

Groundwater sampling procedures, chain of custody, field parameter measurement, and field QA/QC will be performed in general accordance with the Region 4 US Environmental Protection Agency (EPA), Science and Ecosystem Support Division Operating Procedure, Groundwater Sampling (SESDPROC-301-R4), effective April 26, 2017. Surface water sampling procedures and field QA/QC will be performed in general accordance with the Region 4 US Environmental Protection Agency (EPA), Science and Ecosystem Support Division Operating Procedure, Surface Water Sampling (SESDPROC-201-R4), effective December 16, 2016. Low-level mercury sampling will be performed in general accordance with EPA Method 1669.

**Sample Collection Procedures**

*Equipment Decontamination*

Any reusable sampling equipment that may contact the interior of the piezometer, groundwater, or surface water will be decontaminated in the field immediately prior to use, or in the office/lab and protected using aluminum foil and/or plastic. For sampling events requiring non-dedicated sampling equipment, decontamination procedures will consist of rinsing the equipment once with distilled or deionized water, brushing the equipment with a phosphate free laboratory-quality detergent, and finally rinsing the equipment with distilled or deionized water.

*Water Level Measurement – (Piezometers Only)*

Prior to purging and sampling, water-level measurements will be made at each piezometer by utilizing a dedicated or portable water-level indicator, tape, or other suitable measuring device capable of achieving an accuracy of 0.01 foot. The depth to water in each piezometer will be measured on the same day and prior to purging. The measuring device will be used in accordance with the manufacturer's recommendations and/or directions. Measurements of the depth to water from the top of the piezometer casing will be to the nearest 0.01 foot, and the value will be recorded. Total depths will be measured at each piezometer and recorded.

*Piezometer Purging*

Prior to the collection of groundwater samples, each piezometer will be purged to ensure that fresh aquifer water is being sampled. Purging of each piezometer will be completed using either a peristaltic or electric submersible pump. Due to the depths of the proposed piezometers and the high groundwater tables at the site (i.e. excessive purge volumes), low-flow purging procedures may be utilized. During low-flow purging, the pump or tubing intake will be located within the screened interval and at a depth that will remain under water at all times. During low-flow purging:

- The pumping rate will be set at a speed that produces minimal and stable drawdown within the well.
- The pumping rate will be measured using a graduated cylinder or bucket and a stop watch.
- The groundwater level, pumping rate, and field parameters (pH, temperature, specific conductivity, dissolved oxygen, oxidation-reduction potential, and turbidity) will be monitored and recorded every 5 to 10 minutes (or as appropriate).
- The field parameters will be measured using a calibrated multi-parameter instrument and flow-through cell.

Purging will be considered complete and sampling will begin when the field measured parameters have stabilized. Stabilization is considered complete when three consecutive readings are within the following limits:

- **Turbidity** – 10% for values greater than 10 NTU.
- **Dissolved Oxygen** – Varies no more than 0.2 mg/L or 10% saturation.
- **Oxidation-Reduction Potential** – Varies no more than 20 millivolts.
- **Specific Conductance** – Varies no more than 5%.
- **pH** – Varies no more 0.1 unit

*Sample Collection and Preservation – Piezometers*

Groundwater sampling is the process of obtaining, containerizing, and preserving a groundwater sample after the purging process is complete. Appropriate devices to be used to collect groundwater samples from piezometers include: peristaltic or electric submersible pumps. Alternative sampling devices/methods may be utilized if the alternative device/method is approved for use in EPA field sampling guidance literature.

During sample collection, each piezometer will be sampled with equipment and methodologies that minimize the potential for alteration or contamination of the sample and that are capable of obtaining a sample representative of the formation ground water. Care will be taken to avoid placing clean sampling equipment on the ground or on any contaminated surface. Additionally, personnel who contact sampling equipment that may contact the interior of the monitoring well or the ground water will wear new powderless latex or nitrile gloves. Gloves will be changed between sample locations to avoid cross-contamination.

Field personnel responsible for sample collection will record, at a minimum, the following:

- Date, time and technician's name
- Piezometer number and well depth
- Well casing material and inside diameter
- Static water level prior to purging
- Sampling equipment used
- Volume of water purged prior to sampling
- Sample container numbers, types, sizes, and preservatives
- pH, specific conductance, dissolved oxygen, oxidation-reduction potential, and temperature of water samples
- Comments about sample color, odor, and unusual characteristics
- Comments about weather conditions
- Comments about accessibility and condition of well

Groundwater collected from each piezometer will be slowly discharged into laboratory provided sample containers of the appropriate size and type, and with the preservatives appropriate for the analytical tests required. The sample container will be labeled with the following information:

- Site name,
- Collected date and time,
- Sampler's name,
- Analysis required, and
- Preservative, if any

The laboratory will specify the preservation methods based on knowledge of methods and procedures approved by the Georgia EPD or EPA.

*Sample Collection and Preservation – Surface Water*

Surface water samples will be collected directly into the laboratory provided container from the surface water body or by decanting the water sample from a collection device such as an unpreserved laboratory provided plastic container. The field sampler will face upstream if there is a current and collect the sample without disturbing the bottom sediment. Alternative sampling devices/methods may be utilized if the alternative device/method is approved for use in EPA field sampling guidance literature. Water quality samples collected for low-level mercury analysis (EPA Method 1631E) will be collected in general accordance with EPA Method 1669.

Each surface water sample will be sampled with equipment and methodologies that minimize the potential for alteration or contamination of the sample. Care will be taken to avoid placing clean sampling equipment on the ground or on any contaminated surface. Additionally, personnel who contact sampling equipment will wear new powderless latex or nitrile gloves. Gloves will be changed between sample locations to avoid cross-contamination.

Field personnel responsible for sample collection will record, at a minimum, the following:

- Date, time and technician's name
- Sample location identifier
- Sampling equipment used
- Sample container numbers, types, sizes, and preservatives
- pH, specific conductance, dissolved oxygen, oxidation-reduction potential, and temperature of water samples
- Comments about sample color, odor, and unusual characteristics
- Comments about weather conditions
- Comments about accessibility and condition of the sample locations

Surface water samples will be collected into laboratory provided sample containers of the appropriate size and type, and with the preservatives appropriate for the analytical tests required. The sample container will be labeled with the following information:

- Site name,
- Collected date and time,
- Sampler's name,
- Analysis required, and
- Preservative, if any

The laboratory will specify the preservation methods based on knowledge of methods and procedures approved by the Georgia EPD or EPA.

*Sample Shipment*

Upon completion of sampling each piezometer and/or surface water monitoring point, each laboratory provided container will be sealed, labeled and placed in an iced cooler for preservation and transport to a Georgia EPD approved laboratory for analysis. Chain of custody forms will be completed in the field at the time of sampling of each well. Samples will be transported to the laboratory via courier or shipped for overnight delivery using FedEx or UPS delivery.

*Laboratory Analysis*

Water-quality samples will be analyzed for the constituents listed below. The analytical list may be revised during the life of the mine. Sampling will be conducted according to sufficiently sensitive test procedures (i.e., methods) approved under 40 CFR 136.

|                                |                   |                         |
|--------------------------------|-------------------|-------------------------|
| pH                             | Aluminum, Total   | Selenium, Total         |
| BOD5                           | Antimony, Total   | Silver, Total           |
| COD                            | Arsenic, Total    | Tin, Total              |
| Color                          | Cadmium, Total    | Titanium, Total         |
| Fluoride                       | Chromium, Total   | Zinc, Total             |
| Nitrate-Nitrite                | Cobalt, Total     | Zirconium               |
| Nitrate                        | Copper, Total     | Ammonia, Nitrogen       |
| Nitrite                        | Iron, Total       | Total Kjeldahl Nitrogen |
| Nitrogen, Total Organic (as N) | Lead, Total       | Alkalinity, Total       |
| Oil & Grease                   | Magnesium, Total  | Alkalinity, Bicarbonate |
| Phosphorus (as P), Total       | Manganese, Total  | Alkalinity, Carbonate   |
| Sulfate (as SO4)               | Mercury, Total    | Total Hardness          |
| Sulfide                        | Molybdenum, Total | Total Cyanide           |
| Sulfite (as SO3)               | Nickel, Total     | Uranium                 |
| Alfa, Total                    | Radium, Total     | Thorium                 |
| Beta, Total                    | Radium 226, Total |                         |

*Quality Assurance and Quality Control*

A quality-assurance and quality-control program (QA/QC) will be part of the sampling protocol and a requirement of the laboratory chosen to provide analytical services. At a minimum, field QA/QC per sampling event will require the collection of an equipment-rinsate blank if equipment is field cleaned and re-used on-site. Additional QA/QC sampling such as field or trip blanks may also analyzed as deemed necessary.

The laboratory QA/QC program will be a written program and will describe the accuracy and completeness of the laboratory data; the documentation of procedures for calibration and maintenance of laboratory equipment, for analysis of samples, for computing and validating test data, and for chain-of-custody control; and the control and security of all documentation. Laboratory QA/QC standards will be initiated with the receipt of samples and will be maintained throughout the record-keeping period.

*Chain-of-Custody Control*

The chain-of-custody program will allow tracing the possession of and the handling of individual samples from the time of field collection through the completion of laboratory analysis.

*Evaluation of Analytical Data*

Results of the field measured and analytical groundwater data will be tabulated for each monitoring event. The data will be analyzed for trends and compared to applicable groundwater protection and in-stream water quality standards. The purpose of the trend analysis will be to evaluate if concentrations are declining, remaining level or constant (no discernable change), or increasing.

**Groundwater- and Surface-Water-Monitoring Reporting**

A report summarizing mining activities and water-level and water-quality data will be prepared and submitted to the applicable regulatory authorities on a quarterly basis for the first year and on an annual basis thereafter. These reports will include groundwater contour maps, results of water-quality analysis for the period of monitoring and trend graphs of concentrations. Water-level and water-chemistry data will be evaluated to determine the success of initial mining operations and methods. Groundwater-level data will be compared with groundwater levels predicted by the groundwater models. Water-chemistry data will be evaluated against current groundwater and surface water quality standards.

**X. ADDITIONAL OPERATOR SUBMISSIONS**

- Bonding – Bonding will be completed upon approval of this application for surface mining.
- Annual Permit Status Report – An annual status report will be prepared by the Operator and submitted to the Division as required.
- Amendments to Plan – The Operator will submit any future proposed changes in this proposed plan to the Division for approval.
- Change of Ownership of Mining Operation – Should a change in Operator ownership of this mining operation occur, the new owner(s) will submit a new application and anew bond wining sixty days from the date of consummation of the ownership change.

**XI. ATTACHMENTS**

- Exhibit A Figures
- Exhibit B USACE Individual Permit Application
- Exhibit C NOI for GAR 050000 (pending submittal and will be provided once submittal has been completed)



# SURFACE MINING LAND USE DEVELOPMENT PLAN (3)

## TWIN PINES MINERALS

### ST. GEORGE, CHARLTON COUNTY, GEORGIA

|                              |
|------------------------------|
| DRAWN BY: DEK                |
| CHECKED BY: WW               |
| DRAWING DATE: 6/18/2020      |
| REVISION DATE: N/A           |
| TTL JOB NO.: 000180200804.00 |
| APPROX. SCALE:               |