STATEMENT OF BASIS
TAMRA MINING, LLC COPPER BENEFICATION FACILITIES
Ground Water Discharge Permit No. UGW010014

I. Description of Facilities

Tamra Mining Company, LLC operates copper mining and beneficiation facilities in Beaver County, Utah. These facilities are supported by process water ponds and tailings impoundments. The primary tailings facility at the time of permit renewal, the Intermediate Tailings Disposal Facility (ITDF), is located in the SW ¼ of Section 5, SE ¼ of Section 6, NE ¼ of Section 7 and the NW ¼ of Section 8, T. 27 S., R. 11 W., SLBM. The three process water ponds are located in the NW ¼ of Section 7, T. 27 S., R. 11 W., SLBM.

The facilities store solutions and tailings as part of Tamra Mining's copper cathode production process. Copper-bearing ore is crushed and ground. If sufficient quantities of magnetite are present, it may be separated from the copper-bearing ore by magnetic separation for sale off-site. The non-magnetic material is processed in a flotation circuit to separate acid-leachable (primarily oxides) ore from sulfide ore. Flotation agents are added to the ground ore in an aerated water suspension. The floatable ore, primarily sulfides, is dried and sold as concentrate. The ore that does not float, the underflow from the flotation tanks, contains oxide copper minerals that are acid soluble. The ore from the flotation process may be further processed in an acid leaching circuit that produces a pregnant leach solution (PLS), that is stored in a PLS process water pond. This solution is processed with solvent extraction and electrowinning, to produce copper cathodes. The barren process liquid remaining after solvent extraction is called raffinate and is stored in a raffinate process water pond, to be recycled for reuse in the acid leach process. Two ponds, one for raffinate and one for PLS, were constructed under this permit. All process water ponds are double-lined to allow for detection of any leaks that may develop through the upper liner. In double-lined ponds, the upper liner serves to break the hydraulic head that the impounded liquid imposes on it, proportional to the depth of the liquid; therefore any leakage that may collect on the lower liner will not have significant hydraulic head that would tend to drive it through any holes that may develop in the lower liner. Under these conditions, it can be reasonably assumed that leakage through the upper liner at flow rates less than 200 gallons per acre of liner per day will not result in significant leakage through the lower liner into the subsurface.

Tailings from the flotation process undergo leaching with recycled raffinate solution and sulfuric acid solution in a series of three agitated tanks, followed by separation of solids and liquids in a counter-current decantation (CCD) circuit. Pregnant (metal-bearing) solution from this circuit is sent to the PLS pond for eventual processing with solvent extraction and electrowinning to produce copper cathodes. Tailings removed at the end of the CCD circuit process are a slurry consisting of approximately 54% solids suspended in a liquid similar in composition to PLS.

Tailings from the acid leach circuit are waste rock that must be disposed of, but contain water and soluble constituents that may affect ground water quality. Tamra's predecessor, CS Mining, proposed to construct the ITDF in two small canyons east of the milling operations. A dam on the eastern canyon was constructed, using borrow from unconsolidated alluvium and weathered bedrock, across the eastern drainage after this permit was first issued in 2014. In its 2014 permit application, CS Mining estimated that water entrained with the tailings would be of fairly good quality, as described below. On this basis, DWQ approved a liner design for the ITDF of a 40-mil HDPE liner on the gently-sloping areas of the drainage, and a geocomposite liner to cover the steeper upper margins of the impoundment. In actual operation of the acid leach circuit, it turned out that the ore did not have the acid-neutralizing capacity anticipated in CS Mining's permit application, and the process fluid entrained with the tailings had very low pH. To neutralize the acidic water, it was necessary to add significant quantities of alkaline materials to the tailings water, which raised

its TDS into the range of 30,000 mg/l. Water balance mistakes associated with the acid leach circuit also required Tamra to apply excess leach solution to mine waste dumps as a one-time emergency action.

Under these conditions, the original liner design approved for acid leach tailings impoundments is not appropriate. Raises of the tailings pond following operation of the acid leach circuit have been done using 60-mil HDPE, and geocomposite liner has not been used; however, 40-mil HDPE was installed for the lower portion of the ITDF liner, before tailings water chemistry was known.

Tamra filled up the east drainage of the ITDF in 2018 before it was able to secure a construction permit and build the lined impoundment in the west drainage. To contain tailings until the west ITDF is constructed, Tamra began disposing of acid leach tailings in a pond constructed by CS Mining, and granted permit-by-rule status by DWQ for disposal of flotation tailings, referred to as the Flotation Tails Pond (FTP). The pond was re-lined and the dike surrounding this pond was raised in late 2018 to allow for disposal of additional tailings. Tamra did not apply to modify the 2014 version of this permit to cover this impoundment. Tamra has received a construction permit to expand the ITDF by constructing the dam on the western drainage and installing 60-mil HDPE liner. Tamra will also raise the elevation of the existing east ITDF.

II. Description of Site

The mill site and ITDF are located on the southern end of the Beaver Lake Mountains, in the Basin and Range geologic province. Late Paleozoic and Early Mesozoic sedimentary rocks in this area were folded and faulted during the Late Cretaceous Sevier Orogeny. These rocks were intruded by igneous rocks of latest Mesozoic to Tertiary age. Volcanic rocks were deposited over much of the region during the mid to late Tertiary age. In the late Tertiary and Quaternary age, fault-block mountain ranges and intervening valleys were formed, trending generally north-south.

Tamra is mining three ore deposits from the Rocky Range, approximately 2 miles southeast of the mill facilities, and the adjacent pediment. Ore deposits in this area occur as skarns, metasomatically altered sedimentary rocks with replacement silicate minerals, abundant marble and local vein-like concentrations of copper oxide and lesser sulfide minerals. Copper occurs in the three deposits predominantly as oxide minerals. Tamra and its predecessor CS Mining also processed low-grade ore in a stockpile left by historic mining at the OK Mine, located in the Beaver Lake Mountains north of the mill facilities. This deposit was a mineralized breccia pipe in a granodiorite intrusive body.

The ITDF is located in an area underlain by alluvium and an unnamed Tertiary granodiorite. Investigations carried out by CS Mining and its predecessors at the site suggest that the bedrock underlying the alluvium at the ITDF site is fractured granodiorite. Test pits dug at the ITDF site show the igneous bedrock overlain by generally less than 10 feet of soil, alluvium and weathered bedrock.

Intrusive igneous rocks such as granodiorite have very low primary porosity and permeability; if the rock is fractured, the fractures may hold ground water. A 200-foot deep core hole and seismic surveys was done at the ITDF site for the initial permit application in 2014 indicate that the granodiorite bedrock is fractured with the following features: 1) fracturing is more intense at the core hole location below 130 feet depth, and; 2) the fracturing is likely to continue to an unknown distance below 200 feet. The core hole did not encounter ground water. It is unknown whether the fracturing is connected enough to form a single aquifer in the granodiorite, or whether the ground water encountered in the existing wells in the area represents different, unconnected zones of fracturing.

Information about ground water conditions in the area of the milling facilities is revealed in several wells completed around the site. Ground water was encountered in the three water supply wells used by the mining operation and at monitor wells drilled by one of Tamra's predecessor for a proposed leach pad that was not built. Driller's logs are available for the water supply wells. Well WW-3, located approximately one mile northwest of the ITDF site and up-gradient from it, encountered water at 186' below ground surface (bgs) when drilled in 2008. Well WW-6, approximately ¾ mile southeast and down-gradient of the ITDF site, encountered water at 96' bgs in 2008. Both these wells were completed in bedrock, which the driller described as "dolomite", but which is more likely to be igneous rock considering the mapped surficial geology. Monitor wells drilled in 1996 near the existing and proposed mill facilities, located approximately ½ mile west of the ITDF site, were completed in intrusive igneous bedrock (granodiorite/quartz monzonite) and had an average depth to ground water of 167 feet bgs. Well ITDF-1 was drilled to a depth of 197' bgs and encountered ground water at 178.7 feet. The boring encountered granodiorite bedrock to total depth. This well has had low-flow conditions throughout its sampling history. These observations indicate that ground water at the mill site is contained in fractured bedrock with very low primary porosity and permeability

Ground water sampled in well WW-3 had total dissolved solids (TDS) content of 1410 mg/l; water from well WW-6 had TDS content of 1760 mg/l. Trace metals were below the ground water standards for these samples. Existing evidence, therefore, suggests that ground water in this area is Class II.

The project site has an arid climate. Average annual precipitation for Milford, UT, located approximately 9 miles southeast of the site, is 9 inches per year.

III. Tailings Characteristics

Analytical results from the meteoric water mobility procedure (MWMP) and the synthetic precipitation leaching procedure (SPLP) done on samples of bench-scale testing of the acid leach process were reported in Appendix C of CS Mining's 2014 permit application and summarized in Table 2 of that application. These results indicated that water from the tailings slurry would have TDS content of approximately 2400 mg/l, with significant content of calcium (550 mg/l) and sulfate (1500 mg/l); pH neutral to slightly alkaline, and trace metals at non-detectable levels except for antimony, which slightly exceeded the ground water standard of 0.006 mg/l in the MWWP analysis.

As cited above, in actual operation the ore did not have the acid neutralizing capacity that was first anticipated. As a result, tailings water had a very low pH, below 1 in some analyses. It was necessary to add alkaline material (lime kiln dust) to reduce pH. Analysis of tailings water treated with lime kiln dust was reported in Tamra's 2019 permit application, and it indicates that the sample analyzed had a TDS content of 37,800 mg/l, and exceeded ground water quality standards for copper and zinc. The sample had a pH of 4.93 as measured in the lab.

Tailings water will be sampled from the tailings water return line at the plant terminus of that line. During plant operation, samples will be collected daily and analyzed for pH and electroconductivity. A return-water sample will be collected quarterly and analyzed for pH, electroconductivity, TDS, major ions (Na, Ca, Mg, K, Cl, SO_4), alkalinity, nitrate + nitrite, metals from Table 1 of UAC R317-6, gross alpha and Ra 226 + 228. If daily sampling reveals significant changes in pH or electroconductivity lasting for one week or longer, a sample will also be collected and analyzed for these parameters.

IV. Discharge Control Plan

All impoundments for acid leach tailings will be regulated under this permit. The permit will be modified to include new acid tailings impoundments as they are constructed. All impoundments for acid leach tailings must be lined with 60-mil HDPE as a minimum. Impoundments must be monitored either by ground water monitoring or monitoring of a leak detection system. Tamra is currently using well ITDF-1 to monitor the Intermediate Tailings pond and Lab Well 1 to monitor the Flotation Tails Pond. Tamra will construct a monitor well at the bottom of the west drainage immediately down-gradient from the future west ITDF dam. Tamra will collect at least eight samples from Lab Well 1 and any other new monitor wells, and analyze them for the parameters designated in Part I.E.4(b)(3a), to determine background water quality and set permit protection levels. At least one sample shall be taken from this well before any tailings are placed in the west ITDF.

The permit also regulates the two existing, and any future, process water ponds. As explained above, these ponds are double-lined and are monitored for potential discharges by monitoring of a leak detection sump. Tamra will also conduct monthly, documented inspections of containment facilities to insure visible parts of those facilities are not damaged or otherwise failing to provide containment according to permit conditions.

After acid-leach tailings deposition is finished in any particular impoundment, the tailings must be drained to the point they are not free-draining, to the best extent practicable, and the drained fluids disposed of in a manner that will not affect ground water quality.

To coordinate permitting activities with Tamra's need to develop potential new tailings disposal facilities, at least 6 months before the planned start of construction of any new acid leach tailings impoundment, Tamra will notify DWQ and submit a plan for development of the future acid leach tailings disposal site. The plan will list:

- The location of the future tailings disposal site.
- The anticipated date the new facility will be needed.
- Application for a construction permit for the proposed facility.
- Location and type of monitoring point of compliance to be used for the facility. If monitoring wells are proposed, a description of the hydrogeologic characteristics of the site adequate to justify well location and construction details.

V. Monitoring

Tamra shall monitor the leak detection sumps under the process water ponds. Any water recovered from the sumps will pass through a totalizer before being discharged back into the pond where it originated. Tamra shall record daily totalizer readings for each process water pond. Tamra shall keep records of whether fluids were present in the sumps on the weekly monitoring events, and if present, records of the daily volumes pumped from the sumps. If leakage into any process water pond leak detection sump exceeds 200 gallons per acre of liner surface per day (440 gal/day for a 2.2-acre pond), Tamra shall notify DWQ by phone within 24 hours, and in writing within 5 days. Unless it can be demonstrated that the fluid in the sump is not wastewater which has leaked through the upper liner, Tamra shall immediately begin activities to locate, isolate and repair any leaks in the upper pond liner. A report on the leakage and repair activities shall be submitted to DWQ within 30 days of the initial report of the leakage.

As stated in Part III, above, Tamra shall sample and analyze the water drained from tailings deposited in the currently-used impoundment.

All impoundments for acid leach tailings will be monitored for potential discharges to ground water. Existing and planned impoundments will use monitor wells; future impoundments may employ either monitor wells or a leak detection system built into the impoundment's liner. The east drainage of the ITDF is monitored by down-gradient well ITDF-1. The Flotation Tails Pond is monitored by Lab Well 2. As stated in Part II, above, ground water contained in the bedrock under the ITDF and Flotation Tails Pond is most likely contained in fractures within rock of low primary porosity and permeability. Under these conditions, the monitor wells possibly may not sample potential leakage from all parts of the tailings impoundments. However, without knowledge of the extent and orientation of fractures in the bedrock (which is not exposed at the surface), it is not possible to place monitor wells in locations which would be most likely to intercept leakage from the impoundments. This is balanced by the site's remote location, limited yield of groundwater as observed in ITDF-1 (implying a limited quantity of ground water present in the aquifer), and the strong contrast in TDS content between the ground water and the tailings water. Under these conditions, ground water is not likely to be developed for future beneficial uses, and it is likely that leakage will be detected in the more distant down-gradient well WW-6.

Tamra will construct a monitor well immediately down-gradient of the future west ITDF impoundment, and the existing east ITDF monitor well will be protected during future raises of the east ITDF dam. Lab Well 1 and WW-3 and shall be sampled for the parameters listed in Part _ _, at a schedule that will provide a total of at least eight sampling events, including events that have already been completed, within one year of permit issuance, to determine background water quality. Any new monitor wells shall be sampled at least eight times within one year of well completion.

Following background monitoring, WW-3 shall be monitored semi-annually and Lab Well 1, ITDF-1 and WW-6 monitored quarterly.

V. Closure Plan

Within one year of issuance of this permit, Tamra shall submit for DWQ review and approval a conceptual closure plan for the ITDF and Float Tails Pond that is protective of waters of the state. Tailings shall be drained of interstitial waters till they are not free-draining, to the greatest extent practicable. The plan shall be based on an evaluation of the tailings for potential to leach contaminants, site conditions and the existing containment structures at the facility. Tamra shall submit a conceptual closure plan for any future acid leach tailings impoundments along with the application to revise this permit.