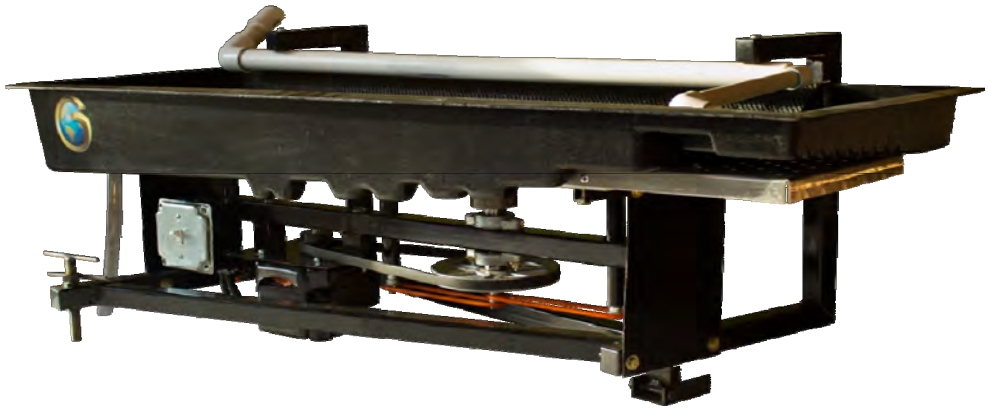
KEENE ENGINEERING INC.
INSTALLATION & OPERATION INSTRUCTIONS FOR THE ST-1 SHAKER CONCENTRATING TABLE



All shaker tables operate best when firmly secured to a dense solid mounting base. Wooden stands will set up harmonics and vibrations. Dense concrete or solid bed rock is preferred or a heavy braced steel table sitting on concrete. Mount shaker table to solid bed rock if possible when operating in the field. When that is not an option, six or seven sand bags may also be used if concrete or bedrock is not available for mounting.

(See http://youtu.be/cLWzSXuN5ok for field setup video.)

NOTE
Vibration and/or harmonics will have a negative effect on the concentrating action of the deck and a negative scattering effect on the gold.

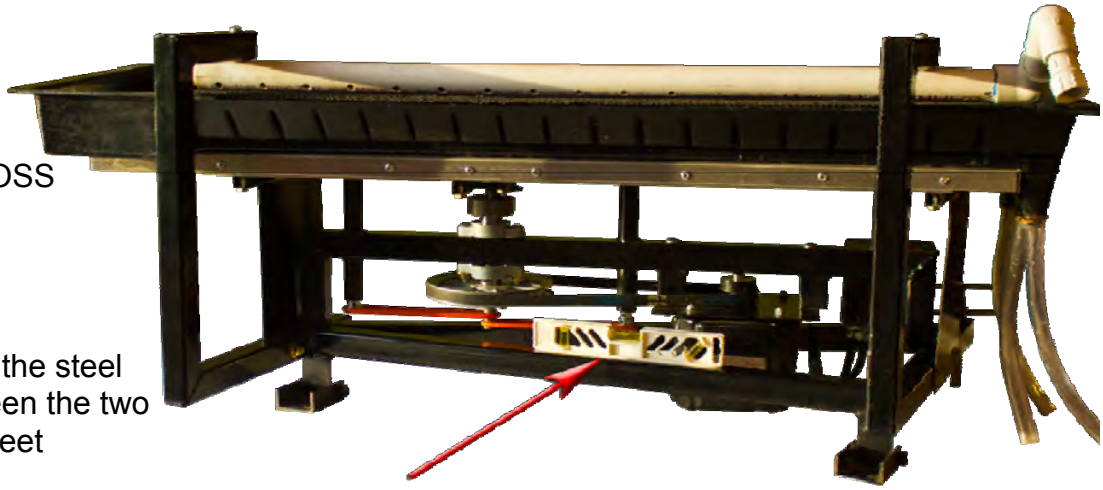
LEVELING

DO NOT LEVEL ACROSS

OR ON TOP OF THE

DECK RIFFLES.

Place a level on top of the steel bar that extends between the two bolts down mounting feet



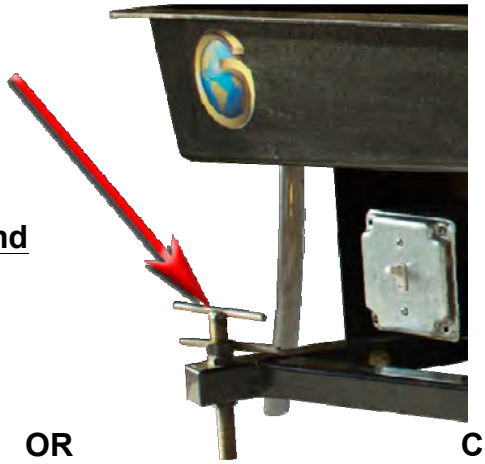
Level Across Back Horizontal Bar

Use flat washers installed under either end of the mounting feet for precise level adjustment in the long axis.

Level Across Back Bar

Adjusting Screw

Horizontal slope tilting concentrate line.



slope of table will change by adjusting the screw up or down for precise control of Occasional apply lubricant to threads.

Optional Stand

SETTLING OR CLARIFYING PONDS

At no time should sand or slime be re-circulated back with mill water. Large, calm, surface areas are required to settle slimes. Buckets, barrels or any deep containers with turbulent water will not allow slimes to settle. Tailings should discharge into a tails pond or into a primary holding vessel before entering slime settling ponds. Surface area is more important than depth. A small 10 x 20 ft. settling pond can be installed in about 30 minutes. Shovel a 6" high retainer wall of earth and remove all gravel. Lay a soft bed of sand in the bottom. A small raised wall area (with the top approximately 2" blow water level) should be placed around the pump area. Roll out plastic liner and fill with water. Desert areas require a plastic cover to retard evaporation. Use a 2x4 wood across pond and lay plastic.

SETTLING OR CLARIFYING CONTAINERS

As with ponds, at no time should sand or slime be re-circulated back with mill water. A calm surface is needed in the final two barrels to settle slimes. (In lieu of the last two barrels, the discharge from barrel two may be directed to a settling pond as outlined above.)

Turbulent water will not allow slimes to settle. Tailings are discharged into the first container

Note: Care must be taken not to overload the barrels if they are to be emptied without mechanical assistance.

COMPACT TAILINGS THICKENERS

A small compact tailings thickener introduces tailings feed at a controlled velocity in a horizontal feed design that eliminates the conventional free settling zone. The feed particles quickly contact previously formed agglomerates. This action promotes further agglomeration and compacting of the solids. Slowly rotating rakes aid in compacting the solids and moving them along to the discharge pipe, these solids are eventually discharged at the bottom of the unit. Under flow from the thickener 60-65% solids are processed through a vacuum filter and a 90-95% solids is sent to the tailings area. Tailings thickeners are compact and will replace ponds.
A 23 ft. diameter will process flow rates at 800 gpm or 50tph.

DEFLOCCULANTS AND WETTING AGENTS

GOLD LOSSES

Pine oils and vegetation oils regularly coat the surface of placer gold. Sometimes up to 50% of the smaller gold will float to the surface and into the tails. The pine oil flotation method for floating gold is still in use today. A good wetting agent will aid in the settling and recovery of oil coated gold.

OPERATION OF THE ST-1 SHAKER TABLE

Separation of concentrate from tails

Minerals or substances that differ in specific gravity of 2.5 or to an appreciable extent, can be separated on shaker tables with substantially complete recovery. A difference in the shape of particles will aid concentration in some instances and losses in others. Generally speaking, flat particles rise to the surface of the feed material while in the presence of rounded particles of the same specific gravity. Particles of the same specific gravity but varying in particle size, can be separated to a certain extent, varying in particle size, can be separated to a certain extent, removing the larger from the smaller, such as washing slime from granular products.

Mill practice has found it advantageous in having the concentrate particles smaller than the tailing product. Small heavy magnetite particles will crowd out larger particles of flat gold making a good concentrate almost impossible with standard gravity concentrating devices. The ST-1 table, using rare earth reverse polarity magnets, overcame this problem by lifting the magnetite out and above the concentrate material thus allowing the magnetite to be washed into the tails. This leaves the non-magnetics in place to separate normally.

Image Above Shows the Magnetite Being Lifted Out of the Concentrate

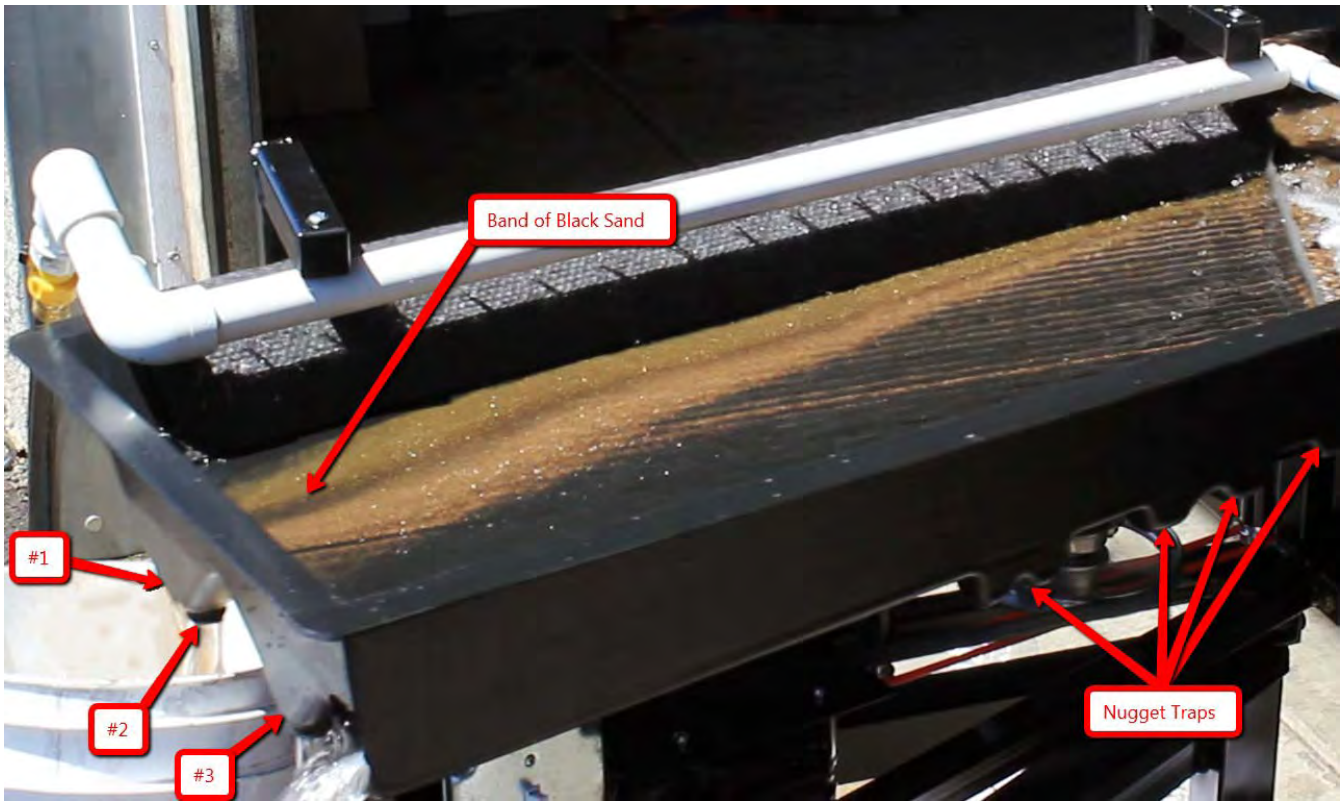
SIZING OF HEAD FEED MATERIAL

No established mathematical relationship exists for the determination of the smallest size of concentrate particle and the largest size of tailing particle that can be treated together. Other factors, such as character of feed material, shape of particles, difference in specific gravity, slope or grade of table dock and volume of cross flow wash water will alter the final concentrate.

Size of feed material will determine the table settings. Pulverized rod mill pulps for gravity recovery tables should not exceed 65-minus to 100-minus 95% except where specific gravity, size, and shape will allow good recovery. Recovery of precious metals can be made when processing slime size particles down to 500-minus, if the accompanying gangue is not so coarse as to require excessive wash water or excessive grade to remove the gangue, (pronounced gang), to the tails. Wetting agents must be used for settling small micron sized gold particles. Once settled, 400-minus to 500minus gold particles are readily moved and saved by the ST-1 shaker table headmotion. Oversized feed material will require excess grade t0  remove the large sized gangue, thus forcing large pieces of gold further down slope and into the middling. Too much grade and the fine gold will lift off the deck and wash into the tailings. Close screening of the concentrate into several sizes requires less grade to remove the gangue and will produce a cleaner product. A more economical method is to screen the head ore to window screen size (16-minus) or smaller and re-run the middling and cons to recover the larger gold. This concept can be used on the ST-1 shaker tables and will recover all the gold with no extra screens. A general rule for good recovery is less grade for the table deck and as much was water as possible without scouring off the fine gold. Re-processing on two tables will yield a clean concentrate without excess screening. Oversized gold that will not pass through window screen size mounted on RP-

4 shaker tables, will be saved in the nugget trap. Bending a small 1/4” screen lip at the discharge end of the screen will trap and save the large gold on the screen for hand removal.

On the first run, at least one inch or more of the black concentrate line should be split out and saved into the #2 concentrate bin. This concentrate will be re-run and the clean gold saved into the #1 concentrate pocket. Argentite silver will be gray to dull black in color and many times this product would be lost in the middling if too close of a split is made.



SCREEN SIZING OR CLASSIFICATION

The riffled portion of the ST-1 shaker table separates coarse non-sized feed material better than the un-riffled cleaning portion. Upon entering the non-riffled cleaning plane, small gangue material will crowd out and force the larger pieces of gold further down slope into the middling. Screen or to classify.

The largest feed particles should not exceed 1/16” in size. It is recommended that a 16-minus or smaller screen be used before concentrating on the ST-1 shaker table, eliminating the need for separate screening devices. Perfect screen sizing of feed material is un-economical, almost impossible, and is not recommended below 65-minus.

A classified feed is recommended for maximum recovery, (dredge concentrates, jig concentrates, etc.) The weight of mill opinion is overwhelmingly in favor of classified feed material for close work. Dredge concentrates are rough classified and limiting the upper size of table feed by means of a submerged deck screen or a mechanical classifier is all that is necessary. A separate screen for the sand underflow is used for improved recovery when using tables.

HEAD FEED MATERIAL AND WASH WATER CAPACITY

Head feed capacity on the ST-1 tables will differ depending on the feed size, pulp mixture and other conditions. Generally speaking, more head feed material may be processed when feeding unclassified, larger screened sized material and correspondingly, less material may be processed when feeding smaller sized classified rod or ball mill pulps. Smaller classified feed material will yield a cleaner concentrate. Ultimately, the shape of the feed material particles and a quick trial test will determine the maximum upper size.

The width between the riffles of the ST-1 table is small and any particle over 1/8" may cause clogging of the bedding material. A few placer operators will pass 1/8" or larger feedmaterial across the ST-1 table, without a screen, with the intent of making a rough concentrate for final clean up at a later date. This method will work, but excess horizontal slope/grade of the table deck must not be used as some losses of the precious metals will occur. Magnetite black sands feed material, passing a 16-minus screen (window screen size if 16-minus + or -) will separate without losses and make a good concentrate at approximately 500 to 600lbs feed per hour for the ST-1. Head feed material must flow onto the ST-1 screen, at a constant even feed rate. An excess of head feed material placed on the table and screen at a given time will cause some gold to discharge into the tailings nugget trap. Head feed material should be fed at the end of the water bar into the pre-treatment feed sluice. Do not allow dry head feed material to form thick solids. The wash water will not wash and dilate the head feed material properly, thus allowing fine gold to wash into the tails.

Feed material should disperse quickly and wash down slope at a steady rate, covering all the riffles at the head end, washing and spilling over into the tails trough. A mechanical or wet slurry pump feeder (75% water slurry) is recommended for providing a good steady flow of feed material. This will relieve the mill operator of a tedious chore of a constantly changing concentrate line when hand feeding.

Eight gallons of water per minute is considered minimum for black sands separation/concentration on the ST-1 shaker table. 15 gallons of water per minute is considered optimum and will change according to feed material size, feed volume and table grade. A 1" inch hose will pass up to 15 gpm, for good recovery, wash water must completely cover the feed material 1/4" or more on the screen.

PVC WATER DISTRIBUTOR

The PVC water distribution bar is pre-drilled with individual water volume outlets, supplying a precision water flow. Water volume adjustment can be accomplished by installing a 1” mechanical PVC ball valve for restricting the flow of water to the water distributing holes. Said valve may be attached between the garden hose attachment and water distributing bar.

More water at the head end and less water at the concentrate end is the general rule for precise water flow. More feed material will occupy the head end of the ST-1 shaker table deck in deep troughs and less material will occupy the concentrate end on the cleaning plane. A normal water flow will completely cover the feed material over the entire table and flow with no water turbulence.

A rubber wave cloth is installed to create a water interface and to smooth out all water turbulence. This cloth is installed with holes. Holes allow water to run underneath and over the top of the cloth and upon exiting will create a water interface smoothing out all the water turbulence. Bottom of water cloth must contact the deck.

Note: A shallow turbulent water flow without the wave cloth or no deflocculant / wetting agent and/or excess table grade will wash the gold further down slope and into the middling.

HORIZONTAL TABLE SLOPE

Avoid excessive slope and shallow turbulent water

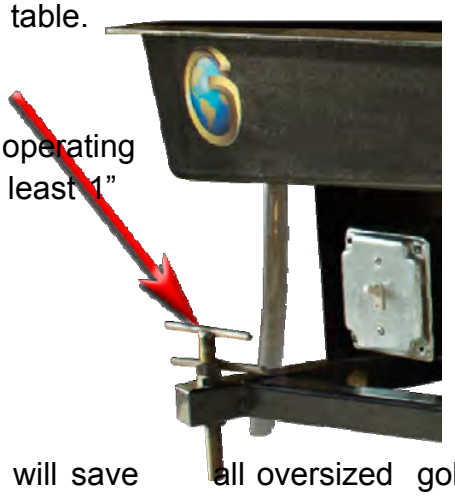
For new installations, all horizontal grade/slope adjustments should be calculated measuring from the concentrate end of the steel frame to the mounting base. For fine gold, the deck should be adjusted almost flat.

PULP FEEDS

All head feed must be fed as a 75% water pulp. Clean classified sand size magnetite will feed without too much problem when fed dry. Ground rod or ball mill feed material 65-minus or smaller must be fed wet, (75% water slurry by weight or more) and evenly at a constant rate, spilling over into the tails drain trough at the head end of the table. Feed material without sufficient water will not dilute quickly and will carry concentrate too far down slope or into the tails. A good wet pulp with a deflocculant and a wetting agent will aid the precious metals to sink and trap within the first riffles, thus moving onto the cleaning plane for film sizing. Round particles of gold will sink instantly and trap within the first riffles. The smaller flat gold particles will be carried further down slope to be trapped in the mid riffles. Potential losses of gold can occur if the table deck is overloaded by force feeding at a faster rate than the smaller flat gold can settle out. Under-feeding will result in the magnetite’s inability to wash out of the riffles, thus leaving a small amount of magnetite concentrated with the gold. A small addition of clean quartz sand added to a black sand concentrate will force the magnetite to the surface and will aid in its removal. Slimes require a separate table operation.

CONTROL OF CONCENTRATE LINE

At some point on the concentrate end of the ST-1 table, separation of middling and concentrate must occur. Small changes in the volume of feed material, wash water, deck slope and other factors will affect and change the concentrate line formed on the cleaning plane, thus requiring attention. A belt feeder for dry or a slurry pump feeder for wet is recommended for large tonnages or commercial operations. Hand feeding is tedious and one cannot feed at a continuous rate, which will cause the concentrate line to change continually. Deck horizontal slope/grade is used for the final control of the concentrate line and for accurate splitting of the concentrate. A slope T handle adjusting screw on the ST-1 shaker table is located at the concentrate end of the table. The entire table assembly rotates, thus eliminating \complicated splitting devices.



Middling will always contain some values and should be re-run if operating at a high volume or the concentrate line was split too close. Save at least 1" of the top concentrate line into the #2 nugget trap on the first run.

ST-1 NUGGET TRAP

A live bed nugget trap is molded into the tailings drain trough and will save all oversized gold that will not pass the submerged deck screen. The nugget trap should be cleaned periodically. When cleaning the nugget trap, the wash water and table deck should continue to operate with the head feed material shut off. This will allow the nugget trap to clean itself of all tails gangue. After the remaining tails material has moved off and out of the nugget trap, stop the water and reciprocating action of the table. The remaining heavy material should be hand washed out of the nugget trap, into a gold pan, and inspected for values. NOTE: Excessive slope, overloading of feed material or no wetting agent during operations, will result in fine gold trapped in the nugget trap. Continued operation of the table with water, during clean-up of the nugget trap without a protective cover of sand in the nugget trap will result in some fine gold being scoured out of the nugget trap. Large gold nuggets will withstand the normal flow of water in the drain trough and will not be scoured out of the nugget trap.

TABLE FLOTATION

Flotation, using the ST-1 shaker table, is almost a lost art. For most operations this method willnever be practiced, but for a few, this method could save the mill operator thousands of dollars. Froth Most minerals respond to the modification of particle surface by atoms, ions or compounds from aqueous phase, thereby aiding selective sorption of collector agents.

Minerals can be made to float or sink. Air bubbles attach themselves to the oil coated mineral to be floated and will form froth at the surface. This froth can be dispersed into the tailings or with the use of pipes and air jets; they can be discharged into the concentrate bins.

Discovery of mineral flotation occurred when miners discovered gold floating on top of the water in their gold pans. Most libraries will carry books explaining the principles of flotation.

CRUSHING

Jaw for primary and cone crusher for secondar crushing. (See Glossary)

Grinding

Conventional grinding must be analyzed using the performance characteristics of the mill for the rock type. Hammer and impact mills are designed for soft materials with no more than 5- **1**0% silica. Rolls should be used for dry soft friable ores. Excessive maintenance and downtime are associated with these mills.

Combinations of rod and ball mills continue to dominate the serious mining operations around the world. Characteristics of a combination rod and ball mill circuit include:
1.High unit power efficiency.
2 Low steel consumption per mt of ore. Depending on ore hardness and other factors steel consumption will range from ½ lbs. -3lbs mt.
3. Low mechanical and process risk.
4. High controllability of plant capacity and product size.
5. Necessity for a three or four stage crushing plant.
6. Necessity for more grinding units than a single stage rod or ball mill circuit.
7. Design availability of 95%. Generally, rod mill ball mill circuits can be justified for use in long life plants because of their low operating cost. Single stage wet rod mills are normally used in minerals processing plants using the ST-1 shaker tables. Advantage of rod mills include the ability to feed larger and harder feed product, low operating costs and close control of size without creating excessive slimes. flotation using air and flotation re-agents have survived

GLOSSARY

AQUEOUS
Made from, with, or by water

BENEFICIATION
The dressing or processing of ores for the purpose of removing unwanted constituents.

CATIONIC REAGENTS
In flotation, surface active substances which have the active constituent in the positive ion. Used to flocculate and to collect minerals that are not flocculated by the reagents, such as oleic acid or soaps, in which the surface active ingredient is the negative ion. Reagents used are chiefly the quaternary ammonium compounds, for example, cetyl trim ethyl ammonium bromide.
the test of time.

CLASSIFICATION
The grading of particles too small to be screened in accordance with they're size, shape, and density by control of their settling rate through a fluid medium, water, slurry, or air.

COLLOID
A substance composed of extremely small particles, ranging from 0.2 micron to 0.005 micron, which when mixed with a liquid will not gravity separate or settle, but remain permanently suspended in solution.

CONCENTRATE
Enriched ore after removal of waste in beneficiation mills. To intensify in strength or to purify by the removal of value-less or unneeded constituents, (gangue)

CRUSHER
A crusher is a machine designed to reduce large rocks into smaller rocks, gravel, or rock dust. Crushers may be used to reduce the size, or change the form, of waste materials so they can be more easily disposed of or recycled, or to reduce the size of a solid mix of raw materials (as in rock ore), so that pieces of different composition can be differentiated. Crushing is the process of transferring a force amplified by mechanical advantage through a material made of molecules that bond together more strongly, and resist deformation more, than those in the material being crushed do. Crushing devices hold material between two parallel or tangent solid surfaces, and apply sufficient force to bring the surfaces together to generate enough energy within the material being crushed so that its molecules separate from (fracturing), or change alignment in relation to (deformation), each other. The earliest crushers were hand-held stones, where the weight of the stone provided a boost to muscle power, used against a stone anvil. Querns and mortars are types of these crushing devices.
See also: MILL – GRINDING (ROD & BALL)

DEFLOCCULANT
A basic alkali material, such as sodium carbonate or sodium silicate, used as an electrolyte to disperse and separate non-metallic or metallic particles. Added to “Slip” to increase fluidity. Used to aid in the beneficiation of ores, to convert into individual very fine particles, creating a state of colloidal suspension in which the individu l particles of gold will separate from clay or other particles. This condition being maintained by the attraction of the particles for the dispersing medium, water, purchase at any chemical house.

DUMP
A pile or heap of waste rock material or other non-ore refuse near a mine. Waste rock that has not been pulverized, washed or otherwise treated for the extraction of values.

ELLIPTICAL POLARIZATION
Manner in which the intensity and direction of an electrical or magnetic field change as a function of time that results from the super position of two alternating fields, (+/-) that differ in direction and in phase.

FIRE ASSAY
The smelting of metallic ores for the recovery of precious metals, requiring a furnace heat. Each milligram of recovered precious metal is gravimetric weighed and reported as one ounce per short ton. Atomic Absorption (AA finish) is the preferred method for replacing the gravimetric weighing system.

FLOCCULATION AGENT
A reagent added to a dispersion of solids in a liquid to bring together the fine particles to form flocs and which thereby promotes settling, especially in clays and soils. For example, lime alters the soil pH and acts as a flocculent in clay soils. Acid reagents and brine are also used as a flocculent.

FLOTATION
The method of mineral separation in which a froth created in water with air and by a variety of reagents floats some finely crushed minerals, whereas other minerals sink. Separate concentrates are made possible by the use of suitable depressors and activators.

GANGUE
(Pronounced Gang) Undesired waste minerals associated with ore.

GRADE or GRADIENT
A gradient, slope, pitch or incline

HEAD MOTION
Vibrator of shaking table which imparts reciprocating motion to the deck.

HEADS
In ore dressing, the feed material to a concentrating system is called heads.

IGNEOUS
Formed by solidification from a molten state. (plutonic)

LIMONITE CRYSTALS
Oxidized sulfides, black/brown in color and non-magnetic, often occurs with magnetite.

MAGNETITE
An igneous oxide of iron, with a specific gravity of 5.2 and having an iron content of 65-70% or more. Limonite crystals, sometimes mistaken for magnetite, occurs with the magnetite and sometimes may contain gold. Vinegar will remove gold locked in limonite coated magnetite.

MAGNETIC FLOCCULATION
Phenomenon which results from residual magnetism of ferromagnetic particles (magnetite) which have bunched together under the influence of their individual polar forces.

METALLIFEROUS
Containing a metallic element. Often used to describe ores that are mined commercially.

MILL – GRINDING (ROD & BALL)
In materials processing a grinder is a machine for producing fine particle size reduction through attrition and compressive forces at the grain size level. See also CRUSHER for mechanisms producing larger particles. Since the grinding process needs generally a lot of energy, an original experimental way to measure the energy used locally during milling with different machines was proposed recently.

Ball Mill

A typical type of fine grinder is the ball mill. A slightly inclined or horizontal rotating cylinder is partially filled with balls, usually stone or metal, which grinds material to the necessary fineness by friction and impact with the tumbling balls. Ball mills normally operate with an approximate ball charge of 30%. Ball mills are characterized by their smaller (comparatively) diameter and longer length, and often have a length 1.5 to 2.5 times the diameter. The feed is at one end of the cylinder and the discharge is at the other. Ball mills are commonly used in the manufacture of Portland cement and finer grinding stages of mineral processing. Industrial ball mills can be as large as 8.5 m (28 ft) in diameter with a 22 MW motor, drawing approximately 0.0011% of the total world's power. However, small versions of ball mills can be found in laboratories where they are used for grinding sample material for quality assurance.

Rod mill

A rotating drum causes friction and attrition between steel rods and ore particles. But note that the term 'rod mill' is also used as a synonym for a slitting mill, which makes rods of iron or other metal. Rod mills are less common than ball mills for grinding minerals.

MILL WATER

The clean water delivered to the table

MICRON

A unit of length, (1 micron= 1/25,000 inch). 25,000 microscopic gold specks to the inch. 400-minus= 36 micron. 500-minus=25 micron depending on wire size.

MICRON GOLD

Gold so small or fine as to be invisible without the use of a high power microscope.

MIDDLING

That part of the product of a concentrating table, or preparation plant which is neither clean gold /mineral nor reject.

PULP

Pulverized ore mixed with water. Its dilution or consistency is specified either as solid to liquid ratio by weight or as a percentage of solids. 75% water to ore for table feed.

REVERSE POLARITY/PARA MAGNETISM

The North Pole of magnetite is repelled 180 degrees by the North Pole of the inducing magnet and the South Pole of magnetite is repelled 180 degrees by the South Pole of the inducing magnet.

REVERSE CLASSIFICATION

Stratification of particles by size, created in water with the action of a shaker table, with smaller size lower and forcing the largest size uppermost.

SCREENING

Screening is the separation of solid materials of different sizes by causing one component to remain on a surface provided with apertures through which the other component passes. Screen size is determined by the number of openings per running inch. Wire size will affect size of openings. -500=500 openings per inch is maximum for gravity operations due to having a solid disperse phase.

SHAKER TABLE
Long established in concentration of sands or finely crushed ores by gravity. Plane, rhombohedra deck is mounted horizontally and can be sloped about its axis by a tilting screw. Deck is molded of ABS plastic, and has longitudinal riffles dying a discharge end to a smooth cleaning area. An eccentric is used to create a gentle forward motion, compounded to full speed and a rapid return motion of table longitudinally. This instant reverse motion moves the sands along, while they are exposed to the sweeping and scouring action of a film of water flowing down slope into a launder trough and concentrates are moved along to be discharged at the opposite end of the deck.

SLIME
A material of extremely fine particle size encountered in ore treatment, containing valuable ore in particles so fine, as to be carried in suspension by water. De-slime in hydro Cyclones before concentrating for maximum recovery of precious metals.

SLIP
Mud, Slime. · a thin, slippery mix of clay and water.

SLURRY
A thin watery suspension of pulverized head ore, required head feed for shaker tables.

SPECIFIC GRAVITY
The weight of a substance compared with the weight of an equal volume of pure water at 4 degrees c.

STRATIFICATION
A structure produced with shaking tables by deposition of feed ores forming beds or layers with the action of water.

SULFIDE
A compound of sulfur with more than one element, sometimes containing gold and silver, (oxidizes to limonite).

SUSPENSOID
A mixture of finely divided, micron/colloidal particles in a liquid. The particles are so small that they do not settle, but are kept in suspension by the motion of molecules of the liquid. Not amendable to gravity separation. (Bureau of Mines)

TABLE FLOTATION
Flotation process practiced on a shaking table. Pulverized ore is de-slimed, conditioned with flotation reagents and fed to table as a slurry. Air is introduced into the water system and floatable particles become glom rules, held together by minute air bubbles and positive charged edge adhesion. Generated froth can be discharged into the tailings launder trough or concentrates.

TRANSVERSE
Literally, across, usually signifying a direction or plane perpendicular to the direction of working concentrates.

TAILINGS
The parts, or a part of any incoherent or fluid material separated as refuse, or separately treated as inferior in quality or value. The gangue or valueless refuse material resulting from the washing, concentration or treatment of pulverized head ore. Tailings from metalliferous mines will appear as sandy soil and will contain no large rock, not to be confused with dumps.

WETTING AGENT
A substance that lowers the surface tension of water and thus enables it to mix more readily with head ore. Foreign substances, such as natural occurring pine oils, vegetation oils and mill grease prevent surface wetting and cause gold to float. Addition agents, such as detergents, (dawn), wetting out is a preliminary step in deflocculating for retarding gold losses.

SPECIFIC GRAVITY AND MELTING POINT OF PRECIOUS METALS

PT-platinum- 21.45/1,773*c

PD-palladium- 12.02/1,550*c

AU-gold- 19.32/1,063*c

AG-silver- 10.50/960*c
When silver is combined with sulfur or chlorides (argentite, cerargyrite, etc.) specific gravity and melting temperature will change.

WEIGHTS
To convert PPM to ounces per ton multiply .0292 x PPM
1 USA (avoirdupois) ounce = 28.35 grams
1 TROY ounce = 20 pennyweights or 480 grains or 31.1035 grams. Troy ounce is used in all assay returns for gold, silver and platinum group metals.
1000 milligrams = 1 gram
Microgram = one millionth of a gram. (ug)

Magnetite ores require additional 15 grams silica and 1-2 additional grams of reducing agent, (flour) *use 40 gram crucibles.

Standard assay flux (*30 grams ore*)

- 30 grams soda ash
- 10 grams borax glass (anhydrous)
- 70 grams reagent grade litharge
- 2 ½ grams flour
- 2 - 6 grams silica

Mix and fire in kiln at 1850º for 45 minutes and pour.

WARRANTY

Keene Engineering warrants that all mining equipment manufactured will be as specified and will be free from defects in material and workmanship for a period of ONE YEAR for the ST-1. Providing that the buyer heeds the cautions listed herein and does not alter, modify or disassemble the product, GMS liability under this warranty shall be limited to the repair or replacement upon return to GMS if found to be defective at any time during the warranty. In no event shall the warranty extend later than the date specified in the warranty from the date of shipment of product by GMS. Repair or replacement, less freight, shall be made by GMS at the factory in Prineville, Oregon, USA.

MAINTENANCE

All bearings are sealed and no grease maintenance is required. Do not use paint thinners, or ketones to clean your deck.

A small amount of grease should be applied to the adjustable T handle which is used for the changing the slope of the deck.

CAUTION

DO NOT ALLOW THE ST-1 TO STAND IN DIRECT SUNLIGHT WITHOUT WATER. ALWAYS KEEP COVERED AND OUT OF THE SUN WHEN NOT IN USE. HEAT MAY CAUSE THE DECK TO WARP.

DO NOT LIFT OR PULL ON THE ABS PLASTIC TOP, ALWAYS LIFT USING THE STEEL FRAME.

DO NOT ATTACH ANYTHING TO THE ABS PLASTIC TOP. DO NOT ATTACH PVC PIPE TO CONCENTRATE DISCHARGE TUBES, CONSTANT VIBRATION FROM THE EXCESS WEIGHT
WILL CAUSE STRESS FAILURE OF THE PLASTIC.

WARNING

DO NOT REACH OR PLACE HANDS UNDER THE MACHINE WHEN IN OPERATION AS SERIOUS INJURY MAY OCCUR DUE TO EXPOSED MOVING PARTS, PULLEYS, BELTS, SPINNING BLADES AND/OR ELECTRICAL TERMINALS MAY CAUSE SHOCK!