluent	N	8/2/2022	< 0.0800	U		< 0.00500	D1, U		0.00958	D1, J	J	0.0197	D1		< 0.00100	D1, U		< 0.00150	D1, U		558	D3		< 0.0350	D1, U		0.00368	D1, J	J	< 0.00500	D1, U		< 0.0400	U		< 0.00250	D1, U		38.7			0.632	D1	
2223PWT016-FMB	Field Method Blank	FMB	8/4/2022	< 0.0800	U		< 0.00100	U		< 0.00160	U		< 0.00150	U		< 0.000100	U		< 0.000300	U		< 0.200	U		< 0.00350	U		< 0.000500	U		< 0.00100	U		< 0.0400	U		< 0.000500	U		< 0.200	U		0.347		
2223PWT017-EFF	PWT Effluent	N	8/4/2022	< 0.0800	U		< 0.00100	U		0.00671			0.0183			< 0.000100	U		< 0.000300	U		574	D3		< 0.00350	U		0.00345			< 0.00100	U		< 0.0400	U		< 0.000500	U		40.5			0.542		U
2223PWT018-EFF	Duplicate	FD	8/4/2022	< 0.0800	U		< 0.00100	U		0.00716			0.0189			< 0.000100	U		< 0.000300	U		569	D3		< 0.00350	U		0.00369			0.00165	J	J	< 0.0400	U		< 0.000500	U		40.3			0.575		U
2223PWT019-EFF	PWT Effluent	N	8/9/2022	< 0.0800	U		< 0.00100	U		0.00482			0.0153			< 0.000100	U		< 0.000300	U		567	D3		< 0.00350	U		0.00260			< 0.00100	U		< 0.0400	U		< 0.000500	U		41.4			0.390		
2223PWT020-EFF	PWT Effluent	N	8/11/2022	< 0.0800	U		NA			0.00536			NA			NA			< 0.000300	U		NA			< 0.00350	U		NA			0.00133	J	J	< 0.0400	U		0.00113			NA			NA		

			Analyte	Mercury			Nickel			Selenium			Silver			Sulfate (as SO4)			Thallium			Total dissolved solids			Vanadium			Zinc			Sulfur			Chloride (as Cl)			Sulfate (as SO4) by SM4500_S04*		
			USEPA DailyDischarge				0.84			NP																		0.21														
			USEPA 4DayDischarge				0.094			0.005																		0.21														
Sample ID	Sample Description	Sample Type	Sample Date	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ	Result	DQ	EQ
2223PWT001-PC	Pre-Discharge	N	7/7/2022	NA			0.0462			0.00176			NA			NA			NA			NA			NA			< 0.0100	U		NA			NA			NA					
2223PWT003-EFF	PWT Effluent	N	7/8/2022	< 0.000100	Q4, U		0.0142			0.00260			< 0.000500	U		1760	D3		0.0221			2760			< 0.00400	U		< 0.0100	U		NA			NA			NA					
2223PWT005-EFF	PWT Effluent	N	7/12/2022	< 0.000100	U		0.0132			0.00187		J	< 0.000500	U		1840	D3		0.0273			2780			< 0.00400	U		< 0.0100	U		NA			NA			NA					
2223PWT006-FMB	Field Method Blank	FMB	7/12/2022	< 0.000100	U		< 0.00200	U		< 0.000500	U		< 0.000500	U		1.14			< 0.000100	U		130			< 0.00400	U		< 0.0100	U		NA			NA			NA					
2223PWT007-EFF	Duplicate	FD	7/12/2022	< 0.000100	U		0.0119			0.00274		J	< 0.000500	U		1720	D3		0.0243			2680			< 0.00400	U		< 0.0100	U		NA			NA			NA					
22223PWT008-EFF	PWT Effluent	N	7/14/2022	NA			0.0231			0.00244			NA			NA			NA			NA			NA			< 0.0100	U		NA			NA			NA					
2223PWT010-EFF	PWT Effluent	N	7/19/2022	< 0.000100	U		< 0.0200	B6, D1, U		0.00245			< 0.00500	D1, U		166	D3		0.0600	D1		2540			< 0.00400	U		< 0.0100	U		NA			NA			NA					
2223PWT011-EFF	PWT Effluent	N	7/21/2022	NA			0.0296	B6, D1, J	J+	0.00373	D1	J+	NA			NA			NA			NA			NA			< 0.0100	U		NA			NA			NA					
2223PWT013-EFF	PWT Effluent	N	7/27/2022	< 0.000100	U		< 0.0200	D1, U		0.00243			< 0.00250	D1, U		1680	D3		0.0216	D1		2800			< 0.00400	U		< 0.0100	U		587		J	< 5.00	D3, U		1760	H	J			
2223PWT014-EFF	PWT Effluent	N	7/28/2022	NA			< 0.0200	D1, U		0.00342			NA			NA			NA			NA			NA			< 0.0100	U		NA			NA			NA					
2223PWT015-EFF	PWT Effluent	N	8/2/2022	< 0.000100	U		0.0424	D1		0.00271	D1, J	J+	< 0.00250	D1, U		1650	D3		0.0305	D1		2370		J	< 0.00400	U		< 0.0100	U		596		J	3.37	D3		1790	H	J			
2223PWT016-FMB	Field Method Blank	FMB	8/4/2022	< 0.000100	U		< 0.00200	U		< 0.000500	U		< 0.000500	U		< 0.50	U		< 0.000100	U		< 20.0	U		< 0.00400	U		< 0.0100	U		NA			NA			NA					
2223PWT017-EFF	PWT Effluent	N	8/4/2022	< 0.000100	U		0.0127			0.00247			< 0.000500	U		1620	D3		0.0287			2300			< 0.00400	U		< 0.0100	U		536		J	< 5.00	D3, U		1610	H	J			
2223PWT018-EFF	Duplicate	FD	8/4/2022	< 0.000100	U		0.0140			0.00238			< 0.000500	U		1650	D3		0.0304			2380			< 0.00400	U		< 0.0100	U		563		J	< 5.00	D3, U		1690	H	J			
2223PWT019-EFF	PWT Effluent	N	8/9/2022	< 0.000100	U		0.0112			0.00230			< 0.000500	U		1650	D3		0.0258			2390		J	< 0.00400	U		< 0.0100	U		556			3.34	D3		1670					
2223PWT020-EFF	PWT Effluent	N	8/11/2022	NA			0.0138			0.00279			NA			NA			NA			NA			NA			< 0.0100	U		NA			NA			NA					

* Sulfate was analyzed for select samples using SM4500_S04 for the calculation of sulfur.

Notes:

All values reported in milligrams per liter (mg/L). All parameters are dissolved except Selenium which is total recoverable.

< = Less than the method detection limit
EFF = effluent
FD = field duplicate
FMB = field method blank
N = normal field sample
NA = Not applicable
NP = Not promulgated
PC = pit clarifier

EPA Qualifiers (EQ) from an additional QA/QC

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+ = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample with a potential for high bias.
UJ = The analyte was not detected and was reported less than the method detection limit. The associated numerical value is approximate.
U = The analyte was detected but qualified as not detected due to blank contamination.

Data Qualifiers (DQ) from the Laboratory:

U = The analyte was analyzed for but was not detected above the reported quantitation limit. The quantitation limit has been adjusted for any dilution or concentration of the sample.
D1 = Dillution performed due to matrix interference.
D3 = Dilution performed due to high target analyte concentration.
J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
B6 = Target analyte is detected in continuing calibration blank at or above the reporting limit. There is no impact on the reported value.
H = Sample was analyzed past holding time.
Q4 = ICV recovery is above acceptance limits.

Table 4-4
2022 Pond Water Treatment Sludge Field and Analytical Results

Regulatory Criteria	Date	Percent Solids	Aluminum			Antimony			Arsenic			Barium			Beryllium			Cadmium			Chromium		
TTLC (mg/kg)		NP	NP			500			500			10000			75			100			2500		
STLC (mg/L)		NP	NP			15			5			100			0.75			1			5		
Sample ID and Testing Procedure		**Result**	**Result**	**DQ**	**EQ**	**Result**	**DQ**	**EQ**	**Result**	**DQ**	**EQ**	**Result**	**DQ**	**EQ**	**Result**	**DQ**	**EQ**	**Result**	**DQ**	**EQ**	**Result**	**DQ**	**EQ**
2223PWT022-PC-A *(18 inch sample depth)*	9/27/2022	15.8																					
TTLC (mg/kg dry)			71300			< 10.8	ND		520			6.07			2.44			4.72			172		
STLC (mg/L)			223			< 0.500	ND		< 0.100	ND		< 0.0500	ND		0.0180	J	J	< 0.0100	ND		0.736		
TCLP (mg/L)			16.5			< 0.500	ND		< 0.100	ND		< 0.0500	ND		< 0.0100	ND		< 0.0100	ND		< 0.0250	ND	
2223PWT022-PC-B *(24 inch sample depth)*	9/27/2022	11.4																					
TTLC (mg/kg dry)			82900			< 15.0	ND		447			12.2			2.84			5.79			180		
STLC (mg/L)			217			< 0.500	ND		< 0.100	ND		0.0513	J	J	0.0174	J	J	< 0.0100	ND		0.721		
TCLP (mg/L)			11.4			< 0.500	ND		< 0.100	ND		< 0.0500	ND		< 0.0100	ND		< 0.0100	ND		< 0.0250	ND	
2223PWT022-PC-C *(21 inch sample depth)*	9/27/2022	12.8																					
TTLC (mg/kg dry)			82000			< 14.9	ND		535		J	5.85			2.75		J	5.39			188		J
STLC (mg/L)			206			< 0.500	ND		< 0.100	ND		< 0.0500	ND		0.0158	J	J	< 0.0100	ND		0.620		
TCLP (mg/L)			23.4			< 0.500	ND		< 0.100	ND		< 0.0500	ND		< 0.0100	ND		< 0.0100	ND		0.0565		

Regulatory Criteria	Cobalt			Copper			Iron			Lead			Mercury			Molybdenum			Nickel		
TTLC (mg/kg)	8000			2500			NP			1000			20			3500			2000		
STLC (mg/L)	80			25			NP			5			0.2			350			20		
Sample ID and Testing Procedure	**Result**	**DQ**	**EQ**	**Result**	**DQ**	**EQ**	**Result**	**DQ**	**EQ**	**Result**	**DQ**	**EQ**	**Result**	**DQ**	**EQ**	**Result**	**DQ**	**EQ**	**Result**	**DQ**	**EQ**
2223PWT022-PC-A *(18 inch sample depth)*																					
TTLC (mg/kg dry)	418			256			75100			< 2.16	ND		<0.0630	ND		< 6.49	ND		1130		
STLC (mg/L)	2.62			1.10			174			< 0.100	ND		< 0.00100	ND		< 0.0500	ND		6.32		
TCLP (mg/L)	0.779			< 0.0500	ND		< 1.00	ND		< 0.100	ND		< 0.00100	ND		< 0.0500	ND		3.60		
2223PWT022-PC-B *(24 inch sample depth)*																					
TTLC (mg/kg dry)	481			278			79400			< 3.00	ND		<0.0860	ND		< 8.99	ND		1300		
STLC (mg/L)	2.43			1.02			245			< 0.100	ND		< 0.00100	ND		< 0.0500	ND		5.72		
TCLP (mg/L)	0.635			< 0.0500	ND		< 1.00	ND		< 0.100	ND		< 0.00100	ND		< 0.0500	ND		2.72		
2223PWT022-PC-C *(21 inch sample depth)*																					
TTLC (mg/kg dry)	471			285		J	85200		J-	< 2.98	ND		<0.0736	ND		< 8.93	ND		1270		
STLC (mg/L)	2.41			0.968			132			< 0.100	ND		< 0.00100	ND		< 0.0500	ND		5.78		
TCLP (mg/L)	0.979			< 0.0500	ND		< 1.00	ND		< 0.100	ND		< 0.00100	ND		< 0.0500	ND		3.73		

Regulatory Criteria	Selenium			Silver			Thallium			Vanadium			Zinc		
TTLC (mg/kg)	100			500			700			2400			5000		
STLC (mg/L)	1			5			7			24			250		
Sample ID and Testing Procedure	**Result**	**DQ**	**EQ**	**Result**	**DQ**	**EQ**	**Result**	**DQ**	**EQ**	**Result**	**DQ**	**EQ**	**Result**	**DQ**	**EQ**
2223PWT022-PC-A *(18 inch sample depth)*															
TTLC (mg/kg dry)	< 2.16	ND		< 1.08	ND		< 10.8	ND		23.4			219		
STLC (mg/L)	< 0.175	ND		< 0.0500	ND		< 1.00	ND		< 0.0500	ND		1.23		
TCLP (mg/L)	< 0.175	ND		< 0.0500	ND		< 1.00	ND		< 0.0500	ND		0.381		
2223PWT022-PC-B *(24 inch sample depth)*															
TTLC (mg/kg dry)	< 3.00	ND		< 1.50	ND		< 15.0	ND		21.5			277		
STLC (mg/L)	< 0.175	ND		< 0.0500	ND		< 1.00	ND		0.0556	J	J	1.19		
TCLP (mg/L)	< 0.175	ND		< 0.0500	ND		< 1.00	ND		< 0.0500	ND		< 0.100	ND	
2223PWT022-PC-C *(21 inch sample depth)*															
TTLC (mg/kg dry)	< 2.98	ND		< 1.49	ND		< 14.9	ND	UJ	23.0			253		
STLC (mg/L)	< 0.175	ND		< 0.0500	ND		< 1.00	ND		< 0.0500	ND		1.17		
TCLP (mg/L)	< 0.175	ND		< 0.0500	ND		< 1.00	ND		< 0.0500	ND		0.231		

Notes:
Sludge samples represent a homogenized section through the entire sludge blanket thickness.

mg/kg = milligrams per kilogram
mg/L = milligrams per liter
TTLC - Total Threshold Limit Concentration
STLC - Soluble Threshold Limit Concentration
TCLP - Toxicity Characteristic Leaching Procedure
NP - Not Promulgated

Data Qualifiers (DQ) from the Laboratory:
ND = Not detected at or above adjusted sample detection limit.
J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

EPA Qualifiers (EQ) from an additional QA/QC:
J- = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample with potential low bias.
UJ = The analyte was not detected and was reported less than the method detection limit. The associated numerical value is approximate.
J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.