SURFACE MINING LAND USE PLAN
SAUNDERS DEMONSTRATION MINE (MINE ID NO. 2073)
SUPPLEMENTAL INFORMATION

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1. Introduction

The Twin Pines Minerals, LLC (TPM) Saunders Demonstration Mine in Charlton County will recover essential Heavy Mineral Sands from Trail Ridge through a safe, cost-effective, and environmentally sound process that poses no threat to surrounding lands, the Okefenokee National Wildlife Refuge, or the broader environment.

The deposits that can be recovered from Trail Ridge include the primary ores of titanium dioxide (TiO_2) and zircon ($ZrSiO_2$) — minerals the United States Government has deemed both "critical" and scarce, such that shortages threaten the national defense and/or the national economy. TiO_2 is primarily obtained from mining and processing the minerals ilmenite, rutile, and leucoxene. Leucoxene, not technically a mineral, is a higher quality derivative of ilmenite resulting from the preferential weathering and leaching of iron, increasing the percentage of TiO_2 to more than 70 percent. Zircon is recovered as a co-product from the processing of Heavy Mineral Sands deposits.

The minerals will be extracted, separated, and processed on-site and at a Mineral Separation Plant directly across Highway 94, maximizing the number of high-paying jobs that will be created and retained within Charlton County. After the Heavy Minerals Sands products have been separated, the final products will be containerized, bulk shipped or loaded onto trucks or rail dependent upon customer requirements.

The proposed project will demonstrate in practice what extensive studies have already proved: that these critical minerals can be recovered without any impact to the Okefenokee National Wildlife Refuge, the boundary of which is three miles away at its closest corner, and with negligible environmental impacts beyond the mine site.

2. Twin Pines Minerals, LLC

The Saunders Demonstration Mine is owned and operated by Twin Pines Minerals, LLC. The underlying real estate is owned by Trail Ridge Land, LLC, a wholly owned subsidiary of Twin Pines Minerals, LLC.

TPM is a privately held mining company established to develop, construct and operate mines throughout the United States and to sell output to consumers throughout the world through long-term forward purchase contracts. The management team has over 180 years of combined mining and geological experience.

3. Project Boundaries

The Permit Boundary (including undisturbed buffers and haul roads) is depicted on Sheet 2. Adjacent properties are also identified. Consistent with applicable regulations, undisturbed buffers do not include drainage features such as ditches, swales, piping, or rip-rap.

Non-jurisdictional wetlands within the Permit Boundary are shown in light green on Sheet 2. Through two Approved Jurisdictional Determinations (App. A), the United States Army Corps of Engineers has confirmed that none of the wetlands on site constitute "waters of the United States."

4. Mining Plan

The Mining Plan is illustrated in Sheets 3–5. Sheet 3 shows the site layout. Sheet 4 illustrates how the mining process will progress. Sheet 5 provides flow charts showing how excavated sands will be processed and how water will move through the site.

4.1. Acreage and Site Layout

The 820-acre Permit Area is shown on Sheets 2 and 3. The site includes the area to be excavated (the "Mining Footprint"), which consists of approximately 582 acres; the processing area consisting of a Pre-Concentration Plant (PCP) and a Wet Concentration Plant (WCP); Process Water Ponds and Water Management Ponds; and the haul road that will be used to move material from the Wet Concentration Plan to the Mineral Separation Plant directly across Highway 94.

Conveyors (rather than a haul road) will be used to convey excavated material and tailings between the mine pit and the Pre-Concentration and Wet Concentration Plants. The conveyors will be constructed for the entire east-west length of the mining corridor from near T-Model Road to near Trail Ridge Road, where they will turn to the north towards the concentration plants, located near the northeastern portion of the mining area.

The approximate center of the site is latitude 30.524023° N and longitude –82.113326, W. According to the USGS Topographic Map, surface elevation ranges from approximately 155 to 175 feet above mean sea level (amsl).

4.2. Affected Lands and Community

The mine site is not swampland. It has been used for industrial silviculture for at least 50 years. It was almost completely denuded in the West Mims Fire of 2017 and currently has the appearance of a clear-cut pine plantation that is just beginning to regrow.

The predominant land use in the vicinity of the mine is commercial silviculture. The following land use types were identified within the mining area during pre-mining field evaluations:

- Southeastern North American Temperate Forest Plantation
- Recently Logged-Herb and Grass Cover
- Southern Coastal Plain Non riverine Cypress Dome
- Developed-Roads
- Southeastern Ruderal Grassland
- Southern Coastal Plain Seepage Swamp and Baygall Woodland
- Atlantic Coastal Plain Upland Longleaf Pine Woodland
- Southern Coastal Plain Nonriverine Basin Swamp
- Southeastern Ruderal Shrubland
- Southeastern Native Ruderal Flooded & Swamp Forest

Land use types are classified in accordance with land use cover descriptions by Natureserve: *The Descriptions of Ecological Systems for Modeling of LANDFIRE Biophysical Settings, Ecological Systems* (2020). The dominant land use was managed pine silviculture (Southeastern North American Temperate Forest Plantation, Recently Logged Herb and Grass Cover), which comprises more than 88% of the existing land use.

Due to the rural nature of the surroundings and the nature of the operation itself, off-site impacts due to dust and noise are not anticipated. Dust will be managed by applying water to haul roads and other high traffic areas. Most equipment — including the dragline, conveyors, and mineral processing equipment — will be powered by electricity, substantially minimizing noise.

In a letter dated November 12, 2020, the County Administrator for Charlton County stated the mining operation is consistent with land use in the area, and that no zoning regulations would prohibit the proposed mining operation.

4.3. Mine Progression and Timeline

The progression of the mine is shown on Sheet 4. A mine pit approximately 100-feet wide and 500-feet long, and no more than 50-feet deep, will move from West to East, and then East to West, in bands across the site until the entire Mining Footprint has been mined.

It will take approximately six months to a year to prepare the site and construct the necessary infrastructure after a permit is issued. Active mining will commence immediately after this work is completed.

Once the operation begins, the moving mine pit will progress at a rate of approximately 100-200 feet per day, or approximately 10 to 15 acres per month. The entire process is expected to take 4 years. Reclamation will be completed within 24 months after the mining process is completed.

Sheet 5 provides a flow diagram for the excavation and beneficiation process. The steps in this process are described further below.

4.4. Site Preparation

Prior to initiating mining activities, the project area will be delineated by survey markers, boundary markers, and flagging to indicate the locations of permanent infrastructure and mining boundaries. A pre-mining survey using LiDAR will be used to create a topographic surface to guide reclamation.

Merchantable timber will be harvested prior to the beginning of mining activities. Timber will be harvested on average 4 to 6 months prior to the initiation of mining in each area. Timber that is not merchantable and timber scraps will be removed by TPM and all areas within the limits of clearing and mining will be root raked, windrowed, and burned in compliance with Georgia Forestry Commission and/or county permits.

The first areas to be cleared will be for the processing facilities, initial mining area, and feed and tailings conveyors. Once these areas have been cleared, the permanent facilities and infrastructure will be constructed/installed along with the berms, stormwater controls, and other erosion and sediment controls detailed in Sheets 6 and 7.

With respect to the mining process, the first step will be to clear the mining corridor ahead of the dragline. The initial mining corridor will be approximately 700 feet north to south, which will allow for mining of three pit widths before relocating the feed/tailings conveyors. This clearing will extend approximately 500 feet ahead of the mining and will progress as the dragline advances. The clearing of this 700-foot north to south corridor is required to facilitate the advancement of the apron feeder and mobile conveyors as mining progresses to the east in the initial pit.

Topsoil will be removed approximately two weeks before mining. As described in the Erosion Control Plan (Sheet 7) and Reclamation Plan (Sheet 8), it will be stockpiled for reuse during the reclamation process. Topsoil stockpiles will be placed near the excavation, generally beneath or alongside the conveyor lines. Mine tailing stockpiles will not be mixed with topsoil stockpiles. Details about the topsoil stockpiles are provided on Sheet 7.

4.5. Active Mining: Excavation

Excavation of the mining cuts will commence after the topsoil is removed. TPM has developed a completely land-based heavy mineral sand mining technique using a dragline excavator, conveyor system for materials transport, and processing plants. The dragline is a large crane-like earthmoving machine equipped with a large-capacity bucket to scoop material. The bucket swings from cables on the end of the boom, scooping material that is then moved to adjacent areas. The dragline is powered by electricity.

The dragline technique is different from conventional "wet mining," which utilizes a dredge and floating concentration plant to mine and process heavy mineral-bearing sands. The dragline method is more efficient when long mining cuts can be utilized. Elongated cuts allow for excavation and backfilling to occur simultaneously in the same pit. Backfilling and rough grading will occur within 500 feet of the dragline dig face.

The excavation will be approximately 100-feet wide by 500-feet long. Its depth will vary depending on the depth of heavy minerals sands; but its maximum depth will be 50 feet below ground surface. A profile and cross-section of the mining cut is shown in Sheet 5.

Because dragline mining is a "dry" technique, it will be necessary to remove standing water above a depth of about 8 feet. As described in the Water Use and Management Plan (App. P), water removed from the mine pit will be pumped to the Water Management Ponds, where it will be conserved for use in the beneficiation process and/or evaporated.

4.6. Transport by Conveyor to the Pre-Concentration Plant

An electric-powered conveyor system will be used to transport excavated sands from the mine pit to the Pre-Concentration and Wet Concentration Plants.

Excavated material will initially be stockpiled near the mine pit before being transferred to an apron feeder that feeds to a screen. The screen will be used to remove roots and other large objects, which will be placed near the screen area and then returned to the mining pit during the reclamation process.

The screened material will be transferred to a pit/feed conveyor system, which feeds a mainline feed conveyor system. The mainline feed conveyor system will incline (or feed a stacker conveyor) and then feed the trommel (screen). The under-sized material from the trommel will be fed to the Pre-Concentration Plant as a slurry.

4.7. Pre-Concentration Plant and Wet Concentration Plant

In the Pre-Concentration Plant and Wet Concentration Plant, spirals will be used to separate heavy mineral sands from the lighter clays and quartz sand. From the Pre-Concentration Plant, the heavy mineral sands will be fed to the Wet Concentration Plant, which further separates the lighter minerals from heavy mineral sands. The result is a Heavy Mineral Sands concentrate that will be trucked to the Mineral Separation Plant for additional processing.

Process water used in the Pre-Concentration Plant and Wet Concentration Plant will be reclaimed through a series of dewatering screens and hydrocyclones. Humates and clays will be separated from the process water as "slimes." The slimes will be separated from process water in a thickener. The underflow, which includes the slimes, from the thickener will be dewatered and temporarily stored before being transported back to and placed in the mined pit area for reclamation.

Tailings and slimes from the Pre-Concentration Plant will be stockpiled until they can be fed to the conveyor system and returned to the pit.

4.8. Mineral Separation Plant

A portion of the Heavy Mineral Sands concentrate from the Wet Concentration Plant will be packaged as finished product and shipped to customers. The remaining concentrate will be trucked to the Mineral Separation Plant across Highway 94. The locations of these plants are shown on Sheet 3. The close proximity of the Mineral Separation Plant to the Mineral Processing Plant decreases the distance and energy needed to transport materials.

The Mineral Separation Plant further separates mineral products such as zircon, titanium minerals (ilmenite, leucoxene, rutile), and staurolite etc. After products have been separated, the final products will be containerized, bulk shipped or loaded on truck or rail depending upon customer requirements.

4.9. Soil Amendments and Backfilling

As discussed above, tailings and slimes from the Pre-Concentration and Wet-Concentration Plants will be stockpiled near the processing plants. These materials will then be loaded onto a conveyor to be returned to the mine pit.

Some of the tailings will be mixed with bentonite to produce a low-permeability mixture (10.9% bentonite) that will be installed in a 3-foot to mimic the hydraulic conductivity of the consolidated black sands that underlay portions of the site. Details are provided on Sheet 9 and App. M.

After the soil amendment layer has been installed, processed sands will be placed on top, followed by topsoil, to recreate pre-mining grades.

5. Erosion and Sediment Control

The Erosion and Sediment Control Plan is provided on Sheets 6 and 7, which identifies best management practices (BMPs) to be employed to control sedimentation, protect adjacent watersheds, and prevent erosion on the periphery of the property. Additional Erosion and Sediment Controls for the Process Water and Water Management Ponds are provided in Sheets C-400 to C-425.

A berm will be constructed along Georgia State Highway 94 to control erosion and contain stormwater. Silt fencing, hay bales, and overflow outlet control features will also be utilized. Berms or other control structures may be constructed along T-Model and Trail Ridge Roads as necessary to control stormwater.

Silt fences will be placed around the topsoil storage piles. The silt fences will also preserve seed banks for native vegetation and a planting medium to be used in the reclamation process. The topsoil storage piles will be stabilized with three-to-one (3H:1V) internal slopes and four-to-one (4H:1V) external slopes. Silt fences and hay bales will be utilized along the outside of the topsoil storage piles to control post construction erosion.

6. Reclamation

The Reclamation Plan is provided on Sheets 9 and 10. The reclamation objective is to restore the land surface to pre-mining contours and to ensure groundwater elevations return at least to pre-mining levels. As discussed in Section 4.9 above, the mine pit will be backfilled with processed tailings, with a layer of bentonite added to replicate pre-mining hydraulic properties. Details are provided on Sheet 9 and in App. M. The reclaimed pit will be contoured to match pre-mining elevations before being revegetated with plant communities appropriate to pine flatwoods and depressional wetlands. Although some wetlands may be restored and/or created, no lakes will be intentionally developed.

All structures and materials associated with the mine will be removed. The process for decommissioning and removing the lined Process Water and Water Management Ponds is described in Sheet C-801.

7. Water Use and Water Management

A detailed Water Use Management Plan is set forth in Appendix P. As that document explains, the beneficiation process requires a water supply of approximately 3,000 gallons per minute ("gpm"), but only about 10% will be used consumptively. The rest will be returned and used again.

Water will be managed in four Process Water Ponds (P1–P4) and four Water Management Ponds (M1-M4). All of the ponds will be lined, and all will be above-ground. Details are provided in Sheet C-701. The Process Water Ponds will feed the Pre-Concentration and Wet Concentration Plants. The Water Management Ponds will receive water from the mine pit, and any overflow from the Process Water Ponds. The Water Management Ponds will conserve this water and feed it to the Process Water Ponds as necessary. Evaporators will be installed in the Water Management Ponds to manage excess water and ensure there is no discharge to the environment.

Water will be supplied initially from two wells screened in the Upper Floridan Aquifer with a combined permitted capacity of 1,000 gpm. The primary purpose of the wells is to charge the system Process Water Ponds before active mining begins. Once the system is charged and mining has begun, most or all of the water needed for the beneficiation process will be supplied by seepage water evacuated from the mine pit, which will be conserved in the Water Management Ponds for subsequent use. The wells will continue to be available as a backup water supply if needed, however.

Water required at the Mineral Separation Plant will be hauled, utilizing tanker trucks, from Water Management Pond M-3. Process water from the Mineral Separation Plant will be hauled, by tanked trucks, to the Process Water Ponds for reuse. The maximum inflow/outflow volume of process water to and from the Mineral Separation Plant is estimated to be 120 gallons per minute.

Evaporators capable of removing up to 1,000 gpm will be installed in the Water Management Ponds to ensure sufficient freeboard is available to store the total amount of precipitation that would be expected to accumulate during a 1,000-year, 60-day event (i.e., the total 60-day accumulation that is statistically expected to be exceeded only once in a thousand years, or that has a 0.1% chance of occurring in any given year).

The process used to remove heavy minerals from excavated sands (the "beneficiation process") relies on water and centrifugal force, followed by electrostatic and magnetic separation. No chemicals are used in the process itself. The only exceptions are chemicals used to flocculate suspended solids and adjust the pH of recycled process water before it is used again. Because the water in the Process Water and Water Management Ponds

will consist only of rainwater, groundwater evacuated from the mine pit, water draining from wet material held in the stockpile, and any overflow from the Process Water Ponds, there is little risk the water will be contaminated.

8. Groundwater and Surface Water Monitoring

Groundwater and surface water levels in the vicinity of the mine will be monitored to ensure that unexpected impacts do not occur. The groundwater and surface water monitoring plan is set forth on Sheet 11. The plan shows where piezometers and staff gauges will be installed. It also describes the action levels for adaptive management, along with the steps that will be taken if these levels occur. Water quality will also be monitored.

9. Chemical Storage

No chemicals will be used in the processing plants. Diesel fuel and hydraulic fluid will be required for equipment operation. Waste oil will periodically be generated during equipment maintenance. Diesel fuel and waste oil will be stored in aboveground storage tanks. The storage tanks will be stored in secondary containment structures in accordance with state and federal rules for Spill Prevention, Control, and Countermeasure (SPCC) Plan and Storm Water Pollution Prevention Plan (SWPPP). Hydraulic fluid will be contained in drums, which will be stored under shelter. Flocculants used in the processing ponds to help remove suspended solids will be stored in totes or drums, which will be stored under shelter within a secondary containment structure.

In the event of a reportable release of diesel, waste oil, or hydraulic fluid, TPM will promptly take all reasonable and necessary steps to prevent injury to people, property, and waters of the State of Georgia. Notification of the release will be completed in accordance with State and Federal release notification requirements.

10. Lighting

A detailed lighting plan will be developed following guidelines established by Dark Sky International (DSI 2018, 2019), which includes strategies for the overall lighting plan (i.e., ensuring that lighting is limited to places requiring illumination that and that lights are left on only when needed) and also for the types of bulbs and fixtures that are used (i.e., avoiding blue light and installing shields on all fixtures to direct light where it is needed while minimizing sky glow and leakage). DSI also maintains a database of fixtures bearing the "Dark Sky Seal of Approval."

A September 28, 2023 memorandum prepared by Jacobs for Twin Pines (Appendix Y), assesses potential "Dark Sky" impacts and recommends measures based on DSI guidelines to ensure project lighting will have no effect on wildlife or on the experience of visitors to the Okefenokee Wildlife Refuge. These recommendations, which are set forth in Section 3 of the memorandum. will be implemented.

11. Cultural Resources

A Cultural Resources Survey of the proposed mine site was conducted by TerraXplorations, Inc. In a report dated April 20, 2020, the investigators concluded that "no significant cultural resources will be adversely affected by the proposed mining project." If any previously unknown historic or archaeological remains are discovered during the course of the activity, TPM will immediately stop work and notify the Georgia State Historic Preservation Officer to determine the appropriate course of action before proceeding.

The trigger is based on federal permits, but we've pulled back from requiring work to stop until SHPO green lights. This text is intended to leave some wiggle room in the event SHPO is non-responsive or we have a disagreement about the significance of the find (both of which frequently happen).

12. Other Permits and Approvals

In addition to authorization under the Surface Mining Act, the following permits and authorizations will be required:

GEORGIA REGISTERED No. PE24021 PROFESSIONAL 10-2-23 ENGINEER SHERYLE G. REEVES

TTL

Certificate of Authorization No.: PEF00415
3516 Greensboro Ave., Tuscaloosa, AL 34501

SHEET 15: SUPPLEMENTAL NARRATIVE

TWIN PINES MINERALS, LLC SAUNDERS DEMONSTRATION MINE (ID NO. 2073)

ST. GEORGE, CHARLTON COUNTY, GEORGIA

DRAWN BY: DEK
CHECKED BY: SGR
DRAWING DATE: 11/13/2020
REVISION DATE: 10/2/2023
TTL JOB NO.: 18-02-00804.00
APPROX. SCALE: N/A