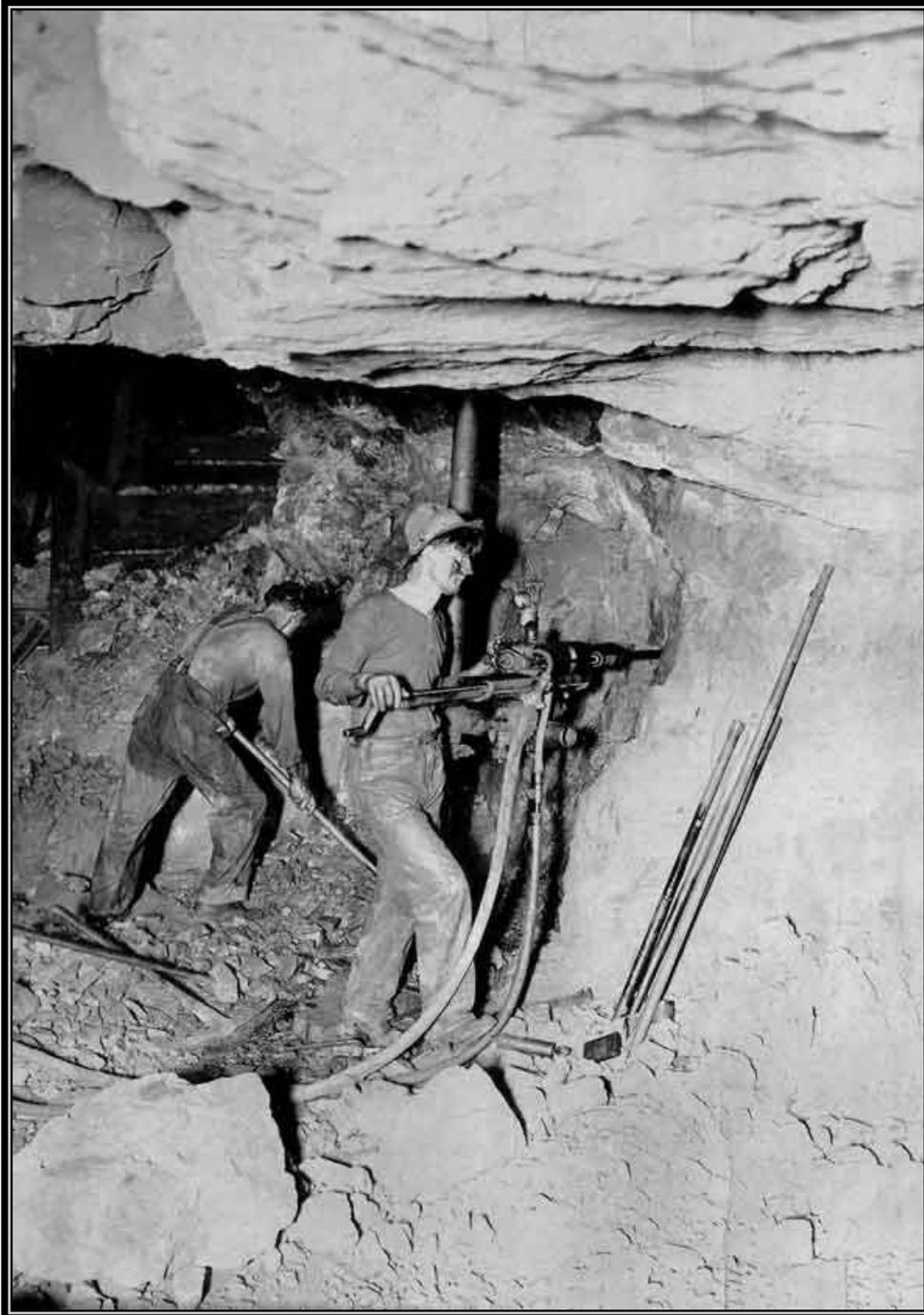


# **A GLOSSARY OF THE MINING AND MINING RELATED TERMS AS USED AT BISBEE, ARIZONA**

**RICHARD W. GRAEME III**

**RICHARD W. GRAEME IV, DOUGLAS L. GRAEME**





**COVER: DRILLING AND MUCKING IN A STOPE IN THE  
JUNCTION MINE 1917.**

**A MACHINE MAN IS RUNNING A DRIFTER STYLE ROCK DRILL ON A  
BAR AND COLUMN SETUP BY THE LIGHT OF A STOPE LAMP.  
LEANING AGAINST THE RIGHT RIB IS A SET OF INTEGRAL DRILL  
STEELS WITH SEVERAL HAND TOOLS NEARBY, INCLUDING THE  
UBIQUITOUS PRINCE ALBERT TOBACCO CAN, NOW FILLED WITH  
GREASE TO LUBRICATE THE MACHINE.**

**NEARBY IS SHOVELER OR MUCKER CLEANING UP THE REMNANTS  
OF THE PREVIOUS BLAST, WHILE BEHIND HIM ARE THE OTHER  
TOOLS HE NEEDED FOR THIS CHORE, A PICK TO LEVEL THE BOTTOM  
AND A DOUBLE JACK TYPE HAMMER TO BREAK OVERSIZED  
BOULDERS.**

**PHOTO: GRAEME LARKIN COLLECTION**

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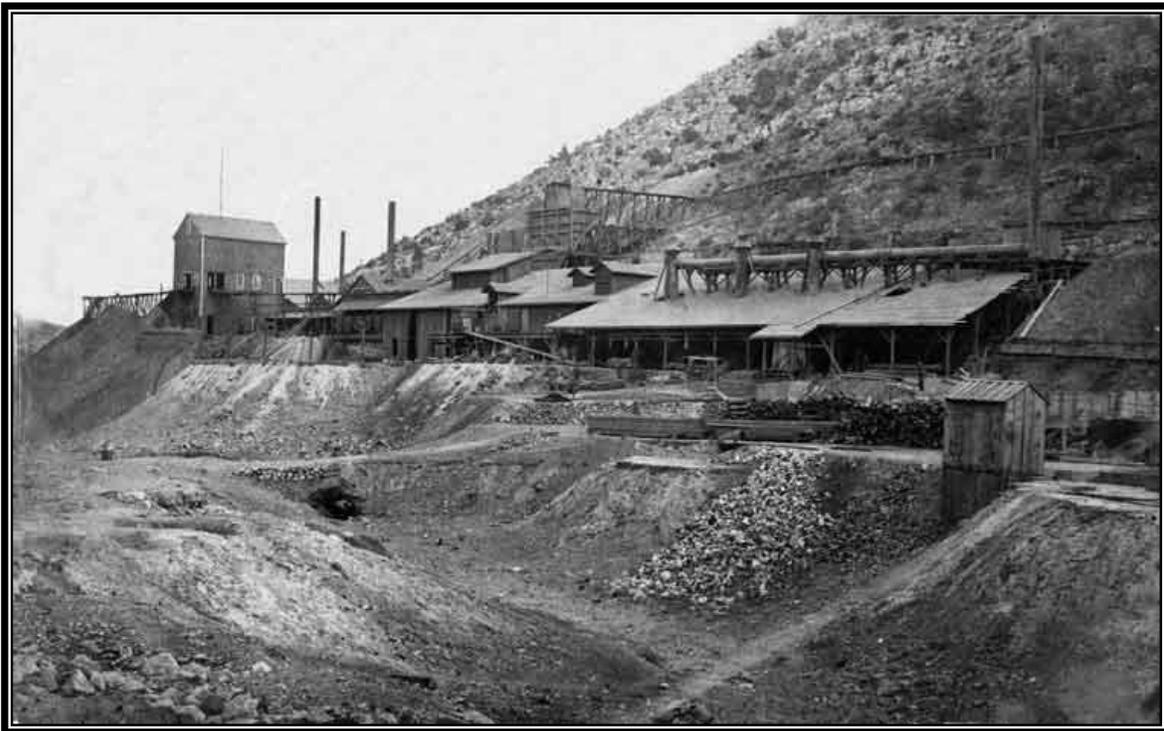
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**PUBLISHED BY COPPER CZAR PUBLISHING**

**P. O. Box 4272**

**BISBEE, ARIZONA 85603**



**Copper Czar Mine and Copper Queen Smelting Works, Bisbee, A.T., 1888**

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**INTERNATIONAL STANDARD BOOK NUMBER 978-1-4507-1499-0**

**PRINTED IN THE UNITED STATES OF AMERICA**

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**FOR INFORMATION:  
COPPER CZAR PUBLISHING  
POST OFFICE BOX 4272  
BISBEE, ARIZONA 85603**

**“WE MINED MORE TONS WITH A SANDWICH AND CUP OF COFFEE IN OUR HANDS AT LUNCH, THAN WE EVER DID WITH A PICK AND SHOVEL IN THE STOPES.”**

**CHARLES KEELER, 1950**

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**\_CHARLES KEELER, MY MATERNAL GRANDFATHER, WORKED AT BISBEE FROM 1883 UNTIL 1945. WITH THE ABOVE COMMENT, HE WAS RECOUNTING SOME OF HIS MINING EXPERIENCES TO ME AND TO HIS TWO SONS, CHARLIE AND DAN, BOTH OF WHOM WERE WORKING AS MINERS, UNDERGROUND IN THE NEARBY, COLE MINE AT THE TIME. IT WAS HE WHO INSTILLED IN ME A LOVE OF BISBEE MINERALS AND INSPIRED ME TO PURSUE A CAREER IN MINING, THUS, FOLLOWING IN HIS HONORABLE, STEADY FOOTSTEPS. A FEW YEARS LATER, I TOO WAS WORKING UNDERGROUND, AS A MINER, IN SOME OF THE SAME MINES HE HAD LABORED. I WAS THE THIRD AND LAST GENERATION OF MY FAMILY TO DO SO AT BISBEE, AS IT CLOSED IN 1975. YET MY OWN SONS, DOUGLAS AND RICHARD BOTH WORKED IN OTHER MINES EARLY IN THEIR CAREERS. THE TRADITION**

## **FORWARD**

EVERY OCCUPATION HAS ITS OWN, OFTEN DISTINCT, TERMINOLOGY AND MINING IS NO EXCEPTION. WHILE MANY OF THE TERMS WERE USED THROUGHOUT THE U. S. MINING INDUSTRY OF THE TIME, THEIR USE AT BISBEE MAY HAVE VARIED, PERHAPS SUBSTANTIALLY, AS IT WAS COMMON FOR WORDS TO EVOLVE IN MEANING AT A LOCALITY TO REFLECT THE ACTUAL APPLICATION.

FOLLOWING IS A GLOSSARY OF THE MINING AND MINING RELATED TERMS AS USED AT BISBEE OVER THE YEARS. IN SOME INSTANCES, SPANISH TERMS HAVE BEEN INCLUDED IN THE ENGLISH SECTION AS THEY WERE AN IMPORTANT PART OF THE VOCABULARY OF THE MINeworkERS, IRRESPECTIVE OF ETHNICITY OR PRIMARY LANGUAGE. A SEPARATE SECTION WITH THE MAJORITY OF THE COMMONLY USED SPANISH TERMS FOLLOWS THE ENGLISH SECTION FOR EASY REFERENCE.

THE SOURCES OF THESE DEFINITIONS ARE VARIED. THE AUTHORS DEFINED MOST WITH THE KIND ASSISTANCE OF OTHERS WHO WORKED IN THE MINES AT BISBEE, MOST NOTABLE THE FORMER MINERS WHO ARE NOW GUIDES AT THE QUEEN MINE TOURS. THE VOLUMINOUS LITERATURE ON MINING AT BISBEE WAS EXTENSIVELY REVIEWED AND HAS SERVED AS A SOURCE OF SOME OF THE TERMS AS WELL AS THEIR DEFINITIONS. THE MORE IMPORTANT OF THE REFERENCES CONSULTED ARE LISTED AT THE END OF THIS DOCUMENT.

HOWEVER, THE MAJORITY OF THE TERMS DEFINED ARE DONE SO USING A MORE OR LESS CONTEMPORARY MEANING, THAT IS, AS THEY WERE TYPICALLY USED AFTER 1915. THIS IS SIMPLY BECAUSE FEW WHO WORKED BEFORE THIS TIME WERE STILL IN THE MINES WHEN I ENTERED THEM AS A MUCKER IN 1960. THUS, THERE IS CLEARLY THE OPPORTUNITY FOR ADDITIONS AND IT IS HOPED THAT OTHERS WITH EXPERIENCE IN BISBEE'S MINES WILL ADD TO THIS EFFORT AND HELP MAKE IT A MORE COMPLETE DOCUMENT.

AS THE READER WILL NOTE, NO EFFORT HAS BEEN MADE TO BE GENDER NEUTRAL IN THESE TERMS, AS THIS WAS A MALE ONLY INDUSTRY UNTIL THE VERY END. THE SOLE EXCEPTION WAS THE GENERAL OFFICE WHERE A FEW WOMEN WERE EMPLOYED AS CLERICAL AND ADMINISTRATIVE STAFF. THERE WERE NEVER ANY FEMALE EMPLOYEES IN ANY OF THE MINES OR AS A PART OF THE TECHNICAL STAFF, EVEN DURING THE DAYS OF WORLD WAR II WHEN WOMEN ENTERED THE WORK FORCE OF OTHER MINES. THIS WAS ABSOLUTELY A FUNCTION OF BOTH THE TEMPER OF THE TIMES AND THE VERY DIFFICULT NATURE OF THE LABOR IN THE MINES AS A WHOLE.

JACK RIDDLE, FORMER UNDERGROUND MINE SUPERINTENDENT AT BISBEE, WAS KIND ENOUGH TO REVIEW THIS WORK AND MAKE IMPORTANT CORRECTIONS AS WELL AS ADDITIONS, ALL OF WHICH GREATLY ENHANCED THE DOCUMENT'S QUALITY AND COMPLETENESS.

## MINING AND MINING RELATED TERMS



**ABRIGO** — A REFERENCE TO THE CAMBRIAN AGE, ABRIGO LIMESTONE ROCK UNIT, WHICH WAS THE LOWEST, PRODUCTIVE UNIT IN THE UNDERGROUND MINES AT BISBEE.

**ACID MINE WATER** — MINE WATER THAT CONTAINS FREE SULFURIC ACID, MAINLY DUE TO THE OXIDATION OF PYRITE AND OTHER ASSOCIATED SULFIDES. THIS WAS VERY CORROSIVE AND DAMAGED OR DESTROYED A GOOD MANY PUMPS, PIPELINES, TRACK AND EQUIPMENT. THIS COMMON AND TROUBLESOME WATER WAS ALSO COMMONLY CALLED “COPPER WATER” AS IT TYPICALLY CONTAINED COPPER OR “ACID WATER” AS IT WAS LOW PH IN NATURE.

**ACCIDENT CALL** — THE EMERGENCY CALL RANG ON THE CALL BELL IN THE CASE OF AN ACCIDENT REQUIRING IMMEDIATE MEDICAL ATTENTION. THE CALL WAS SEVEN BELLS FOLLOWED BY THE NUMBER AND SEQUENCE OF BELLS USED TO DESIGNATE THE LEVEL. THE CAGER WOULD RESPOND IMMEDIATELY TO THIS SIGNAL AND THE CAGE SENT TO THE LEVEL TO STAY WHILE THE GRAVITY OF THE ACCIDENT WAS EVALUATED.

**ADIT** — A HORIZONTAL OR NEARLY HORIZONTAL PASSAGE DRIVEN FROM THE SURFACE FOR THE WORKING OR DEWATERING OF A MINE. IF DRIVEN THROUGH THE HILL OR MOUNTAIN TO THE SURFACE ON THE OPPOSITE SIDE, IT WOULD BE A TUNNEL. THE QUEEN TUNNEL IS ACTUALLY AN ADIT, WHILE THE HIGGINS TUNNEL IS ACTUALLY A TUNNEL AS IT PASSES THROUGH THE HILL AND DAYLIGHTS IN UNCLE SAM GULCH.

**ADVANCE PER ROUND** — THE LENGTH MEASURED ALONG THE LONGITUDINAL AXIS OF THE WORKING, TUNNEL, OR STOPE, OF THE HOLLOW SPACE BROKEN OUT BY EACH ROUND OR BLAST. FOR RAISES, IT IS UPWARD ADVANCE; FOR SUNK SHAFTS OR WINZES, DOWNWARD ADVANCE.

**AERIAL TRAMWAY** — A SYSTEM FOR THE TRANSPORTATION OF MATERIAL, SUCH AS ORE OR ROCK, IN BUCKETS SUSPENDED FROM PULLEYS OR GROOVED WHEELS THAT RUN ON A CABLE, USUALLY STATIONARY. THE SHATTUCK MINE WAS THE ONLY MINE AT BISBEE TO USE A TRAMWAY. ORE WAS TRANSPORTED DOWN IN THE BUCKETS WHILE SUPPLIES AND MATERIALS SUCH AS TIMBER WERE SENT UP. MEN ALSO RODE IN THE BUCKETS TO REACH THE MINE, BUT IT WAS PRACTICE NOT NECESSARILY APPROVED OF BY MANAGEMENT BECAUSE OF THE SAFETY CONCERNS. ALSO, CALLED SIMPLY A TRAMWAY.

**AIR** — ALMOST ALWAYS REFERS TO COMPRESSED AIR, BUT ON OCCASION USED TO REFER TO THE ATMOSPHERE AS IN “BAD AIR.”

**AIR DOOR** — A DOOR ERECTED IN A CROSSCUT TO PREVENT THE PASSAGE OF AIR AND THUS CONTROL VENTILATION. THESE WERE OPENED BY PUSHING AN ARM CONNECTED TO A CABLE, WHICH ACTIVATED A PNEUMATIC CYLINDER. THESE WERE USUALLY BUILT IN PAIRS TO PROVIDE AN AIRLOCK WITH ONLY ONE DOOR TO BE OPEN AT A TIME. THERE WAS SUFFICIENT SPACE BETWEEN DOORS TO ACCOMMODATE A MOTOR AND, USUAL, A NUMBER OF MINE CARS. MANUAL DOORS WERE ALSO COMMONLY USED IN AREAS WHERE MOTORS WERE NOT IN USE SUCH AS HAND TRAMMING AND MULE HAULAGE AS WELL AS AREAS OF THE MINE, WHICH WERE NOT ACTIVE.

**AIR HOIST** — A SMALL PNEUMATIC HOIST USED IN STOPES AND RAISES TO HOIST TOOLS AND SUPPLIES. SEE ALSO TUGGER.

**AIR HOSE** — THE HEAVY DUTY HOSE CONNECTED TO THE AIR LINE THEN TO THE PNEUMATIC EQUIPMENT TO BE USED SUCH AS A SLUSHER, DRILL OR MUCKING MACHINE TO PROVIDE COMPRESSED AIR TO THE EQUIPMENT.

**AIR LINE** — THE STEEL PIPELINE THAT TRANSPORTS COMPRESSED AIR FOR USE BY THE PNEUMATIC EQUIPMENT. BEFORE THE ADVENT OF MECHANICAL VENTILATION, COMPRESSED AIR WAS USED AT MANY WORKING FACE TO COOL THE AREA AS WELL AS TO BRING IN FRESH AIR. THE COMPRESSED AIR PIPELINE TO WORKING AREAS WAS USUALLY A TWO-INCH DIAMETER PIPE TO PROVIDED ADEQUATE VOLUME. THESE WERE HUNG WITH WIRE ALONG CROSSCUT WALLS.

**AIR RECEIVER** — A PRESSURE VESSEL INTO WHICH COMPRESSED AIR IS DISCHARGED, TO BE STORED, UNTIL REQUIRED. THIS STORAGE REPRESENTS SURGE CAPACITY FOR USE DURING TIMES OF HIGH DEMAND, AS MOST WORKING PLACES WOULD BE DRILLING AT MUCH THE SAME TIME.

**AIRLEG MACHINE** — AN EARLY NAME FOR THE JACKLEG ROCK DRILL.

**ALTERATION** — ANY PHYSICAL OR CHEMICAL CHANGE IN A ROCK OR MINERAL SUBSEQUENT TO ITS FORMATION. MILDER AND MORE LOCALIZED THAN METAMORPHISM.

**AMOGEL** — A BRAND NAME FOR ONE OF THE DYNAMITE BASED EXPLOSIVES MARKETED BY THE APACHE POWDER COMPANY AND WIDELY USED AT BISBEE.

**ANFO** — AN EXPLOSIVE MATERIAL CONSISTING OF AMMONIUM NITRATE (AN) AND FUEL OIL (FO). IT IS A BLASTING PRODUCT, WITH APPROX. 94.5% INDUSTRIAL-GRADE AMMONIUM NITRATE AND 5.5% No. 2 GRADE DIESEL FUEL OIL FOR A NEARLY OXYGEN-BALANCED MIX. IT IS AVAILABLE IN BULK FORM FOR ONSITE MIXING OF THE AN AND FO, AS WAS DONE IN THE LAVENDER PIT, OR IN 50 POUND, PREMIXED BAGS AS POURABLE FORMS SUCH AS USED UNDERGROUND AT BISBEE. SEE ALSO CARBAMITE.

**ANFO LOADER** — A COMBINATION OF A SHORT LENGTH OF RUBBER HOSE AND SIX FOOT LONG PLASTIC TUBING JOINED AT ABOUT A 45° ANGLE WITH A SHORT, STAINLESS STEEL VENTURI TUBE, WHICH CONNECTED TO COMPRESSED AIR. THE RUBBER HOSE WOULD BE INSERTED INTO A BAG OF ANFO (CARBAMITE), THE PLASTIC TUBE INTO THE BLASTHOLE AND WHEN THE COMPRESSED AIR WAS TURNED ON, A VACUUM WAS CREATED, SUCKING THE ANFO INTO THE TUBING AND BLOWING IT INTO THE BLASTHOLE. THE MINER SLOWLY WITHDREW THE TUBE AS THE HOLE FILLED WITH ANFO. ALSO CALLED CARBO LOADERS.

**ANFO TRUCK** — THE TRUCK, WHICH CARRIED AMMONIUM NITRATE (AN) AND FUEL OIL (FO) AND MIXED THESE COMPONENTS, IN THE MINE, MAKING THE BLASTING AGENT, ANFO AS THE MATERIAL WAS LOADED DIRECTLY INTO THE BLASTHOLE IN THE LAVENDER PIT BY THE TRUCK AS MIXING TOOK PLACE.

**ANGLE BRACE** — IN HEAVY GROUND, IT WAS NOT UNCOMMON TO PLACE A HEAVY TIMBER DIAGONALLY IN A TIMBER SET, EXTENDING FROM THE TOP OF ONE POST AT THE CAP TO THE BOTTOM OF THE POST OPPOSITE IT IN THE SET. THIS WAS USUALLY A TEMPORARY MEASURE TO KEEP THE SUPPORTED POST OR CAP FROM FAILING BEFORE IT COULD BE REPLACED OR OTHERWISE REINFORCED.

**ANGLE OF REPOSE** — THE MAXIMUM ANGLE FROM HORIZONTAL AT WHICH A GIVEN MATERIAL WILL REST ON THE SURFACE WITHOUT SLIDING OR ROLLING. THE SLOPE OF A MINE DUMP IS AT THE ANGLE OF REPOSE FOR THE MATERIAL CONTAINED.

**ANIMAL TRAMMING** — A GENERIC TERM USED TO DESCRIBE TRAMMING WITH THE USE OF EITHER A MULE OR HORSE. IN BISBEE, ONLY MULES WERE EMPLOYED FOR TRAMMING UNDERGROUND AND THESE WERE FAR MORE EFFICIENT THAN THE EARLIER HAND TRAMMING.

**APEX** — THE TOP OR TERMINAL EDGE OF A VEIN OR A FORMATION CONTAINING AN ORE DEPOSIT, ON SURFACE OR AT ITS NEAREST POINT TO THE SURFACE.

**ARM** — THE HORIZONTAL BAR IN A COLUMN DRILL SETUP, UPON WHICH IS MOUNTED SADDLE, WHICH HOLDS THE ROCK DRILL. ALSO, MOST FREQUENTLY CALLED A BAR.

**ASSAY** — 1). TO ANALYZE THE PROPORTIONS OF METALS IN A SAMPLE. 2). THE TERM “ASSAY” IS ALSO USED TO REFER TO THE CONTAINED METAL OF INTEREST.

**ASSAY OFFICE** — A LABORATORY FOR EXAMINING ORES, USUALLY COPPER, GOLD AND SILVER ORES, IN ORDER TO DETERMINE THEIR ECONOMIC VALUE.

**AUGER** — A HELICAL (SCREWLIKE) TOOL OPERATED BY HAND, FOR DRILLING HOLES IN SOFT MATERIAL FOR BLASTING. MANY OF THE SOFT OXIDE ORES AT BISBEE WERE DRILL USING AN AUGER, AND THEN LIGHTLY BLASTED.

**AZURITE** — A BLUE CARBONATE OF COPPER, WHICH WAS SUFFICIENTLY ABUNDANT AT BISBEE TO BE AN IMPORTANT ORE MINERAL. BECAUSE OF ITS STRIKING BEAUTY AND EXCEPTIONAL QUALITY, IT WAS VERY MUCH COVETED AS A COLLECTOR MINERAL AND THE MINERS AT BISBEE REMOVED MANY THOUSANDS OF FINE AZURITE SPECIMENS, WHICH ARE NOW IN COLLECTIONS WORLDWIDE.

**B. O.** — ACRONYM FOR “BAD ORDER” OR “BLOWN OUT” AND USED TO DENOTE OUT OF ORDER OR MALFUNCTIONING. A DEFECTIVE TOOL OR CAR, ETC., WOULD HAVE “BO” WRITTEN ON IT OR TAGGED WITH A RED TAG AS SUCH, SO THAT IT WOULD NOT BE USED BUT SENT OUT OF THE MINE TO BE REPAIRED. SEE BAD ORDER.

**BACK** — THE CEILING OR UPPER PART OF ANY UNDERGROUND MINING OPENING.

**BACK HOLES** — IN A BLAST ROUND, THE UPPERMOST DRILL HOLES, SET TO BREAK TO DESIRED BACK HEIGHT.

**BACK LAGGING** — THE TWO-INCH THICK WOODEN PLANKS OR LAGGING PLACED ON TOP OF THE TIMBER SETS TO PREVENT THE BACK FROM RAVELING AND DROPPING ROCKS INTO THE WORK AREA.

**BACK POLLING** — RUNNING A TROLLEY MOTOR WITH TROLLEY POLE POINTED IN THE DIRECTION THE MOTOR WAS MOVING. TROLLEY POLES FREQUENTLY JUMPED OFF THE OVERHEAD TROLLEY WIRE AND, IF POINTED IN THE DIRECTION OF MOVEMENT, THEY WOULD BE BROKEN BY IMPACT WITH THE BACK. THUS, BACK POLLING WAS ALLOWED ONLY UNDER SPECIAL CIRCUMSTANCES AND FOR SHORT DISTANCES WITH THE MOTORMAN HOLDING THE SHORT ROPE ON THE POLE TO KEEP IT FROM HITTING THE BACK IF IT JUMPED THE WIRE.

**BACKUP ALARM** — AN AUTOMATICALLY ACTIVATED SAFETY SIGNAL ON HEAVY EQUIPMENT TO INDICATE THAT IT WAS MOVING IN REVERSE TO WARN ANYONE BEHIND AS OPERATOR VISIBILITY WAS OFTEN LIMITED.

**BACKLASH SCREEN** — HEAVY WIRE SCREENING SECURED TO THE SLUSHER STAND, IN FRONT OF THE SLUSHER AND BETWEEN THE RAKE TO PROTECT THE OPERATOR FROM A BROKEN CABLE SNAPPING BACK. ALSO CALLED A SAFETY SCREEN.

**BAD AIR** — OXYGEN DEFICIENT ATMOSPHERE, A NOT UNCOMMON OCCURRENCE IN THE ABANDONED WORKINGS AT BISBEE. IT WAS CAUSED BY THE ROTTING OF TIMBER AND OXIDATION OF SULFIDE MINERALS, BOTH OF WHICH CONSUME OXYGEN. CANDLES WERE COMMONLY USED WHEN ENTERING OLD WORKINGS AS THEY WOULD GO OUT WHEN THE OXYGEN CONTENT BECAME LOW, BUT BEFORE IT BECAME LIFE THREATENING. SEE ALSO DAMP.

**BAD ORDER** — OUT OF ORDER, MALFUNCTIONING, IN NEED OF REPAIR. ITEMS IN NEED OF REPAIR WERE MARKED “BO” (BAD ORDER) WITH A RED TAG. A DESCRIPTION OF THE PROBLEM AND THE WORKING PLACE WERE NOTED ON THE TAG AS WELL. SEE ALSO B.O.

**BAIL** — 1). DEWATERING BY USING A SKIP TO HOIST WATER TO THE SURFACE. THIS WAS NECESSARY ONLY ONCE, IN 1940 WHEN BOTH THE CAMPBELL AND JUNCTION MINES WERE FLOODED ALMOST TO THE 2433 LEVEL BY WATER HIT ON THE 2700 LEVEL CAMPBELL. MOST OF A YEAR OF BAILING AND PUMPING WAS NEEDED TO RECOVER THE FLOODED PORTIONS OF THESE MINES. 2). THE HEAVY STEEL HANDLE ON A SINKING BUCKET BY WHICH IT IS HOISTED.

**BALANCED HOISTING** — ARRANGEMENT OF CAGES OR SKIPS IN MINE SHAFT IN WHICH THE HOIST DRUM RAISES ONE AND AT THE SAME TIME LOWERS THE OTHER, THUS REDUCING POWER CONSUMPTION BECAUSE OF THE GRAVITY PULL ON THE DESCENDING UNIT.

**BALD HEADED** — WHEN A RAISE IS BEING DRIVEN IN GOOD GROUND AND NO SUPPORTING TIMBER IS NEEDED OR USED, IT WAS REFERRED TO AS A “BALD HEADED” RAISE.

**BALL MILL** — A STEEL CYLINDER FILLED WITH STEEL BALLS INTO WHICH CRUSHED ORE IS FED. THE BALL MILL IS ROTATED, CAUSING THE BALLS TO CASCADE AND GRIND THE ORE. IT WAS A PART OF THE MINERAL PROCESSING EQUIPMENT IN BOTH OF THE CONCENTRATORS AT BISBEE. THE DISCHARGE FROM THE BALL MILL WAS FINELY GROUND MATERIAL, WHICH WAS PUMPED TO THE FLOTATION CELLS FOR ORE MINERAL RECOVERY.

**BANK** — THE 50-FOOT HIGH ROCK FACE LEFT FOLLOWING MINING BY A POWER SHOVEL IN THE LAVENDER PIT.

**BANK SHOT** — A MULTI-HOLE BLAST OF A 50-FOOT HIGH BENCH IN THE LAVENDER PIT. A TYPICAL BANK SHOT WOULD BREAK THOUSANDS OF TONS OF MATERIAL AT TIME AND WERE SET OFF DAILY AT ABOUT 3:15 PM. ALSO CALLED PRIMARY BLAST.

**BAR** — 1). A HEAVY, HEXAGONAL STEEL ROD WITH EITHER POINTED OR FLATTENED ENDS USED AS A PRY OR AS A TOOL BY MINERS TO DISLodge LOOSE ROCK IN BACK OR RIBS OF AN UNDERGROUND WORKPLACE. DURING THE 1950s, ALUMINUM BARS FITTED WITH STEEL POINTS WERE INTRODUCED AND WIDELY USED. SEE ALSO SCALING BAR AND PINCH BAR. 2). ALSO, THE ADJUSTABLE, HORIZONTAL STEEL TUBE WHICH ATTACHES TO A VERTICAL COLUMN AND ON WHICH THE SADDLE IS MOUNTED TO HOLD A ROCK DRILL IN A “BAR AND COLUMN” DRILL SETUP. ALSO CALLED AN ARM.

**BARING DOWN** — PRYING OF LOOSE ROCK WITH A BAR AFTER BLASTING TO PREVENT THE DANGER OF FALL OF GROUND.

**BARREN** — ROCK OR AN AREA NOT CONTAINING ANY ORE MINERALS AND THEREFORE OF NO ECONOMIC VALUE.

**BARREN SOLUTIONS** — THE SOLUTIONS EXITING THE PRECIPITATION PLANT AFTER THE COPPER HAS BEEN RECOVERED. GENERALLY, THESE SOLUTIONS WERE RETURNED TO THE LEACH DUMPS AND REUSED.

**BASE METAL** — ANY NON-PRECIOUS METAL, SUCH AS COPPER, LEAD OR ZINC.

**BASKET** — A WIRE MESH, PIPE FRAME STRETCHER USED TO TRANSPORT INJURED MEN FROM A WORKING PLACE WAS CALLED A BASKET. THE INJURED PERSON WAS SECURELY STRAPPED INTO THE BASKET AND COULD BE RAISED OR LOWERED FROM A WORKING PLACE. THESE WERE CARRIED BY EITHER TWO OR FOUR MEN.

**BAT WING SET** — WHEN A CROSSCUT IS TURNED OFF ANOTHER CROSSCUT AND TIMBERED WITH STANDARD DRIFT SETS, THE CAPS IN THE FIRST SET IN THE NEW CROSSCUT ARE PLACED IN THE SHAPE OF AN OPEN V IN RELATION TO THE EXISTING CAPS. THE REMAINDER OF THE SETS ARE NORMAL, EXCEPT FOR ACCOMMODATING FOR THE CURVE RADIUS.

**BATTERING RAM** — A PIECE OF 8" X 8" TIMBER, ABOUT 10 FEET LONG HUNG BY A ROPE TO A DRIFT SET CAP, SO THAT THE MINER CAN SWING IT BACK AND FORWARD AND STRIKE THE END OF A SPILING IN ORDER TO FORCE IT FORWARD. A SHORT JACK-BAR IS SOMETIMES USED INSTEAD OF THE TIMBER.

**BATTERY STATION** — BATTERY POWERED LOCOMOTIVES OBVIOUSLY REQUIRED THE RECHARGING OF THEIR MASSIVE LEAD-ACID BATTERIES. THERE WERE TWO TYPES OF THESE MOTORS, THE SMALL, MANCHA MOTOR AND A MUCH LARGER, EIGHT-TON UNIT, BUT THE STATIONS FOR EACH WERE FUNDAMENTALLY THE SAME. EACH STATION HAD TWO TRACKS WITH A SWITCH TO ACCESS EITHER AND ONE SIDE HELD A CHARGED BATTERY IN ITS STEEL HOUSING. THE MOTOR WOULD ENTER THE EMPTY TRACK WITH THE BATTERY PINS REMOVED SO THE STEEL BATTERY BOX COULD BE LEFT ON A STEEL SUPPORT STRUCTURE. A PLUG WITH AN EXTENSION CABLE THEN ALLOWED THE BATTERY-LESS MOTOR TO BACK OUT OF THIS TRACK, SWITCH TO THE OTHER TRACK, DRIVE UNDER THE OTHER, CHARGED BATTERY, CONNECT TO IT, AND BE GOOD TO GO. THE MOTOR SWAMPER WOULD THEN CONNECT THE DEPLETED BATTERY TO THE CHARGER.

**BEAN HOLE RAISE** — ON OCCASION, IT WAS ADVANTAGEOUS TO DRIVE A VERY SMALL RAISE (TYPICALLY 3' X 3' AND RAW) FROM A STOPE TO ANOTHER OPENING SUCH AS TO A LEVEL ABOVE FOR VENTILATION AND/OR FOR THE INTRODUCTION OF GOB. THESE WERE CUSTOMARILY SHORT RAISES OF 25 FEET OR LESS IN LENGTH AND STRIPPED OF THE LADDERS AND LANDINGS FOLLOWING COMPLETION.

**BEARING TIMBER** — THE LARGE BEAM IN A SHAFT SET, WHICH IS USED AT THE POINT WHERE A STATION IS CUT AND IS PARALLEL TO THE END PLATES IN A SHAFT SET. THE TOP OF THE BEARING TIMBER IS SET EVEN WITH THE FLOOR (TRACK) OF THE STATION AND EXTENDS SEVERAL FEET INTO THE STATION FOR ADDED SUPPORT.

**BEDDING** — THE ARRANGEMENT OF A SEDIMENTARY ROCK IN BEDS OR LAYERS OF VARYING THICKNESS AND CHARACTER.

**BELL CHART** — THESE WERE ALSO REFERRED TO AS SIGNAL CHARTS, BUT ESSENTIALLY WERE A LIST OF ALL OF THE BELL OR SIGNAL COMBINATIONS, AS CODIFIED BY THE STATE OF ARIZONA. EVERY LEVEL WAS LISTED AS WELL AS THE OTHER SIGNALS USED INCLUDING THE CALLING OF A CAGE TO A GIVEN LEVEL, BLASTING IN A SHAFT, ACCIDENTS, OPENING OF AIR VALVES AND THE MOVEMENT OF THE CAGE IN THE SHAFT. BY STATUTE, A COPY WAS POSTED ON EVERY LEVEL, ON THE SURFACE NEAR THE SHAFT AND IN THE HOIST HOUSE IN CLEAR VIEW OF THE HOIST ENGINEER.

**BELLS** — A GONG USED AS A SIGNAL AT MINE SHAFTS TO COMMUNICATE BETWEEN THE CAGERS AND THE HOISTING ENGINEER. AT BISBEE THERE WERE SHAFT BELLS USED TO CONTROL THE CAGE MOVEMENT AND CALL BELL USED TO ADVISE THE CAGER OF THE NEED FOR A CAGE AT A GIVEN LEVEL IN THE MINE OR AT THE SURFACE. EACH OF THE BELLS HAD A DIFFERENT TONE, ALLOWING THE HOISTMAN TO KNOW WHICH HAD RUNG.

**BELLY BOARD** — MORE FREQUENTLY REFERRED TO AS LOADING BOARD (SEE WHICH), BUT AS IT SERVED TO PROTECT THE BELLY OF THE INDIVIDUAL LOADING CARS AT A CHUTE BEFORE ELEVATED LOADING STANDS WERE BROUGHT INTO COMMON USE IN THE LATE 1920s.

**BELT** — THIS INVARIABLY MEANT A CONVEYOR BELT.

**BENCH** — A LEDGE THAT, IN AN OPEN PIT MINE FORMS A SINGLE LEVEL OF OPERATION ABOVE WHICH MINERALS OR WASTE MATERIALS ARE EXCAVATED FROM A CONTIGUOUS BANK OR BENCH FACE. THE MINERAL OR WASTE IS REMOVED IN SUCCESSIVE LAYERS, EACH OF WHICH IS A BENCH, SEVERAL OF WHICH MAY BE IN OPERATION SIMULTANEOUSLY IN DIFFERENT PARTS OF, AND AT DIFFERENT ELEVATIONS IN, THE OPEN PIT MINE. BENCHES IN THE TWO PITS AT BISBEE WERE DESIGNATED BY THEIR ELEVATION ABOVE MEAN SEA LEVEL. BY WAY OF EXAMPLE, THE TOP BENCH WORKED IN THE SACRAMENTO PIT WAS THE 5540 BENCH, AT AN ELEVATION OF ABOUT 5540 FEET. BENCHES IN THE LAVENDER PIT WERE 50 FEET HIGH, WHILE THOSE IN THE SAC PIT STARTED AT 60 FEET IN HEIGHT, BUT FOR SAFETY REASONS, WERE REDUCED TO 30 FEET.

**BENCH TRACK** — THE PANELS OF RAIL SET ON THE OPEN PIT BENCHES IN COMPLETED SECTIONS. THESE WERE TEMPORARY IN NATURE AND USUALLY NOT PERFECTLY LEVEL OR BALLASTED. THIS TRACK WAS CONTINUALLY MOVED TO GIVE THE STEAM SHOVEL ACCESS TO THE BROKEN ROCK AND TO HAVE THE RAILCARS CLOSE TO THE SHOVEL.

**BENCHMARK** — A KNOW POINT FOR SURVEY WORK, WHICH IS WELL LOCATED IN TERMS OF NORTHING, AND EASTING COORDINATES AS WELL AS ELEVATION. THE POINT IS USED TO SURVEY IN BLASTHOLES AND BENCH PROGRESS AS WELL AS TO LAYOUT ROADS, AND THE LIKE.

**BERM** — A CONTINUOUS PILE OR MOUND OF MATERIAL PLACED ALONG THE EDGE OF A ROADWAY OR DUMP CAPABLE OF RESTRAINING THE LARGEST VEHICLE THAT WOULD USE THIS ROADWAY IN THE EVENT CONTROL WAS LOST AND THE VEHICLE WENT OFF THE ROAD. THIS WAS TO PREVENT A HAUL TRUCK, FOR EXAMPLE, FROM GOING OFF THE ROAD AND DROPPING DOWN A BENCH OR TO PRECLUDE BACKING OFF A DUMP. THESE SIMPLE BERMS PREVENTED MANY ACCIDENTS IN THE LAVENDER PIT OPERATION.

**BIRD'S NEST** — A NAME GIVEN TO A TYPE OF POST-MINING CALCITE OR ARAGONITE FORMED BY DRIPPING, CALCIUM CARBONATE RICH WATER. THE CALCITE OR ARAGONITE FORMED A FLAT PLATE WITH RAISED EDGES. A DEEPER CENTER DEPRESSION DEVELOPED WHERE THE WATER DRIPS IMPACTED THE FLOOR. THE DEPRESSION CONTAINED ROUNDED CALCITE OR ARAGONITE PEBBLES, KEPT IN MOVEMENT BY THE DRIPPING WATER. THESE PEBBLES IN THE CENTER DEPRESSION WERE CALCITE OR ARAGONITE COATED SMALL ROCK FRAGMENTS AND RESEMBLED EGGS.

**BISBEE IMPROVEMENT COMPANY** — A UTILITIES COMPANY ESTABLISHED AND OWNED BY THE COPPER QUEEN, WHICH WAS INSTRUMENTAL IN BRINGING A SECURE SUPPLY OF POTABLE WATER TO BISBEE FROM THE WELL FIELDS NEAR NACO. THIS COMPANY ALSO BUILT THE FIRST, LARGE ICE PLANT, WHICH SOLD AND DELIVERED ICE TO THE RESIDENCES AND BUSINESS, ESSENTIAL FOR FOOD PRESERVATION. THIS COMPANY ALSO PROVIDED DEPENDABLE NATURAL GAS SERVICES AS WELL AS EARLY TELEPHONE SERVICES. THE SERVICES DEVELOPED AND DELIVERED BY THIS COMPANY WERE IMPORTANT TO THE HEALTH AND DEVELOPMENT OF BISBEE FOR ALL OF ITS CITIZENS.

**BIT** — (DETACHABLE, DIAMOND, INTEGRAL, KNOCKOFF, SCREW-ON OR TRI-CONE) ANY DEVICE THAT MAY BE ATTACHED TO, OR IS, AN INTEGRAL PART OF A DRILL STEEL OR DRILL ROD STRING AND IS USED AS A CUTTING TOOL TO BORE INTO OR PENETRATE ROCK OR OTHER MATERIALS BY UTILIZING POWER APPLIED TO THE BIT PERCUSSIVELY OR THROUGH ROTATION WITH PRESSURE APPLIED.

**BIT BOX** — WHEN SCREW ON, DETACHABLE DRILL BITS WERE INTRODUCED UNDERGROUND IN 1940, THEY WERE SHARPENED AND TEMPERED IN THE BLACKSMITH SHOP. A TYPICAL WORK PLACE MIGHT NEED 20 BITS PER SHIFT; SOME, IN HARD GROUND, COULD USE 50 IN A SHIFT, SIMPLY TO DRILL A ROUND. BIT BOXES WERE MADE IN THE TIN SHOP OF 16-GAGE MATERIAL WITH A CANVAS STRAP TO CARRY THE BITS TO THE WORKING PLACE AND EVEN CLIMB WITH THE BOX OVER THE SHOULDER. EACH BOX COULD HOLD ABOUT 32 BITS. THE BITS WERE TO BE RETURNED, WHEN USED, IN THE SAME BOX FOR RE-SHARPENING, TEMPERING AND THEN, BROUGHT BACK TO THE MINE. THESE WERE FREQUENTLY CALLED BIT CARRIERS.

**BIT HAMMER** — IN THE LATE 1960S, A CHANGE WAS MADE FROM SCREW ON DETACHABLE DRILL BITS TO CARBIDE STEEL INSERT BITS, WHICH FIT ONTO TAPERED DRILL STEEL. TO SECURE THESE TO THE STEEL, A SOFT FACE, IRON HAMMER WAS USED SO AS NOT TO DAMAGE THE BIT. THIS SAME HAMMER WAS OFTEN USED TO REMOVE THE BIT. THESE BITS WERE ONE USE, DISPOSABLE TYPES AND WERE NOT SAVED AND RESHARPENED, AS HAD BEEN TRUE BEFORE.

**BIT KNOCKER** — A GROOVED PIECE OF STEEL WITH A SOFT IRON HAMMER FACE AND A HANDLE ATTACHED. IT IS PLACED ON A DRILL STEEL WITH THE DRILL STEEL INSIDE THE GROVE, NEXT TO THE RIM OF THE KNOCK OFF BIT. IT IS THEN HIT WITH A BIT HAMMER, DOUBLE JACK OR AN AXE, KNOCKING OFF THE BIT FREE FROM THE DRILL STEEL.

**BIT RACK** — A SMALL PIECE OF USED CONVEYER BELTING WITH USUALLY A DOZEN SCREW MOUNTS FOR DRILL BITS ATTACHED. THE BITS WERE SCREWED ONTO THE MOUNTS AND TRANSPORTED. THIS WAS USED IN AN UNSUCCESSFUL ATTEMPT TO REPLACE THE BIT BOXES.

**BIT WRENCH** — A TOOL DESIGNED SPECIFICALLY FOR REMOVING THE SCREW-ON BITS FROM THE END OF A DRILL STEEL.

**BLACK COPPER** — BLACK COPPER WAS THE TERM USED TO DESCRIBE COPPER, WHICH WAS SMELTED IN FURNACES LIKE THOSE AT EARLY BISBEE WHERE THE ORE WAS SHOVELED IN TO THE FURNACE WITH COKE IN A RATIO OF EIGHT PARTS ORE TO ONE PART COKE. THE BARS TYPICALLY WERE +95% COPPER AND LARGELY FREE OF ANY DELETERIOUS IMPURITIES, BUT BLACK IN COLOR. BY 1983, BLISTER COPPER REPLACED BLACK COPPER AS THE SMELTER PRODUCT.

**BLACKSMITH SHOP** — THE MINE BLACKSMITHS AT BISBEE MADE AND REPAIRED MANY OF THE ITEMS COMMONLY USED IN THE MINE. UNDOUBTEDLY, THOUGH, THE DRILLING RELATED ITEMS WERE THE MOST IMPORTANT OF THESE. THEY MADE HAND DRILL STEELS FROM STOCK MATERIALS, RE-SHARPENED, AND RE-TEMPERED THEM AS NEEDED. LATER IT WAS THE CONVENTIONAL DRILL STEEL, WHICH WAS MADE FROM STOCK AND, HERE TOO, RE-SHARPENED

AS NECESSARY. LATER, THE DETACHABLE BITS WERE SHARPENED AND TEMPERED AS WELL. PICKS RE-SHARPENED, CANDLESTICKS MADE, CHUTE HINGES AND MINE CAR PARTS FABRICATED FROM STEEL STOCK, THESE WERE BUT A FEW OF THE MANY SERVICES PROVIDED.

**BLADE** — 1). THE BUSINESS END OF A BULLDOZER WAS REFERRED TO AS THE BLADE. THIS MASSIVE STEEL ATTACHMENT TO THE DOZER FRAME WAS OFTEN ADJUSTABLE TO ONE SIDE OR THE OTHER TO FACILITATE PLACING MATERIAL WHERE NEEDED. 2). A TERM USED TO REFER TO A ROAD GRADER.

**BLAST** — THE IGNITION OF HEAVY EXPLOSIVE CHARGES IN A NUMBER OF CLOSELY SPACED HOLES TO BREAK LARGE AMOUNTS OF ROCK FOR MINING IN THE OPEN PIT. IT WAS SIMILARLY USED UNDERGROUND TO DENOTE THE BREAKING OF ROCK AT THE WORKING FACE.

**BLASTER** — THE INDIVIDUAL WHO FIRED THE BLAST IN BOTH THE SACRAMENTO AND LAVENDER PITS AFTER RECEIVING THE ALL-CLEAR SIGNAL.

**BLASTHOLE** — A DRILL HOLE IN A MINE THAT IS, OR IS TO BE, FILLED WITH EXPLOSIVES IN ORDER TO BLAST LOOSE A QUANTITY OF ROCK FOR MINING.

**BLASTING AGENT** — ANY MATERIAL CONSISTING OF A MIXTURE OF A FUEL AND AN OXIDIZER, SUCH AS AMMONIUM NITRATE. SEE ALSO ANFO.

**BLASTING BASKET** — FOUR, OVAL, WIRE HOOPS WELDED TOGETHER WITH TWO AT RIGHT ANGLES TO WHICH STICKS OF DYNAMITE WERE TIED, THEN WIRED ON THE END OF A BLASTING STICK AND USED TO BLAST HUNG CHUTES. THE BLASTING BASKET PREVENTED THE POWDER FROM ACTUALLY CONTACTING THE CHUTE LINING TIMBER, AS THE RISK OF BLASTING OUT THE CHUTE LINING WAS VERY REAL.

**BLASTING BULKHEAD** — IN RAISE MINING, A STOUT, INCLINED BULKHEAD WAS CONSTRUCTED OVER THE MANWAY COMPARTMENT SIDE OF THE RAISE BEFORE EACH BLAST, SO THAT WHEN THE RAISE WAS BLASTED, THE BROKEN MUCK WOULD FLOW INTO THE CHUTE SIDE. AFTER THE RAISE HAD BEEN PULLED A BIT, THE RAISE CREW WOULD OPEN A HOLE IN THE BULKHEAD FOR BARRING DOWN. THEN WHEN SAFE, ENTER THE RAISE AND TAKE THE BULKHEAD OUT COMPLETELY. THESE WERE ALSO SIMPLY REFERRED AS BULKHEADS.

**BLASTING CAP** — A DETONATOR CONTAINING AN IGNITION EXPLOSIVE MIXTURE, A PRIMARY INITIATING CHARGE, AND A HIGH-EXPLOSIVE BASE CHARGE, ENCAPSULATED IN AN ALUMINUM OR COPPER SHELL. CAPS ARE INITIATED EITHER ELECTRICALLY OR NON-ELECTRICALLY SUCH AS BY FIRE FUSE.

**BLASTING MACHINE** — A PORTABLE DYNAMO THAT GENERATES ENOUGH ELECTRIC CURRENT TO DETONATE ELECTRIC BLASTING CAPS WHEN THE MACHINE RACK BAR OR HANDLE IS GIVEN A QUICK, DOWNWARD PUSH. THESE WERE NOT WIDELY USED AT BISBEE.

**BLASTING OUT TIMBER** — IF TIMBER IS NOT VERY WELL BLOCKED IN, A BLAST COULD KNOCK IT OUT, EITHER PARTIALLY OR COMPLETELY, FORCING REPAIR OR REPLACEMENT. THIS WAS MOST COMMON IN BAD GROUND, WHERE IT WAS NECESSARY TO KEEP SUPPORT TIMBER CLOSEST TO THE WORKING FACE, WHERE THE BLAST WAS FIRED. FURTHER COMPLICATING MATTERS, GOOD, TIGHT BLOCKING IN BAD GROUND IS DIFFICULT.

**BLASTING STICK** — THESE WERE WOODEN STICKS 1 1/2" SQUARE BY EIGHT FEET LONG, AND USED TO BLAST DOWN HUNG CHUTES. THIS WAS ACCOMPLISHED BY ATTACHING A WIRE LOOP, BASKET TO THE STICK END WITH A STICK OR TWO OF POWDER, AND, THEN, PUSHING THE

STICK INTO THE CHUTE TO THE POINT OF BLOCKAGE. ON OCCASION, SEVERAL STICKS WOULD BE WIRED TOGETHER TO REACH HIGHER, A RISKY, BUT NOT ALTOGETHER UNCOMMON PRACTICE AS THE LONGEST FUSE WAS ONLY 10 FEET IN LENGTH AND WAS LIT BEFORE THE SEVERAL STICKS COULD BE WIRED TOGETHER. LITTLE TIME, WOULD THEN, REMAIN BEFORE THE BLAST WOULD GO OFF, IF MORE THAN TWO STICKS WERE TIED TOGETHER.

**BLASTING TIMBER** — WHEN SINKING A SHAFT, THE BOTTOM SHAFT SET OF TIMBER MUST BE PROTECTED FROM THE FLY ROCK FROM THE BLAST IN THE SHAFT BOTTOM. A TIMBER OF EQUAL DIMENSION (BLASTING TIMBER) WAS CHAINED OR TIED UNDER THE WALL PLATES, END PLATES AND CENTER DIVIDERS TO ABSORB THE IMPACT OF THE ROCKS THROWN BY THE BLAST JUST A FEW FEET AWAY. THESE WERE TEMPORARY IN NATURE AND REMOVED FOLLOWING THE BLAST TO ALLOW FOR THE INSTALLATION OF THE SHAFT SETS.

**BLOCK** — 1). A SHORT PIECE OF TIMBER PLACED BETWEEN THE MINE BACK OR RIB AND THE TIMBER SET. A WEDGE DRIVEN BETWEEN THE ROCK AND THE BLOCK HOLDS THE SET SECURELY IN PLACE. 2). ALSO A PULLEY AS USED IN A SLUSHER SETUP. 3). A DIVISION OF A MINE LEVEL FOR MOTOR HAULAGE WITH ACCESS CONTROLLED BY A SYSTEM OF RED OR GREEN LIGHTS, WHICH ARE CHANGED BY THE MOTOR CREW AS THEY ENTER OR LEAVE THE AREA (BLOCK).

**BLOCK CAVING** — A GENERAL TERM THAT REFERS TO A MASS MINING SYSTEM WHERE THE EXTRACTION OF THE ORE DEPENDS LARGELY ON THE ACTION OF GRAVITY. BY REMOVING A THIN HORIZONTAL LAYER AT THE MINING LEVEL OF THE ORE COLUMN, USING STANDARD MINING METHODS, THE VERTICAL SUPPORT OF THE ORE COLUMN ABOVE IS REMOVED AND THE ORE THEN CAVES BY GRAVITY. AS BROKEN ORE IS REMOVED FROM THE MINING LEVEL OF THE ORE COLUMN, THE ORE ABOVE CONTINUES TO BREAK AND CAVE BY GRAVITY. THE TERM "BLOCK CAVING" ORIGINATED IN THE PORPHYRY COPPER MINES, WHERE THE AREA TO BE MINED WAS DIVIDED INTO RECTANGULAR BLOCKS THAT WERE MINED IN A CHECKERBOARD SEQUENCE WITH ALL THE ORE IN A BLOCK BEING REMOVED BEFORE AN ADJACENT BLOCK WAS MINED. THIS TECHNIQUE WAS ATTEMPTED, WITH LIMITED SUCCESS, AT BISBEE FOR EXPLOITATION OF THE EAST OREBODY PORTION OF THE SACRAMENTO STOCK COMPLEX DURING THE LATE 1920S AND THE EARLY 1930S.

**BLOCK LIGHT** — THE TROLLEY MOTOR TRAFFIC CONTROL LIGHT AT THE ENTRANCE TO A BLOCK. THESE CONTAINED RED AND GREEN LENSES. WHEN A MOTOR ENTERED THE BLOCK ON A GREEN LIGHT, THE MOTORMAN PULLED THE FIRST CORD IN LINE TO CHANGE THE BLOCK LIGHTS ON THE ENTERED BLOCK TO RED. ON LEAVING, HE WOULD PULL THE FIRST CORD, WHICH WOULD TURN ALL OF THE LIGHTS FOR THE BLOCK TO GREEN. EARLY BLOCK LIGHTS WERE IN METAL CONTAINERS PERFORATED WITH THE WORD "TROLLEY," WHICH WHEN LIT, INDICATED A MOTOR IN THE BLOCK, BUT FUNCTIONED IN AN IDENTICAL MANNER.

**BOLSA** — A REFERENCE TO THE CAMBRIAN AGE, BOLAS QUARTZITE ROCK UNIT, WHICH UNDER LAYS THE ABRIGO LIMESTONE, LOWEST PRODUCTIVE UNIT AT BISBEE. WHILE LOCALLY MINERALIZED WITH PYRITE, THE BOLSA NEVER CONTAINED ECONOMIC QUANTITIES OF ORE.

**BLOW OUT** — IN OPEN PIT BLASTING, A BLASTHOLE TOO CLOSE TO THE BENCH EDGE OR WITH TOO LITTLE BURDEN IN FRONT OF IT, HAD THE POTENTIAL FOR MUCH OF THE EXPLOSIVE FORCE TO BLOW OUT THROUGH THE WEAK OR UNDER BURDENED SIDE, INSTEAD OF BEING EVENLY DISSIPATED THROUGH THE ROCK, AS INTENDED.

**BLOWER** — THE SMALL VENTILATION FANS USED FOR STOPES AND RAISES WERE THUS LABELED BY THE UNDERGROUND WORKERS IN BISBEE.

**BLOWER STAND** — THE TIMBER STAND ON WHICH THE SMALL VENTILATION FAN WAS MOUNTED.

**BLOWPIPE** — BLOWPIPES WERE USED TO FREE STICKY MUCK IN A CHUTE. THEY WERE MADE OF HALF-INCH PIPE AND ABOUT 6 FEET IN LENGTH WITH A 90° BEND AND A VALVE AT THE END WHERE IT CONNECTED TO AN AIR HOSE. THE IDEA WAS TO STICK THE PIPE IN AS FAR AS POSSIBLE, TURN THE AIR ON AND CONTINUE TO PROD WITH THE FORCE OF THE COMPRESSED AIR UNTIL THE MUCK RELEASED. THESE WORKED REASONABLY WELL, BUT WERE NOISY AND THE OPERATOR (MOTOR SWAMPER) WOULD BE COVERED WITH MUD FROM THE BLOWBACK.

**BLUE CARD** — IF AN EMPLOYEE WAS INJURED ON THE JOB, HE WAS TO REPORT THE INJURY TO HIS BOSS WHO WOULD GIVE HIM A FORM PRINTED ON HEAVY BLUE PAPER STOCK (THUS THE NAME) TO PRESENT TO THE PHYSICIAN AT THE HOSPITAL WHEN REPORTING FOR TREATMENT. THE INJURED PERSON WAS NOT PERMITTED TO RETURN TO WORK WITHOUT RECEIVING A RELEASE FROM THE ATTENDING PHYSICIAN.

**BLUE VITRIOL** — THE MINERAL CHALCANTHITE, A HYDRATED COPPER SULFATE, OFTEN FORMED AS POST-MINING, BRIGHT BLUE CRUST AND STALACTITES IN HIGH SULFIDE AREAS AS THE COPPER SULFIDES OXIDIZED. MANY SPECIMENS OF “BLUE VITRIOL” WERE COLLECTED BY THE MINERS, ONLY TO HAVE THEM TURN TO A WHITE POWDER AFTER A FEW WEEKS IN THE DRY SURFACE AIR, AS THE WATER OF HYDRATION WAS LOST.

**BOILER SHOP** — IT WAS IN THE BOILER SHOP WHERE MOST ITEMS MADE OF STEEL PLATE, “I” BEAMS AND ANGLE IRONS WERE CONSTRUCTED. ALL OF THE MINE CARS WERE MADE HERE, STARTING WITH THE 3/8 PLATE WHICH WAS CUT TO SIZE, HOLES PUNCHED AND THE WHOLE ASSEMBLY RIVETED TOGETHER ON ROLLED ANGLE IRON AND SET ON A FRAME MADE OF I BEAMS WITH WHEELS, PAINTED BLACK AND SENT UNDERGROUND. CHUTE DOORS AND LINERS, HAUL TRUCK BED LINERS AND THE LOT, ALL CAME FROM THIS SHOP. REPAIR OF MOST THINGS STEEL TOOK PLACE HERE AS WELL. ALL WELDING RELATED TASK AND PROJECTS WERE ALSO HANDLED BY THE BOILER SHOP CREWS.

**BOMB** — TO USE EXPLOSIVES TO DROP A HUNG CHUTE IS TO BOMB THE CHUTE.

**BONNET** — A PITCHED COVERING OVER A MINE CAGE, WHICH SERVES AS A ROOF TO SHIELD IT FROM OBJECTS FALLING DOWN THE SHAFT, THEREBY PROTECTING THOSE ON BOARD. IT WAS MADE OF TWO PIECES OF STEEL, WHICH OVERLAPPED AND COULD BE OPENED TO ALLOW FOR VERY LONG ITEMS TO BE PLACED ON THE CAGE VERTICALLY, THAT WOULD OTHERWISE NOT FIT. ANYTHING TOO LONG FOR THIS WOULD BE SLUNG UNDER THE CAGE TO BE RAISED OR LOWERED.

**BONUS** — MANY MINERS WORKED ON “CONTRACT” WHEREBY THEY WERE PAID A BONUS ABOVE THE BASE WAGE AND BASED ON THEIR FOOTAGE ADVANCE IN HEADINGS OR TONS PRODUCED IN STOPES. MOTOR CREWS WERE PAID A “HAULAGE BONUS” BASED ON THE AGGREGATED TONS HAULED BY ALL OF THE MOTOR CREWS AT A GIVEN MINE. TO ALL MINERWORKERS, THE TERM “BONUS” MEANT THIS ADDITIONAL PAY. THE BEST MINERS TYPICALLY MADE A GOOD DEAL OF BONUS, OFTEN MORE THAN THE ALREADY GOOD BASE PAY. A FEW WOULD EVEN DOUBLE OR TRIPLE THEIR WAGE ON A REGULAR BASIS. BISBEE’S MINERS WERE PAID WELL, VERY WELL, BUT THEY EARNED IT ALL THROUGH HARD, SUSTAINED WORK.

**BONUS ENGINEER** — CONDITIONS OR STANDARDS FOR PERFORMANCE (ADVANCE, OUTPUT) FOR A WORKING PLACE WERE DETERMINED BY AN INDIVIDUAL FROM THE ENGINEERING DEPARTMENT “THE BONUS ENGINEER.” THEN THE ADVANCE IN CROSSCUTS AND RAISES WAS MEASURED ON A FORTNIGHTLY BASIS ON “MEASURING DAY” BY THIS PERSON. HE WOULD CONFIRM THE AMOUNT OF ADVANCE, THE PROPER ALIGNMENT OF THE ADVANCE, PLACEMENT OF SUPPORT SYSTEMS AS WELL AS ALSO CALCULATE THE BONUS DUE FOR THE WORK PERFORMED. ALSO CALLED CONTRACT ENGINEER.

**BONUS HOUND** — A TERM USED TO REFER TO A MINER WHOSE EVERY MOVEMENT, AND EVERY ACTION WAS FOCUSED ON INCREASING THE AMOUNT OF BONUS HE WOULD EARN. MANY OF THESE MEN WERE VERY GOOD MINERS AND WELL REGARDED, WHILE OTHERS WERE INCONSIDERATE OF OTHERS WHEN ASSURING THAT THEY WERE FIRST IN RECEIVING ANY SERVICE OR SUPPLIES. THUS, THE TERM WAS USED IN BOTH POSITIVE AND NEGATIVE WAYS WHEN DESCRIBING A MINER.

**BONUS MINER** — WHILE MOST MINERS WORKED ON A CONTRACT BASIS, A SELECT FEW WERE CALLED “BONUS MINER” RECOGNIZING THEIR EXCELLENCE AND THE FACT THEY TYPICALLY MADE A GOOD DEAL OF MONEY. IT WAS NOT UNCOMMON FOR A GOOD BONUS MINER TO MAKE SUBSTANTIALLY MORE THAN HIS BOSS, WHILE A GREAT BONUS MINER COULD KNOCK DOWN MORE THAN THE GENERAL MANAGER. THIS DID NOT REALLY BOTHER THE BOSSES, AS THEY FULLY UNDERSTOOD THE SKILL, EFFORT AND DEDICATION INVOLVED ON THE PART OF THESE FEW SUPERSTAR MINERS.

**BOOM** — 1). UNDERGROUND, A BOOM IS A LONG TIMBER STRINGER (BEAM) WHICH IS PLACED IN A HANGER AND CANTILEVERED ON EXISTING SETS AND WITH CAPS AND LAGGING PLACED ON TOP, TO PROVIDE TEMPORARY SUPPORT UNDER WHICH WORK CAN SAFELY BE PERFORMED. THEY WERE PLACED IN PARALLEL PAIRS AND PUSHED AHEAD OF ESTABLISHED SETS (BOOMED OUT), TO THE NEWLY BLASTED GROUND. 2). ON THE UNDERGROUND DRILL JUMBOS, THE BOOM WAS THE VERTICALLY AND HORIZONTALLY ADJUSTABLE ARM ON WHICH THE DRILL WAS MOUNTED. 3). IN A REVOLVING ELECTRIC SHOVEL, AN INCLINED STEEL BEAM HINGED TO THE DECK FRONT AND SUPPORTED BY HEAVY CABLES, TIED TO THE REAR STRUCTURE OF THE SHOVEL HOUSING. THE STICKS ARE MOUNTED ON PINION GEARS ON THE SHOVEL BOOM.

**BOOM CABLES** — THE THICK WIRE ROPE CABLES THAT HELD THE ELECTRIC SHOVEL BOOM IN PLACE.

**BOOM HANGERS** — HEAVY STEEL BRACKETS HUNG FROM A TIMBER CAP TO HOLD THE BOOM.

**BOOM OUT** — PUSHING BOOM TIMBERS AHEAD, TOWARD THE NEWLY BLASTED FACE. LAGGING IS PLACED ON THE CAPS SET ON THE BOOMS TO PROVIDE A SAFE PLACE TO WORK, BY PROTECTING THE MINERS FROM ANY ROCK THAT MIGHT FALL FROM THE BACK. POST WERE SET UNDER THE CAPS WHEN THE BOOMS WERE FULLY EXTENDED AND THE BOOMS REMOVED FOR REUSE.

**BOOSTER** — AN EXPLOSIVE OF SPECIAL CHARACTER USED IN SMALL QUANTITIES TO IMPROVE THE PERFORMANCE OF ANOTHER EXPLOSIVE, THE LATTER FORMING THE MAJOR PORTION OF THE CHARGE. TNT BOOSTERS WERE COMMONLY USED IN THE LARGE DIAMETER BLASTHOLES IN THE LAVENDER PIT TO SET OFF THE ANFO CHARGE.

**BOOTLEG** — A SHORT REMNANT OF A DRILLED BLASTHOLE THAT REMAINS WHEN THE FORCE OF THE EXPLOSION DOES NOT BREAK THE ROCK COMPLETELY TO THE BOTTOM OF THE HOLE. THESE WERE COMMON AND RANGED FROM JUST A DIMPLE IN THE ROCK TO SEVERAL INCHES, OR MORE DEEP. THESE WERE ALWAYS CONSIDERED A HAZARD, AS ON OCCASION, THEY CONTAINED UNEXPLODED POWDER (SEE DIRTY BOOTLEG). BOOTLEGS WERE ALWAYS TO BE INSPECTED, AND CLEANED IF NECESSARY, OR REBLASTED IF SUBSTANTIAL POWDER REMAINED. IT WAS ABSOLUTELY AGAINST THE RULES TO DRILL IN ONE AS A QUICK WAY TO COLLAR A HOLE, EVEN IF CLEANED OUT. MORE THAN A FEW MINERS WERE KILLED OR BADLY INJURED DRILLING IN A BOOTLEG WHEN THE REMAINING POWDER EXPLODED UNDER THE FORCE OF THE DRILLING.

**BORAS** — THE BORAS MINE.

**BORNITE** — A COMMON, HIGH-GRADE ORE MINERAL FREQUENTLY CALLED “PEACOCK” COPPER AS AN ALLUSION TO ITS COLORFUL, IRIDESCENT APPEARANCE AFTER EXPOSURE TO THE ATMOSPHERE FOR A SHORT PERIOD. IT IS A COPPER (63.31%)/IRON (11.13%)/SULFIDE (25.56%), WHEN PURE, WHICH WAS RARE EXCEPT IN SMALL PIECES.

**BOSSES’ BIKE** — AS THE MINES EXPANDED, THE AREA A SHIFT BOSS NEEDED TO COVER GREW TO THE POINT IN THE MID-1960s, THAT IT WAS PHYSICALLY IMPOSSIBLE TO WALK THE GREAT DISTANCES BETWEEN WORKING PLACES. IN THESE INSTANCES, FOUR WHEELED BIKES WERE MADE FOR THE BOSS TO PEDDLE ALONG THE MINE RAIL. THEY WERE OF LIGHT STEEL TUBING WITH ALUMINUM WHEELS, SO THEY COULD EASILY BE MOVED OFF THE RAIL WHEN A MOTOR CAME BY. THESE HANDY DEVICES WERE FOR THE SOLE USE OF THE SHIFT BOSS ON THAT RUN AND WOE BE IT TO ANY OTHER PERSON PRETENTIOUS ENOUGH TO USE IT WITHOUT EXPLICIT PERMISSION.

**BOULDER HOOK** — A STEEL BAR WITH A HANDLE AT ONE END AND A “J” HOOK ON THE OTHER END AND USED ON THE GRIZZLIES TO LIFT AND MOVE BOULDERS AROUND, POSITIONING THEM TO GO THROUGH THE GRIZZLIES. A DIFFICULT TASK, BUT FAR PREFERABLE TO BREAKING THEM WITH A DOUBLE JACK, THE ONLY OTHER OPTION.

**BRASS** — THE BRASS, TIME CHECK STAMPED WITH THE INDIVIDUAL’S PAYROLL NUMBER USED TO INDICATE WHEN THE MAN HAS REPORTED TO WORK OR HAS COME OUT OF THE MINE. THESE WERE KEPT IN THE TIMEKEEPER’S OFFICE ON A LARGE BOARD FOR EASY REFERENCE. IF THE BRASS WAS ON THE BOARD, THE MAN HAD NOT REPORTED FOR WORK. IF THE BRASS WAS NOT ON THE BOARD, IT WAS ASSUMED THE MAN WAS AT WORK AND UNDERGROUND. A SIMPLE WAY TO KEEP TRACK OF THE MEN’S WHEREABOUTS. SHIFT BOSSES ALWAYS LOOKED AT THE BOARD BEFORE GOING OUT TO THE SHAFT COLLAR TO SEE THEIR MEN, AS ONE GLANCE WOULD TELL HIM IF ALL HIS CREWS HAD REPORTED FOR WORK.

**BRASSING IN** — RETURNING THE BRASS CHECK TO THE TIMEKEEPER AT THE END OF THE SHIFT, TO INDICATE THAT ONE WAS OUT OF THE MINE. FAILURE TO DO SO CAUSED CONCERN, AS IT WOULD BE ASSUMED THE MINER MIGHT WELL BE UNDERGROUND UNTIL OTHERWISE CONFIRMED. FIRST, THE CHANGE ROOM WAS CHECKED TO SEE IF HIS DIGGERS OR STREET CLOTHES WERE HANGING ABOVE HIS ASSIGNED LOCKER. WERE IT HIS DIGGERS HANGING THERE, ALL WOULD BE RELIEVED, MAD AS HELL, BUT RELIVED. IF THE STREET CLOTHES WERE AT HIS LOCKER, A SEARCH WOULD BE UNDERTAKEN UNTIL THE MAN WAS LOCATED.

**BRASSING OUT** — THE COLLECTING OF THE BRASS CHECK FROM THE TIMEKEEPER, EFFECTIVELY REPORTING FOR WORK.

**BRATTICE** — VENTILATING PARTITION, USUALLY OF CANVAS OR A COATED FABRIC AND USED TO DIRECT AIR TO VARIOUS FACES OR TO PREVENT IT FROM ENTERING OTHERS. TEMPORARY BRATTICES ARE OFTEN MADE OF CLOTH. AIR MOVEMENT IN FIRE AREAS WAS OFTEN CONTROLLED BY TEMPORARY BRATTICES. THE IDEA WAS TO KEEP THE TOXIC, FIRE GASSES OUT OF THE MINE AIRFLOW BY SECURELY BLOCKING THE OPENING WITH A TEMPORARY BRATTICE.

**BRATTICE CLOTH** — FIRE-RESISTANT FABRIC, USUALLY COATED, AND USED TO ERECT A BRATTICE ON A TIMBER FRAME.

**BREAK OUT** — 1). MINING OUT, THROUGH TO THE SURFACE. 2). THE ACCIDENTAL LOSS OF MOLTEN MATERIAL FROM A SMELTING FURNACE THROUGH A HOLE.

**BREAK ROCK** — THE BREAKING AND LOOSENING OF ROCK AS A PREPARATORY STEP TO ITS LOADING AND REMOVAL.

**BREAK THROUGH** — WHEN TWO UNDERGROUND OPENINGS ARE CONNECTED, SUCH AS WHEN A RAISE BEING DRIVEN BETWEEN LEVELS, INTERSECTS THE TARGETED CROSSCUT ABOVE. THIS WAS NOT ALWAYS A SIMPLE MATTER, AS EVEN A SMALL BUST IN THE SURVEY COULD RESULT IN A RAISE BEING MANY FEET AWAY FROM THE INTENDED POINT. THEN THE GAME OF FINDING WHERE THE RAISE BEGAN. POUNDING ON ROCK, DRILLING, EVEN BLASTING WERE USED TO HELP LOCATE THE RAISE POSITION RELATIVE TO THE CROSSCUT. SEE ALSO HOLE THROUGH

**BREAKER** — 1). STOPE GRIZZLIES WERE ORIGINALLY CALLED “BREAKERS” AS THIS IS WHERE OVERSIZED BOULDERS WERE BROKEN BEFORE ENTERING THE CHUTE. 2). AN ELECTRICAL CIRCUIT BREAKER, USUALLY REFERRING TO THE TROLLEY BREAKER. ALSO A TERM OCCASIONALLY USED FOR A CRUSHER.

**BREAST** — A WORKING FACE IN A MINE USUALLY RESTRICTED TO A STOPE.

**BREAST BOARD** — PLANKING PLACED BETWEEN THE LAST SET OF TIMBERS AND THE FACE OF A HEADING, WHICH IS IN LOOSE GROUND. THE TIMBER OR BOARDS PLACED HORIZONTALLY ACROSS THE FACE OF A HEADING ARE TO PREVENT THE INFLOW OF LOOSE OR FLOWING MATERIAL.

**BREAST HOLES** — BLASTHOLES DRILLED AT ABOUT BREAST HEIGHT AND USED TO BREAK THE CENTER PORTION OF THE ROUND AFTER THE BURN CUT IS FIRED.

**BRECCIA** — A COARSE-GRAINED CLASTIC ROCK COMPOSED OF ANGULAR BROKEN ROCK FRAGMENTS HELD TOGETHER BY MINERAL CEMENT OR IN A FINE-GRAINED MATRIX; INTRUSIVE BRECCIAS, SUCH AS WERE COMMON AT BISBEE, WERE COMPOSED OF BOTH ANGULAR AND ROUNDED FRAGMENTS, INCLUDING SULFIDE PIECES. THE SACRAMENTO COMPLEX BRECCIATED THE SURROUNDING LIMESTONES DURING INTRUSION AND CREATED INTRUSION BRECCIAS, OFTEN CALLED THE CONTACT BRECCIA, AS IT WAS AT THE STOCK/LIMESTONE INTERFACE. THIS INTRUSION BRECCIA AREA WAS THE SOURCE OF IMPORTANT AMOUNTS OF ORE. SILICA BRECCIAS WERE ABUNDANT IN THE SOUTHWEST/SHATTUCK MINE AREAS AND WERE A SOURCE OF MUCH OF THE ORE MINED IN THESE AREAS.

**BRIDGE** — 1). THE ACT OF PLACING TIMBER ACROSS AN OPEN HOLE OR SPACE. 2). ALSO, TWIN PIECES OF LAGGING SET ON BLOCKS ON TOP OF THE CAP TO SUPPORT THE BACK LAGGING.

**BRIGGS** — 1). THE BRIGGS MINE OF THE C. & A. 2). IN REFERENCE TO THE CLUSTER OF COMPANY HOMES CONSTRUCTED BY PHELPS DODGE IN THE VERY EARLY 1950S NEAR AND PARTIALLY OVER THE SITE OF THE BRIGGS MINE.

**BRING DOWN A CHUTE** — TO CAUSE THE MATERIAL IN A HUNG CHUTE TO DROP.

**BROW** — THE POINT AT WHICH A VERTICAL OPENING MEETS A HORIZONTAL OPENING SUCH AS A RAISE DRIVEN FROM A STOPE. THE BROW IS THE POINT WHERE THE BACK GOES FROM HORIZONTAL TO VERTICAL.

**BURLEY** — THE TRADE NAME OF AN EARLY DRIFTER TYPE ROCK DRILL. THESE WERE HEAVY MACHINE WHEN COMPARED TO LEYNERS AND WERE NO LONGER IN USE BY 1920.

**BURNED GROUND** — BURNED GROUND RESULTED FROM SULFIDE MINE FIRES, WHICH WERE ALL TO COMMON IN MANY OF THE UNDERGROUND MINES AT BISBEE. THE HIGH SULFIDE

ROCK ACTUALLY BURNED, SOMETIMES FOR MANY YEARS. AS MANY OF THE FIRES OCCURRED IN ORE, ATTEMPTS WERE OFTEN MADE TO MINE THE MATERIAL, ONCE THE FIRE WAS EXTINGUISHED. THIS WAS A CHALLENGING AND COMPLICATED EFFORT AS THE ROCK REMAINED VERY HOT FOR SOME TIME. BY WAY OF EXAMPLE, DRILLING DRY WAS ALMOST ALWAYS NECESSARY, AS THE ROCK TEMPERATURE WAS OFTEN WELL ABOVE THE BOILING POINT FOR WATER, THUS DRILL WATER TURNED TO STEAM INSTANTLY, MAKING A DIFFICULT ENVIRONMENT EVEN MORE CHALLENGING, AS VISIBILITY WAS REDUCED TO A DANGEROUS POINT.

**BRUNTON COMPASS** — A COMMON TOOL USED BY UNDERGROUND ENGINEERS AND GEOLOGIST WHICH WAS A COMPACT POCKET INSTRUMENT THAT CONSISTS OF AN ORDINARY COMPASS, FOLDING OPEN SIGHTS, A MIRROR, AND A RECTANGULAR SPIRIT-LEVEL CLINOMETER, WHICH CAN BE USED IN THE HAND OR ON A STAFF OR LIGHT ROD FOR READING HORIZONTAL AND VERTICAL ANGLES, FOR LEVELING, AND FOR READING THE MAGNETIC BEARING OF A LINE. IT IS USED IN SKETCHING MINE WORKINGS, AND IN PRELIMINARY TOPOGRAPHIC AND GEOLOGIC SURVEYS ON THE SURFACE, E.G., IN DETERMINING ELEVATIONS, STRATIGRAPHIC THICKNESS AS WELL AS STRIKE AND DIP.

**BRUNTON AND TAPE MAPPING** — THE TYPICAL MANNER USED BY BOTH THE STOPE ENGINEERS AND GEOLOGIST TO MAP FEATURES AND AS WELL AS STOPED AREAS UNDERGROUND. THE BRUNTON GAVE COMPASS DIRECTIONS AS WELL AS INCLINATION AND THE TAPE THE DISTANCE FROM A KNOWN, SURVEYED POINT.

**BUCKET** — 1). THE DIPPER OF AN ELECTRIC SHOVEL IN THE PIT WAS REFERRED TO AS SUCH. IT WAS MOUNTED ON THE END OF THE STICKS. 2). THE LOADING DIPPER OF A MUCKING MACHINE WAS ALSO CALLED A BUCKET.

**BUCKING** — A HAND PROCESS WHEREBY THE CRUSHED SAMPLE IS FURTHER GROUND TO A FINE POWDER WITH A BUCKING HAMMER, PRIOR TO ASSAY. THIS HAND PROCEDURE WAS MECHANIZED BY 1950 AT BISBEE.

**BULK MINING** — ANY LARGE-SCALE, MECHANIZED METHOD OF MINING INVOLVING MANY THOUSANDS OF TONS OF ORE BEING MOVED PER DAY, SUCH AS THE TWO OPEN PIT MINES AT BISBEE.

**BULKHEAD** — 1). IN RAISES, AN INCLINED COVER FOR THE MANWAY SIDE MADE OF HEAVY TIMBER AND INTENDED TO CHANNEL THE BLASTED MUCK INTO THE CHUTE COMPARTMENT. 2). IN SHAFTS, A HEAVY TIMBER COVERING ABOVE THE SINKING CREW TO PROTECT THEM FROM ITEMS FALLING DOWN THE SHAFT. 3). ALSO, A STONE, STEEL, WOOD, OR CONCRETE WALL-LIKE STRUCTURE PRIMARILY DESIGNED TO HOLD BACK LOOSE OF SOFT MATERIAL OR WATER PRESSURE, SUCH AS A RETAINING WALL HOLDING BACK THE GROUND, OR A PARTITION PREVENTING WATER FROM ENTERING A WORKING AREA IN A MINE.

**BULL GANG** — THE BULL GANG WAS CHARGED WITH THE TRANSPORT, HANDLING AND EMBLACEMENT OF LARGE AND HEAVY ITEMS. THE LOWERING OF TROLLEY MOTORS OF BIG PUMPS INTO THE MINE OR LARGE AIR RECEIVER TANKS AND THE INSTILLATION OF LARGE BORE PIPE IN SHAFTS, SUCH AS PUMP COLUMNS. IF IT WAS HEAVY AND NEEDED SPECIAL RIGGING, OR IF IT WAS IN A DIFFICULT PLACE TO WORK, LIKE A SHAFT, IT WAS THE BULL GANG'S JOB.

**BULL HOSE** — A LARGE DIAMETER, THICK WALLED HOSE, OFTEN USED ON THE SUCTION SIDE OF A PORTABLE PUMP.

**BUMP BLOCK** — A 4" X 6" BOARD PLACED 3½ FEET ABOVE THE TRACK AT THE POINT END-DUMP CARS WERE TO BE DUMPED. THE DUMPING OF THE SMALL, END-DUMP CARS CAUSED THE CAR TO TILT SUCH THAT IF A RESTRAINING FEATURE SUCH AS THIS WERE NOT IN PLACE, THEY WOULD FALL INTO THE RAISE INTO WHICH THEY WERE BEING DUMPED.

**BUMPER BOARD** — A REMOVABLE, THREE INCH THICK PIECE OF LAGGING JUST ABOVE AND A BIT INSIDE ON A VERDE CHUTE TO KEEP MATERIAL FROM OVERFLOWING THE CHUTE DOOR WHILE ALLOWING FOR BETTER ACCESS WHEN THE CHUTE WOULD HANG AND A BLOW PIPE OR BAR NEEDED TO BE INSERTED.

**BURDEN** — 1). THE THICKNESS OF THE ROCK TO BE BLASTED. IN OPEN PIT BLASTING, IT WILL INCLUDE THE AMOUNT OF MATERIAL ALREADY BLASTED AND BROKEN WHICH REMAINS IN FRONT OF THE NEW BLAST. 2). ALSO, THE OTHER COSTS ON TOP OF STRAIGHT WAGES FOR AN EMPLOYEE SUCH AS HEALTH CARE, INSURANCE, HOUSING, RETIREMENT CONTRIBUTIONS AND THE LIKE.

**BURLAPING** — THE SECURING OF BURLAP MATERIAL ON THE INSIDE OF AREAS TO BE SAND FILLED. ALL OPENINGS LEADING OUTSIDE OF THE AREA TO BE GOBBED WERE CAREFULLY COVERED TO PREVENT THE SAND SLURRY FROM ESCAPING. THE COURSE WEAVE HEAVY FIBER OF THE BURLAP ALLOWED FOR THE FREE PASSAGE OF WATER, BUT CONFINED THE SAND DURING THE DRAINING AND DRYING PROCESS FOLLOWING SAND FILLING.

**BURN** — THE CLOSELY SPACED FIVE-HOLE GROUPING IN A SQUARE PATTERN WITH A CENTER HOLE IN THE SQUARE. ONLY THE CENTER HOLE IS LOADED WITH POWDER AND WAS FIRED FIRST, BREAKING TO THE SPACE CREATED BY THE FOUR EMPTY (DUMMY) HOLES. THIS IS A PART OF A LARGER BLASTHOLE PATTERN, TO WHICH THE SUBSEQUENT HOLES BROKE WHEN FIRED.

**BURN CUT** — A DRILL HOLE PATTERN IN WHICH THERE ARE FOUR HOLES ARE DRILLED IN A CENTER OF THE PATTERN IN A CLOSELY SPACED SQUARE WITH A FIFTH HOLE DRILLED IN THE CENTER OF THE FOUR. OF THESE FIVE HOLES, ONLY THE CENTER HOLE IS LOADED WITH EXPLOSIVES AND IS SHOT FIRST, CREATING THE VOID FOR THE OTHER HOLES TO BREAK TO WHEN THEY FIRE IN THE SEQUENCE DESIRED.

**BURNED GROUND** — AN AREA THAT HAS SUFFERED A MINE FIRE. THIS WAS PARTICULARLY APPLIED TO AREAS WHERE THE SULFIDE MINERALS HAD THEMSELVES BURNED, WHICH WAS COMMON AT BISBEE. THE RESULTANT GROUND WAS ALMOST ALWAYS STILL VERY HOT AND QUITE UNSTABLE, AS THE FIRE HAD DESTROYED THE COMPETENCY OF THE ROCK, USUALLY CAUSING IT TO COLLAPSE. MINING BURNED GROUND WAS A DIFFICULT TASK FOR THESE AND OTHER REASONS, BUT SOMETHING ATTEMPTED WHENEVER POSSIBLE. ALSO CALLED FIRE COUNTRY.

**BURNING RATE** — THE RATE WITH WHICH FIRE FUSE BURNS AS MEASURED IN FEET BURNED PER MINUTE. AT BISBEE, THE BURNING RATE WAS 1½ FEET PER MINUTE. THUS, A NINE-FOOT FUSE WOULD DETONATE THE PRIMER SIX MINUTES AFTER IGNITED.

**BUST** — THIS ALWAYS REFERRED TO A SURVEY BUST OR AN ERROR IN SURVEYING. THESE WERE TROUBLESOME EVEN DANGEROUS PROBLEMS, BUT FORTUNATELY RARE. IT WAS VITAL TO KNOW THE POSITION OF A MINE WORKING RELATIVE TO ANY OTHER OPENING, AS A BLAST TOO CLOSE TO ANOTHER WORKING COULD PLACE THE CREW IN THE OTHER WORKING AT RISK, IF NOT ADVISED. IN ADDITION, AS IT WAS COMMON TO CONNECT WORKINGS FOR VENTILATION OR ACCESS, KNOWING THE EXACT LOCATION OF THE BEGINNING AND END POINTS WAS VITAL OR THE DESIRED CONNECTION MAY NOT BE EASILY MADE.

**BUTT-ENDED** — WHEN THE END OF A PIECE OF TIMBER IS PLACED IN TIGHT CONTACT WITH ANOTHER PIECE OF TIMBER AT RIGHT ANGLES, IT IS SAID TO BE BUTT-ENDED.

**BYPRODUCT** — A SECONDARY METAL OR MINERAL PRODUCT RECOVERED IN ONE OF THE RECOVERY PROCESSES SUCH AS SMELTING OR ELECTROLYTIC REFINING. GOLD AND SILVER WERE THE MOST IMPORTANT BYPRODUCTS FROM COPPER AND LEAD/ZINC MINING AT BISBEE.

**BYPRODUCT CREDIT** — THE VALUE OF THE RECOVERED BYPRODUCT METALS WAS TAKEN AS A CREDIT AGAINST MINING COSTS. THUS, IT WAS SOMETIMES POSSIBLE TO MINE LOWER GRADE COPPER ORES, IF THE CREDITS RECEIVED WOULD OFFSET THE LOWER REVENUE FROM MINING A LOWER GRADE. DURING THE LAST YEARS OF OPERATION, ALL METAL VALUES, NOT JUST COPPER, WERE CONSIDERED WHEN SELECTING THE AREAS TO BE MINED.

LOCAL LORE HAD IT THAT THE BYPRODUCT CREDITS FOR THE GOLD AND SILVER IN THE BISBEE ORES WERE SUFFICIENTLY HIGH TO COVER THE SMELTING AND REFINING COSTS. UNFORTUNATELY, THIS WAS NEVER THE CASE.

**C. & A.** — THE CALUMET AND ARIZONA MINING COMPANY.

**C. & A. CHUTE** — THE STOPE CHUTE DESIGN EMPLOYED BY THE C. & A MINING COMPANY AND LATER CONTINUED BY PD IN THE MINES IT ACQUIRED BY MERGER. IT WAS VERY SIMILAR IN DESIGN TO THE COPPER QUEEN CHUTE, BUT DIFFERED FROM THE LATER VERDE CHUTE IN THAT THERE WAS NO NARROWING OF THE CHUTE LIP AND THE DOOR WAS A SIMPLE STEEL PLATE BENT AT RIGHT ANGLES TO FORM PIVOT POINTS.

**C. & A. MINE** — A GENERAL REFERENCE TO ANY OF THE SEVERAL MINES OPERATED BY THE CALUMET AND ARIZONA MINING COMPANY. EARLY ON, IT WAS COMMONLY USED AS A REFERENCE TO THE IRISH MAG MINE OR OLIVER MINE. NO MINE AT BISBEE WAS EVER NAMED THE "C. & A MINE."

**C. & C.** — THE CALUMET AND COCHISE MINE NEAR, WARREN, AND DEVELOPED BY THE COPPER QUEEN BRANCH TO FIND WATER FOR THE SACRAMENTO CONCENTRATOR.

**C. Q.** — THE COPPER QUEEN.

**C. Q. B.** — THE COPPER QUEEN BRANCH OF PHELPS DODGE CORPORATION. MORE THAN A FEW TOOLS, RAILROAD LAMPS, PADLOCKS, ETC. WERE STAMPED C. Q. B. TO INDICATE OWNERSHIP.

**C. Q. C. M. Co.** — THE COPPER QUEEN CONSOLIDATED MINING COMPANY.

**CAB** — THE OPERATOR'S COMPARTMENT OF A PIECE OF HEAVY EQUIPMENT, A HAUL TRUCK OR ON AN ELECTRIC SHOVEL, ETC.

**CABLE** — 1). A FLEXIBLE ROPE COMPOSED OF MANY STEEL WIRES OR HEMP FIBERS IN GROUPS, FIRST TWISTED TO FORM STRANDS, SEVERAL OF WHICH ARE AGAIN THEN, TWISTED TOGETHER TO FORM A ROPE. ALSO CALLED WIRE CABLE, WIRE ROPE OR STEEL CABLE. 2). A ROPELIKE, USUALLY STRANDED ASSEMBLY OF ELECTRICAL CONDUCTORS OR OF GROUPS OF TWO OR MORE CONDUCTORS INSULATED FROM EACH OTHER BUT LAID UP TOGETHER USUALLY BY BEING TWISTED AROUND A CENTRAL CORE, THE WHOLE USUALLY HEAVILY INSULATED BY OUTSIDE WRAPPINGS. THE VERY LARGE, HIGH VOLTAGE POWER CABLES TO THE ELECTRIC SHOVELS AND DRILL WERE OF THIS TYPE.

**CABLE BRIDGE** — IT WAS UNSAFE TO DRIVE, EVEN SMALL VEHICLES, OVER THE LARGE POWER CABLE, WHICH BROUGHT ELECTRICAL POWER TO THE SHOVELS AND DRILLS, AS IT WOULD CAUSE THE INSULATION TO EVENTUALLY BREAK. STEEL PLATE BRIDGES WERE PLACED AT POINTS WHERE REGULAR TRAFFIC NEEDED TO CROSS THESE CABLES. THE BRIDGES WERE HELD IN PLACE BY USING A DOZER TO PUSH UP RAMPS OF ROCKS AND DIRT ON BOTH SIDES.

**CABLE CREW** — THE POWER CABLES USED BY THE ELECTRIC SHOVELS IN THE LAVENDER PIT WERE OF A LARGE DIAMETER, LONG AND HEAVY. A SPECIAL CREW WAS USED TO HANDLE THESE WHEN A CABLE NEEDED TO BE ADDED TO ADVANCE THE SHOVEL OR WHEN A SHOVEL OR DRILL HAD TO BE MOVED A SUBSTANTIAL DISTANCE.

**CABLE CUTTER** — 1). SLUSHER CABLES WERE CUT USING A SHORT PIECE OF 90-POUND RAIL WITH, TRIANGULAR STEEL PIECES WELDED ON THE BALL AND A SOFT IRON HAMMER. THIS WAS A CABLE CUTTER IN THE MINE. 2). THE ROPE SHOP CREW USED A SPECIAL HYDRAULIC KNIFELIKE TOOL TO PRECISELY CUT LARGE HOIST CABLE WITHOUT IMPACT.

**CABLE DOG** — SHORT LENGTHS OF STEEL CABLE FITTED WITH FORGED SPIKES AT EACH END, WHICH ARE AT RIGHT ANGLES TO THE CABLE AXIS. THEY ARE USED TO HANG SETS OR OTHER TIMBER BY DRIVING THE SPIKED END INTO THE TIMBER TO BE SUPPORTED AND INTO A FIXED PIECE OF TIMBER AND ALLOWING THE CABLE TO SUPPORT THE WEIGHT. SEE ALSO SET HANGERS.

**CABLE PADS** — WHEN IT WAS NECESSARY FOR A SMALL VEHICLE TO CROSS A POWER CABLE AT ANY SPOT WITHOUT A CABLE BRIDGE, PADS MADE FROM MULTIPLE LAYERS OF USED CONVEYOR BELTING WITH A CENTER CHANNEL FOR THE CABLE, WERE PLACED OVER THE CABLE, ALLOWING THE VEHICLE TO CROSS WITHOUT TOUCHING THE CABLE.

**CABLE SOCKET** — A CONE-SHAPED, CAST STEEL FIXTURE WITH EYES, WHICH IS FITTED ON THE CAGE END OF A HOISTING CABLE AND HELD ON THE CABLE BY FLARING THE CABLE INSIDE THE SOCKET AND THEN FILLING THE SOCKET WITH MOLTEN ZINC. IT WAS THEN ATTACHED TO THE CAGE WITH A LARGE KINGPIN.

**CABLE TONGS** — FOR SAFETY REASONS, IT WAS FORBIDDEN TO USE BARE HANDS TO MOVE THE HEAVY POWER CABLES IN THE PIT, WHICH CARRIED THE HIGH VOLTAGE TO THE SHOVELS AND DRILLS IN THE LAVENDER PIT. EVEN A SMALL BREAK IN THE INSULATION WAS AN ELECTROCUTION HAZARD. THUS, SPECIAL THONGS WITH NON-CONDUCTIVE WOODEN HANDLES AND A THICK ROPE SLING WERE USED IN MOVING THESE VERY THICK CABLES.

**CAGE** — A VERTICALLY MOVING ENCLOSED PLATFORM, SIMILAR TO AN ELEVATOR, USED IN A MINE SHAFT FOR THE HOISTING OR LOWERING OF WORKERS AND MATERIALS, USUALLY DESIGNED TO ACCOMMODATE 12 MINERS OR TO TAKE ONE CAR PER DECK AND MAY BE SINGLE OR MULTIDECKED.

**CAGE BAR** — SAFETY DEVICES, WHICH MUST BE LIFTED BEFORE THE CAGE GATES, CAN BE OPENED.

**CAGE CHAIR** — MOVABLE SUPPORT FOR A CAGE, ARRANGED TO HOLD THE CAGE AT THE STATION LEVEL WHEN A HEAVY LOAD IS BEING ADDED OR REMOVED. WHEN THE CAGE RESTS IN THE CHAIR, THE HOISTING ENGINEER ALLOWS THE HOIST ROPE TO BECOME SLIGHTLY SLACK, AS THE DRAMATIC CHANGE IN WEIGHT WOULD STRETCH THE ROPE AND CAUSE THE CAGE TO DROP WITH THE ADDED WEIGHT OR, IF A HEAVY ITEM IS BEING REMOVED, MOVE UPWARD SUDDENLY AS THE CABLE CONTRACTS, CREATING A HAZARD.

**CAGE END** — THE END OF THE HOISTING CABLE, WHICH WAS ATTACHED TO THE CAGE BY A STEEL, ZINC-FILLED SOCKET. TO PREVENT UNEVEN CABLE WARE WHERE THE HOIST CABLE PASSED OVER THE SHEAVE WHEEL, THE CAGE END OF THE HOIST CABLE WAS PERIODICALLY TRIMMED BY A LENGTH EQUAL TO TWICE THE DISTANCE FROM WHERE THE CAGE OR SKIP WAS AT ITS CLOSEST TO THE TOP OF THE SHEAVE WHEEL.

**CAGE GATE** — FOLDING GATE MADE OF STEEL BARS TO PREVENT THE RIDERS FROM FALLING OUT OF THE CAGE.

**CAGE HOISTING** — THE HOISTING OF ORE IN MINE CARS PLACED ON THE CAGE DECK. THIS WAS LABOR INTENSIVE TYPE OF HOISTING WAS USED AT BISBEE UNTIL SKIPS WERE INTRODUCED AT THE SACRAMENTO MINE IN 1909.

**CAGE SHOE** — THE STEEL CHANNELS ON BOTH SIDE OF THE CAGE, WHICH FIT THE SHAFT GUIDES AND MAINTAIN THE CAGE CENTERED IN THE SHAFT.

**CAGER** — ONE WHO DIRECTS STATION OPERATIONS AND MOVEMENT OF CAGES USED TO RAISE AND LOWER WORKERS, MINE CARS, AND SUPPLIES BETWEEN VARIOUS LEVELS AND SURFACE. CAGERS WORKED IN PAIRS, ONE ON TOP TO LOAD THE MEN AND/OR MATERIALS AND ONE BELOW TO UNLOAD THEM.

**CALL BELL** — EVERY SHAFT STATION, THE SURFACE AND THE HOIST ENGINEER HAD A BELL, WHICH WAS USED TO NOTIFY THE CAGER THAT THE CAGE WAS REQUIRED AT THAT POINT. IT WAS ALWAYS A BIT AWAY FROM THE SHAFT SO AS NOT TO CONFUSE THE SHAFT BELL WITH THE CALL BELL AND IT WAS ALWAYS NEAR A BELL CHART SO THE CALLER WOULD HAVE AN EASY REFERENCE TO THE BELL CODE FOR THE LEVEL. WHEN RANG, THE BELLS ON EVERY LEVEL IN THE MINE, THE SURFACE AND HOIST HOUSE WOULD SOUND, AS THE CAGER COULD BE ANYWHERE. HE WOULD ACKNOWLEDGE THE CALL BY A SINGLE RING OF THE CALL BELL AND THEN WENT TO THE INDICATED LEVEL AS HIS DUTIES PERMITTED.

**CALYX DRILL** — A ROTARY CORE DRILL THAT USES HARDENED STEEL SHOT FOR CUTTING ROCK, WHICH WILL DRILL HOLES FROM DIAMOND-DRILL SIZE UP TO 6 FT IN DIAMETER. CALYX DRILLS WERE USED TO DRILL FOUR-FOOT DIAMETER RAISES IN SEVERAL PLACES AND A WASTE RAISE AT THE COLE FROM THE SURFACE TO THE 1300 LEVEL.

**CALYX RAISE** — RAISES OF A TYPE ACTUALLY CUT BY A VERY LARGE CORE DRILL. THESE HOLES WERE NEARLY FOUR FEET IN DIAMETER AND WERE USED IN SEVERAL PLACES. THE MOST IMPORTANT WAS AT THE COLE MINE WHERE A CALYX RAISE EXTENDED FROM THE SURFACE TO THE 1300 LEVEL WITH TRANSFER POINTS ON MOST LEVELS. THIS WAS USED AS A POINT TO INTRODUCE WASTE FROM THE SURFACE DUMP TO BE USED AS GOB (BACKFILL) WHEN INSUFFICIENT WASTE WAS AVAILABLE UNDERGROUND. THE SYSTEM CONTINUED TO SERVE IN WASTE HANDLING UNTIL THE END OF MINING.

**CAMPBELL** — THE CAMPBELL MINE.

**CAMPBELL INTERIOR** — AN INTERIOR SHAFT FROM THE 2966 LEVEL CAMPBELL TO THE 3100 LEVEL DENN. THE CAGE WAS AUTOMATED SO THAT THE RIDER COULD CONTROL THE HOIST, THUS ELIMINATING THE NEED FOR A HOISTMAN.

**CAMPBELL OREBODY** — THIS WAS THE LARGEST, RICHEST SULFIDE OREBODY EVER DISCOVERED AT BISBEE. IT WAS DISCOVERED IN 1926 AND EXTENDED FROM ABOVE THE 1200 LEVEL TO THE 2566 LEVEL AND WAS MINED FOR MOST OF 20 YEARS.

**CAMELBACK** — CERTAIN TYPES OF LARGE, SIDE DUMPING MINE CARS (GRANBY) HAD A FIFTH WHEEL OPPOSITE THE STATIONARY DOOR. WHEN ROLLED UP A RAMP (CAMELBACK), THE CAR BODY WOULD TILT THEREBY CAUSING IT TO DUMP. SEE ALSO DUMP RAMP.

**CANDLE** — THE SPECIAL CANDLES MADE FOR MINING USE. SEE MINING CANDLE FOR ADDITIONAL INFORMATION.

**CANDLE SNUFF** — WHEN THE MINERS CANDLE HAD BURNED DOWN TO THE POINT IT WAS INSIDE OF HIS CANDLEHOLDER, IT WAS TOO SHORT TO BE EFFECTIVE. IT WAS COMMON, BUT DANGEROUS TO TAKE THIS SHORT PIECE, THIS “SNUFF” AND SET IT, LIT, ON SOMETHING FOR MORE LIGHT. IF SET ON TIMBER, AND LEFT, IT HAD THE VERY REAL POSSIBILITY OF SETTING THE TIMBER ON FIRE. THIS WAS AN ALTOGETHER TOO COMMON OF AN OCCURRENCE.

**CANDLEHOLDER** — SEE CANDLESTICK.

**CANDLESTICK** — 1). THESE WERE THE HOLDERS FOR THE MINING CANDLES THE MINERS USED FOR LIGHT. TYPICALLY, THEY WERE HAND FORGED FROM A SINGLE PIECE OF 3/8 INCH SQUARE IRON STOCK WITH A LOOP HANDLE ON ONE END AND A SHARP POINT ON THE OTHER TO STICK IN TIMBER, AS WELL AS A HOOK AT THE BALANCE POINT TO HANG IT FROM A PROTRUDING ROCK OR TIMBER. MINERS WERE RESPONSIBLE TO BUY THEIR OWN CANDLESTICK AND THERE WERE A NUMBER OF COMMERCIAL MODELS AVAILABLE THAT RANGED FROM THE MOST BASIC TO ONES WITH ADDED FEATURES, SUCH AS A MATCHSAFE HANDLE, A FUSE KNIFE OR A CAP CRIMPER IN THE HANDLE. SOME WERE AMONG THE FINEST EXAMPLES OF THE BLACKSMITHS’ ART OF THE DAY WITH ALL MANNER OF ADORNMENTS, EMBLEMS, NAMES OR VARIATIONS IN FORMS ON THE SAME STICK, TRULY WORKS OF ART AND WONDERS TO BEHOLD. ALSO CALLED CANDLEHOLDERS OR SIMPLY A STICK. 2). A HEAVY WIRE FRAME SHAPED MUCH LIKE A CANDLESTICK, BUT MADE TO ACCOMMODATE A CAP LAMP SIZE CARBIDE LAMP.

**CAP** — 1). THE TOP PIECE IN A THREE-PIECE TIMBER SET USED FOR SUPPORT. 2). ALSO, A PRIMER, DETONATOR OR BLASTING CAP.

**CAP CRIMPER** — PLIERS-LIKE TOOL, SPECIFICALLY MADE TO CRIMP BLASTING CAPS ONTO FUSE. THESE OFTEN ALSO HAD A FUSE CUTTER JAWS AND SKEWER HANDLE FOR MULTIPURPOSE APPLICATION. BY THE 1930S, ALL CAPS WERE CRIMPED TO PRECUT LENGTHS OF FUSE ON THE SURFACE. AS THIS WAS ALL DONE IN THE FUSE HOUSE IN THE JUNCTION YARD, THE CAP CRIMPER DISAPPEARED FROM THE MINES.

**CAP LAMP** — 1). THE TERM GENERALLY APPLIED TO THE LAMP ON A MINER’S CAP OR, LATER, HARDHAT AND USED FOR ILLUMINATION ONLY. 2). A STYLE OF SMALL CARBIDE LAMP MADE SPECIFICALLY TO FIT ON THE MINER’S CAP, AS OPPOSED TO THE LARGER, STOPE LAMPS, SEE WHICH. THE MINERS WERE RESPONSIBLE TO PURCHASE WHICHEVER LAMP THEY CHOSE AND ANY REPAIR PARTS NEEDED OVER TIME, WHILE THE COMPANY PROVIDED THE CARBIDE.

**CAP RAILS** — A PAIR OF SHORT PIECES OF 75-POUND RAILS, BOLTED TOGETHER AND PLACED JUST BELOW THE FRONT CAPS AT THE ENTRANCE TO THE CHUTE JAWS. THESE STEEL RAILS ALLOWED FOR A POINT OF LEVERAGE WHEN BARING THE CHUTE AS WELL AS PROTECTED THE FRONT CAPS FROM WEAR AS THE ROCK FLOWED INTO THE CHUTE JAWS.

**CAP TIN** — THE LIGHTWEIGHT, METAL CONTAINERS IN WHICH BLASTING CAPS WERE RECEIVED. TYPICALLY PAINTED IN SPECIFIC COLORS TO DENOTE THE CAP SIZE, THE EARLY TINS WERE GALVANIZED WITH PAPER LABELS. WHILE THEY CAME IN SEVERAL SIZES, ONLY 100 CAP CAPACITY TINS HAVE BEEN SEEN AT BISBEE. THESE USEFUL TINS OFTEN FOUND A SECOND LIFE AS PARTS CONTAINERS AND GREASE HOLDERS.

**CAR** — 1). ONE OF THE SMALL MINE RAIL CARS THAT ARE LOADED AT MINING POINTS AND HAULED IN A TRAIN BY MOTORS. THEY VARY IN CAPACITY, AND ARE OF STEEL CONSTRUCTION. FOUR GENERAL TYPES OF MINE CARS WERE USED AT BISBEE (1) END-DUMP CARS, WHICH WERE COMMONLY USED FOR HAND TRAMMING AND MULE HAULAGE (*THE VERY COMMON 1/2 TON "A" AND "C" CARS USED FROM THE BEGINNING UNTIL 1947*); (2) THE GABLE-BOTTOM CAR, WHICH IS SHAPED LIKE A CAPITAL W IN CROSS SECTION AND WHICH WAS EMPTIED BY OPENING SIDE DOORS WITH A DOUBLE JACK (*VERY COMMON FROM 1908 TO 1945*); (3) THE ROCKER DUMP TYPE, WHICH HAS A V-SHAPED BODY ROUNDED AT THE BOTTOM (*"H, E, & K" STYLES*); (4) THE GRANBY CAR, A SPECIAL FORM OF A SIDE-DUMPING CAR (*5 TON GRANBY CARS WERE USED IN A FEW PLACES ONLY, 1400 LEVEL COLE/DALLAS, 1800 LEVEL CAMPBELL TO THE 2000 LEVEL DALLAS*). 2). THIS ALSO REFERS TO A STANDARD RAILROAD, BOTTOM DUMP ORE CAR WHEN SHIPPING OF ORE TO THE SMELTER IS INDICATED AS IN "A CAR OF ORE."

**CAR CHAIN** — 1). MOST OF THE SMALL MINE CARS DID NOT HAVE COUPLERS TO HOLD THEM TOGETHER AND ONLY THE GRANBY TYPE HAD RAILROAD TYPE DRAW HEAD COUPLERS. INSTEAD, SHORT CHAINS (≈12 INCHES LONG) WERE USED TO HOOK THE CARS TOGETHER. THESE CHAINS HAD WIDE "J" HOOKS ON EACH END AND BUT A FEW LINKS BETWEEN. 2). SOME CARS SUCH AS THE "H" SERIES HAD A PAIR OF THE CHAINS PERMANENTLY ATTACHED, ONE AT EACH END ON OPPOSING SIDES AND WERE OF A DIFFERENT TYPE WITH A FORGED BELL SHAPED END WHICH FIT INTO A CAST IRON CUP ON THE NEXT CAR.

**CAR KNOCKER** — THE MINE CARS WERE REPAIRED BY TWO CREWS IN THE BOILER SHOP. ALL THEY DID WAS REPAIR MINE CARS. BECAUSE IT WAS OFTEN NECESSARY TO HIT THE BOTTOM OF A MINE CAR WITH A DOUBLE JACK WHILE DUMPING IT TO LOOSEN STICKY MUCK, THE CAR BOTTOMS EVENTUALLY BECAME QUITE DENTED. THE FIRST THING THE REPAIR CREW DID WAS TO HEAT THE DENTED BOTTOM WITH A TORCH AND, USING A SPECIAL TOOL, KNOCK OUT THE DENTS. AS THIS TYPICALLY TOOK MORE TIME THAN ANYTHING ELSE DID, THE NAME BECAME CAR KNOCKERS FOR THESE MEN. THE TERM CAR WHACKERS WAS ALSO APPLIED THOSE TASKED WITH THE REPAIR OF THE MINE CARS.

**CAR MAN** — THE MAN WHO TRAMMED MINE CARS. SEE ALSO TRAMMER AND HAND TRAMMING.

**CAR SAMPLES** — 1). EACH TRAIN OF ORE PULLED FROM A STOPE WAS SAMPLED BY THE MOTOR CREW AS WAS EACH TRAIN DUMPED INTO THE ORE POCKET. THESE WERE KNOWN AS CAR SAMPLES. 2). SAMPLES WERE ALSO TAKEN OF ALL RAILROAD CARS LOADED AT THE SURFACE FOR SHIPMENT TO THE SMELTERS IN DOUGLAS AND THESE TOO WERE CALLED CAR SAMPLES, BUT DIFFERENT TAGS WERE PLACED WITH THESE SAMPLES TO DISTINGUISH THEM FROM THE OTHERS.

**CAR STEP** — A SMALL STEEL PLATFORM OR STEP PLACED ON THE TAIL CAR OF A TRAIN AND ON WHICH THE MOTOR SWAMPER WOULD STAND TO RIDE WHILE THE TRAIN WAS BEING PULLED.

**CAR WHACKER** — SEE CAR KNOCKER.

**CAR SPOTTER** — IN THE SACRAMENTO PIT, A MAN (CAR SPOTTER) STOOD ALONGSIDE THE RAIL CARS AS THEY WERE BEING LOADED BY THE STEAM SHOVEL AND SIGNALLED TO THE LOCOMOTIVE ENGINEER WHEN TO MOVE AND WHEN TO STOP SO AS TO ALLOW LOADING TO PROGRESS.

**CARBAMITE** — THIS WAS THE APACHE POWDER TRADE NAME FOR THE BAGGED ANFO BASED BLASTING AGENT USED IN THE UNDERGROUND MINE AFTER 1964. FOR SAFETY REASONS, IT WAS DYED RED FOR EASY IDENTIFICATION OF AN OTHERWISE WHITE MATERIAL.

**CARBIDE** — 1). A COMMERCIAL TERM FOR CALCIUM CARBIDE AS USED IN MINER'S LAMPS. CALCIUM CARBIDE, AS USED IN MINER'S LAMPS LOOKED VERY MUCH LIKE ROAD GRAVEL AND WHEN MIXED WITH WATER, A DROP AT A TIME, GENERATED ACETYLENE GAS, WHICH FLOWED THROUGH THE LAMP TIP AND BURNED, GIVING A GOOD LIGHT. 2). THE CARBIDE COMPOUND OF TUNGSTEN USED AS INSERTS IN DRILL BITS.

**CARBIDE BIT** — MORE CORRECTLY, CEMENTED TUNGSTEN CARBIDE. A ROCK DRILL BIT, MADE BY FUSING AN INSERT OF MOLDED TUNGSTEN CARBIDE TO THE CUTTING EDGE OF A STEEL BIT SHANK. THESE CAME INTO WIDE USE AT BISBEE DURING THE EARLY 1960s.

**CARBIDE FLASK** — A MINER'S CARBIDE LAMP, WITH A FULL CHARGE OF FRESH CARBIDE, WOULD BURN FOR BETWEEN FOUR TO SIX HOURS, DEPENDING ON THE LAMP TYPE. THUS, THE MINER NEEDED TO CARRY ADDITIONAL CARBIDE WITH HIM TO RECHARGE HIS LAMP AT SOME POINT DURING THE SHIFT. WHILE A NUMBER OF CONTAINER TYPES WERE USED TO CARRY THIS WATER REACTIVE MATERIAL, THE MOST COMMON WAS A CURVED, METAL POCKET FLASK WITH A SLIDING TOP, WHICH HELD ABOUT SEVEN OUNCES OF CARBIDE, SUFFICIENT TO FINISH THE SHIFT. THE MINER HAD TO BUY THE FLASK OR WHATEVER HE CHOSE TO USE, WHILE THE MINING COMPANY FURNISHED THE CARBIDE. THE FLASK-SHAPED PRINCE ALBERT TOBACCO TINS WERE COMMONLY USED BY MINERS TO CARRY THE NEEDED EXTRA CARBIDE.

**CARBIDE LAMP** — A TWO-PIECE LAMP THAT IS CHARGED WITH CALCIUM CARBIDE IN THE BOTTOM PART INTO WHICH WATER IS SLOWLY FED FROM AN UPPER CHAMBER AND BURNS THE ACETYLENE GAS, WHICH IS GENERATED BY THE REACTION BETWEEN CALCIUM CARBIDE AND WATER.

**CARBO LOADER** — ANOTHER NAME FOR ANFO LOADER (SEE WHICH). THE NAME IS DERIVED FROM THE CARBAMITE BLASTING AGENT USED AT BISBEE, AND THESE WERE USED TO LOAD BLASTHOLES.

**CARBONATE ORE** — A NAME APPLIED TO OXIDIZED ORE WHEN, THE PREDOMINATE ORE MINERAL WAS A COPPER CARBONATE, GENERALLY MALACHITE, WHICH WAS THE MOST COMMON.

**CARTRIDGE** — 1). TO PREVENT THE OVERLOADING OF SKIPS AND THE SUBSEQUENT SPILLAGE, A MEASURED AMOUNT OF ORE WAS PASSED FROM THE ORE POCKET INTO A STEEL TROUGH WITH A GATE AT THE END. THE AMOUNT IN THE TROUGH OR CARTRIDGE WAS EXACTLY THE AMOUNT THE SKIP SHOULD BE LOADED WITH. WHEN THE SKIP ARRIVED, THE CARTRIDGE DOOR WAS OPENED AND THE MEASURED AMOUNT OF ROCK FLOWED INTO THE SKIP AND THE CAGER WOULD RING OFF THE SKIP AND IT WOULD BE HOISTED FOR DUMPING AT THE SURFACE. THE CAGER WOULD THEN OPEN THE POCKET DOOR AND FILL THE CARTRIDGE AGAIN, READY FOR THE RETURN OF THE EMPTY SKIP. 2). A TERM OCCASIONALLY APPLIED TO A STICK OF POWDER OR A PAPER WRAPPED QUANTITY OF STEMMING MATERIAL, READY FOR INSERTION INTO THE BLASTHOLE.

**CASING** — SPECIAL STEEL TUBING WELDED OR SCREWED TOGETHER AND LOWERED INTO A BOREHOLE TO PREVENT ENTRY OF LOOSE ROCK OR WATER INTO THE BOREHOLE, TO PREVENT LOSS OF CIRCULATION LIQUID INTO POROUS, CAVERNOUS, OR CREVASSED GROUND, AND TO SUPPORT THE SIDES OF A BOREHOLE. CASING WAS WIDELY USED DURING DIAMOND DRILLING THROUGH BROKEN GROUND.

**CAT** — IN THE LAVENDER PIT, “CAT” MEANT A BULLDOZER, AS ONLY CATERPILLAR BULLDOZERS WERE USED. THE TERM DOZER WAS ALSO APPLIED TO THESE MAGNIFICENT MACHINES.

**CATCH UP GROUND** — TO CATCH UP GROUND IS TO SUPPORT IT WITH TIMBER AND PREVENT IT FROM FALLING OR FROM CAVING IN; A TASK MORE DIFFICULT THAN IT WOULD SEEM AT A GLANCE. BAD GROUND WAS ALWAYS UNPREDICTABLE AND TREACHEROUS. ONE HAD TO BE ABLE TO READ THE GROUND TO BE TRULY GOOD, TO KNOW WHAT TYPE OF TIMBER TO PLACE AND EXACTLY WHERE TO PUT IT. THIS WAS A TRUE ART AND THE FEW MINERS WHO WERE GOOD AT CATCHING UP GROUND WERE HIGHLY REGARDED.

**CAUGHT** — SECURELY SUPPORTED BY TIMBER.

**CAVE** — 1). A NATURALLY OCCURRING OPENING OF SOME SIZE SUCH AS THE OFTEN-LARGE OXIDATION CAVES WHICH COMMONLY OCCURRED OVER THE OXIDE ORES IN THE WESTERN PART OF THE WARREN DISTRICT. 2). THE COLLAPSE OF AN OPENING, SYNONYMOUS WITH CAVE-IN.

**CAVE-IN** — COLLAPSE OF THE RIBS AND/OR BACK OF A MINE EXCAVATION. THIS CAN OCCUR EITHER SUDDENLY (RARE) OR GRADUALLY (MOST COMMON).

**CAVING GROUND** — ROCK FORMATIONS THAT WILL NOT STAND IN THE RIBS OR BACK OF AN UNDERGROUND OPENING WITHOUT TIMBER SUPPORT.

**CAVO** — A RUBBER TIERED OVERSHOT MUCKER. THESE WERE NOT COMMON AT BISBEE.

**CEMENT COPPER** — A REDDISH MUD FROM THE PRECIPITATION PLANT THAT IS A HIGH COPPER MATERIAL (60% TO 80% CU) AND PRECIPITATED BY IRON REPLACEMENT FROM COPPER SULFATE SOLUTIONS COLLECTED FROM UNDERGROUND OR FROM THE LEACH DUMPS.

**CENTRALIZER** — A HAND HELD, STEEL BRACKET USED WHEN COLLARING A BLASTHOLE WITH A JUMBO TO ASSURE THAT THE HOLE IS COLLARED IN A STRAIGHT LINE WITH THE JUMBO MOUNTED LEYNER.

**CERUSSITE** — A LEAD CARBONATE MINERAL, WHICH WAS A COMMON SUPERGENE ORE OF LEAD IN MANY OF THE MINES.

**CERUSSITE SAND** — ON OCCASION, AREAS OF CERUSSITE, AS SAND LIKE MATERIAL, WERE FOUND AND MINED. THE MATERIAL WOULD FLOW FREELY THROUGH ANY OPEN SPACE AND ALL SUPPORT HAD TO BE TIGHT WITH ANY HOLES CHINKED TO PREVENT THE SAND FROM FLOWING INTO THE OPENING, CREATING AN UNSUPPORTED VOID ABOVE, WHICH WAS CERTAIN TO COLLAPSE. CERUSSITE SAND WAS THE MOST COMMON IN THE SILICA BRECCIA AREAS OF THE SOUTHWEST AND SHATTUCK MINES.

**CHALCOCITE** — A HIGH-GRADE COPPER SULFIDE MINERAL, WHICH WAS, MINED IN IMPORTANT AMOUNTS, PARTICULARLY IN THE SUPERGENE ENRICHED PORTIONS OF BOTH THE SACRAMENTO AND LAVENDER PITS. CHALCOCITE WAS ALSO REASONABLY COMMON, AS A MINOR CONSTITUENT, IN THE LIMESTONE REPLACEMENT DEPOSITS MINED UNDERGROUND. ALSO CALLED “GLANCE.”

**CHALCOPYRITE** — THE MOST COMMON SULFIDE, COPPER ORE MINERAL MINED AT BISBEE. IT IS A COPPER (34.63%)/IRON (30.43%)/SULFIDE (34.94%), WHEN PURE. SELDOM FOUND IN LARGE, PURE MASSES, BUT MIXED WITH OTHER SULFIDE MINERALS, PARTICULARLY PYRITE. ALSO CALLED “COPPER PYRITES.”

**CHANGE DAY** — THE FRIDAY ON WHICH CHARGES MADE AT THE COMPANY STORE WOULD BE WITHHELD FROM THE PAYCHECK TO BE RECEIVED IN THREE WEEKS TIME, NOT THE PAYCHECK TO BE GIVEN ON THE NEXT FRIDAY. AS MANY MINERS LIVED PAYCHECK TO PAYCHECK, THEY RELIED HEAVILY ON CREDIT AT THE PD MERC., AS THE STORE WAS CALLED BY THE LOCALS.

**CHANGE ROOM** — A SPECIAL BUILDING AT A MINE WHERE WORKERS MAY WASH THEMSELVES OR CHANGE FROM STREET TO WORK CLOTHES AND VICE VERSA. ALSO CALLED CHANGE HOUSE OR DRY.

**CHARGE** — TO LOAD A BLASTHOLE WITH EXPLOSIVES.

**CHANNEL SAMPLING** — THE CUTTING OF A GROOVE ON A ROCK FACE, ALONG A GIVEN DISTANCE AND COLLECTING THE CHIPS FOR ASSAY DETERMINATION OF DESIRABLE METAL CONTENT. THIS WAS OFTEN DONE WITH A HAMMER AND A MOIL WITH THE CHIPS COLLECTED ON A TRAP PLACED BELOW THE SAMPLE AREA.

**CHIEF ENGINEER** — THE INDIVIDUAL IN CHARGE OF THE ENGINEERING DEPARTMENT, A POSITION OF SOME IMPORTANCE, AS MANY GENERAL MANAGERS PASSED THROUGH THIS POSITION DURING THEIR CAREER. ALL OF THE MINING ENGINEERS AND GEOLOGIST REPORTED TO THE CHIEF ENGINEER.

**CHIEF GEOLOGIST** — THE SENIOR GEOLOGIST RESPONSIBLE FOR THE GEOLOGIC DEPARTMENT. HE REPORTED TO THE CHIEF ENGINEER.

**CHINK** — TO FORCE CLOTH OR OTHER MATERIAL INTO A SMALL HOLE OR CRACK IN OR BETWEEN MINE TIMERS TO PREVENT THE FLOW OF LOOSE MATERIAL FROM PASSING THROUGH THE OPENING.

**CHIP SAMPLE** — A METHOD OF SAMPLING A ROCK EXPOSURE WHEREBY A REGULAR SERIES OF SMALL CHIPS OF ROCK IS BROKEN OFF ALONG A LINE ACROSS THE FACE AND COLLECTED FOR ASSAY. UNDERGROUND, THE SHIFT BOSSES FREQUENTLY CHIP SAMPLED THE WORKING FACE TO GIVE A ROUGH INDICATION OF THE GRADE TO MINED THE NEXT DAY. THE GRADE DETERMINED BY THIS SAMPLE WOULD BE WRITTEN ON THE FACE OR SUPPORTING TIMBER TO ADVISE ALL OF THE EXPECTED GRADE.

**CHISEL BIT** — A DRILL BIT TYPE SHAPED LIKE A CHISEL, WITH A SINGLE, STRAIGHT CUTTING EDGE. ALL HAND STEEL USED FOR DRILLING WAS OF THIS TYPE. ONLY AFTER THE ADVENT OF PNEUMATIC DRILLING DID CROSS BITS COME INTO USE.

**CHIVA** — SPANISH WORD FOR “GOAT KID” AND USED FOR THE SPIKE PULLERS AS THE CLOVEN SHAPED, GROOVED END ROUGHLY RESEMBLES A SMALL GOAT’S FOOT. IT IS A STEEL BAR OF ABOUT THREE FEET IN LENGTH WITH ONE END BENT AT 90°, THEN TAPERED AND GROOVED SO AS TO FIT A TRACK SPIKE FOR PULLING THE SPIKE FROM THE WOODEN TRACK TIE. SEE ALSO SPIKE PULLER.

**CHUCK** — THE PART OF A DIAMOND OR ROTARY DRILL THAT GRIPS OR OTHERWISE HOLDS THE DRILL RODS AND BY MEANS OF WHICH LONGITUDINAL AND/OR ROTATIONAL MOVEMENTS AND/OR PERCUSSION ARE TRANSMITTED TO THE DRILL RODS.

**CHURN DRILL** — A TYPE OF DRILL USED TO DRILL LARGE DIAMETER HOLES FOR PROSPECTING OR BLASTING. USUALLY MOUNTED ON SKIDS, FOUR WHEELS OR CRAWLER TRACKS AND POWERED BY STEAM, DIESEL, OR GASOLINE-POWERED ENGINES OR ELECTRIC MOTORS. THE DRILLING IS ACCOMPLISHED BY USING A HEAVY STRING OF TOOLS TIPPED WITH A BLUNT-EDGE CHISEL BIT SUSPENDED FROM A FLEXIBLE MANILA OR STEEL CABLE, TO WHICH A RECIPROCATING MOTION IS IMPARTED BY ITS SUSPENSION FROM AN OSCILLATING BEAM OR SHEAVE, CAUSING THE BIT TO BE RAISED AND DROPPED, THUS STRIKING THE ROCK WITH SUCCESSIVE BLOWS, BY MEANS OF WHICH THE ROCK IS CHIPPED AND PULVERIZED AND THE BOREHOLE DEEPENED; ALSO, THE ACT OR PROCESS OF DRILLING A HOLE WITH A CHURN DRILL.

AT BISBEE, CHURN DRILLS WERE EMPLOYED IN SURFACE EXPLORATION FOR MANY YEARS. THEY WERE USED IN THE DEFINITION OF THE SACRAMENTO AND LAVENDER PIT OREBODIES, INCLUDING THE HOLBROOK EXTENSION IN THE EARLY 1960S. ALSO, CHURN DRILLS WERE USED TO DRILL THE BENCH BLASTHOLES IN THE SAC PIT.

**CHUTE** — 1). A VERTICAL OR STEEPLY INCLINED UNDERGROUND OPENING, THROUGH WHICH ROCK PASSES BY GRAVITY FROM A HIGHER TO A LOWER LEVEL AND REMOVED LOADING INTO CARS ON PASSAGEWAYS BELOW. 2). THE WOODEN, STEEL GATED STRUCTURE ON THE LEVEL WHICH ARE USED FOR LOADING BROKEN ROCK INTO MINE CARS FROM STOPE AND OTHER WORKINGS ABOVE.

**CHUTE BAR** — A SHORT HEAVY STEEL BAR USED BY THE MOTOR SWAMPER TO POKE AND MOVE STUBBORN ROCKS TO HELP KEEP MATERIAL FLOWING FROM AN OPEN CHUTE DOOR. THESE BARS WERE MOST HELPFUL WHEN DISLODGING LARGE ROCKS, WHICH TENDED TO CHOKO CHUTES BY OBSTRUCTING. SEE ALSO PUNCH BAR.

**CHUTE DODGER** — AT STOPE CHUTES, WHERE THE TROLLEY WIRE WAS PRESENT TO ALLOW THE MOTOR TO PASS BY; WERE EQUIPPED WITH A SLIDING ARRANGEMENT, WHICH ALLOW IT TO BE MOVED, PULLING THE TROLLEY WIRE, SO AS TO ALLOW SAFE ACCESS TO THE CHUTE. THE DODGER WAS PROTECTED ON EACH SIDE BY WOODEN PLANKS TO PREVENT ACCIDENTAL CONTACT BY A PERSON ON THE LOADING STAND AT THE CHUTE. SEE ALSO TROLLEY SLIDES

**CHUTE DOOR** — THE STEEL DOOR ON A CHUTE, WHICH PIVOTED ON THICK STEEL PINS WHEN LIFTED TO OPEN. THESE WERE ALL OPENED BY HAND AND THE FLOW OF MATERIAL CONTROLLED BY OPENING OR CLOSING A BIT MORE OR A BIT LESS. TRANSFER RAISE CHUTES AND SHAFT POCKET CHUTE DOORS WERE OPERATED BY PNEUMATIC CYLINDERS AS THEIR LOCATION WAS SUCH THAT HAND OPENING WAS DIFFICULT OR HAZARDOUS.

**CHUTE DOOR HANDLE** — CHUTE DOOR HANDLES ON ALL RAISES WERE REMOVABLE TO ALLOW FOR PASSING FOOT OR MOTOR TRAFFIC TO GO BY UNIMPEDED, AS IT HAD TO BE LONGER THAN A MINE CAR IS WIDE, THEY WOULD PROTRUDE WELL INTO THE CROSSCUT. EARLY CHUTE HANDLES WERE SHORT PIECES OF TWO-INCH DIAMETER PIPE, WHICH FIT OVER A STURDY PIN FORGED INTO THE FRONT PLATE OF THE CHUTE DOOR. LATER, WITH THE INTRODUCTION OF THE VERDE CHUTES, A PIECE OF SLOTTED  $\frac{3}{4}$ -INCH STEEL PLATE WAS INSERTED INTO A FLATTENED END OF THE SHORT LENGTH OF TWO-INCH PIPE AND WELDED. THE SLOT IN THE STEEL WAS AT ABOUT 60° TO THE LONG AXIS OF THE PIPE AND FIT OVER A  $\frac{1}{2}$  STEEL STRAP, WHICH WAS RIVETED TO THE CHUTE DOOR WITH TWO-INCH SPACERS TO ALLOW FOR GAINING A GOOD PURCHASE ON THE STRAP. ONCE THE HANDLE WAS IN PLACE, IT WAS LIFTED AND THE MOTOR SWAMPER COULD CONTROL THE FLOW OF MATERIAL FROM THE OPPOSITE SIDE OF THE MINE CAR BEING LOADED.

**CHUTE JAWS** — THE WOODEN SIDES OF THE CHUTE THAT EXTEND INTO THE CROSSCUT AND UPON WHICH IS MOUNTED THE CHUTE DOOR. THE CHUTE JAWS CHANNEL THE BROKEN ROCK AS IT FLOWS INTO THE MINE CAR WHEN THE CHUTE DOOR IS OPENED.

**CHUTE LINER** — CHUTE STRUCTURES WERE MADE OF MINE TIMBER AND THE CHUTE LIP WAS A POINT OF HIGH WEAR FROM THE ABRASIVE ACTION OF THE MOVING ROCK. THUS, STEEL PLATING, CUT IN THE SHOPS, TO FIT IN THE CHUTE, WAS SPIKED TO THE CHUTE LIP USING SPECIAL SPIKES WITH CONE SHAPED HEADS TO FIT INTO THE COUNTERSUNK HOLES IN THE LINER.

**CHUTE STAND** — OPPOSITE THE CHUTE, WAS A WOODEN PLATFORM FOR THE MOTOR SWAMPER TO STAND ON WHILE LOADING THE MINE CARS. EARLY LOADING STANDS WERE LITTLE MORE THAN A FOOT ABOVE THE TRACK AND EXPOSED THE MOTOR SWAMPER OR TRAMMER TO THE RISK OF INJURY FROM ROCKS OVER SHOOTING THE CAR. LOADING BOARDS WERE CLIPPED ON THE CARS IN FRONT OF THE TRAMMER TO TAKE THE IMPACT OF FAST FLOWING MATERIALS, BUT A COMBINATION OF LOADING BOARDS NOT BEING USED AND NOT TRULY BEING EFFECTIVE, CAUSED THE LOADING PLATFORMS TO BE ELEVATED SO THAT THE INDIVIDUAL WAS ABOVE THE TOP OF THE CAR. THIS MADE A HUGE DIFFERENCE AND CAR LOADING ACCIDENTS WERE DRAMATICALLY REDUCED. ALSO CALLED LOADING STAND. SEE ALSO LOADING PLATFORM.

**CLAIM** — A MINING CLAIM.

**CLAVO** — SPANISH FOR NAIL, A FREQUENTLY USED TERM BY ALL, AFTER MEXICAN AMERICANS ENTERED THE UNDERGROUND MINES DURING WORLD WAR II.

**COBBED** — A TERM THAT WAS SYNONYMOUS WITH HAND SORTING, BUT LESS COMMONLY USED. UNTIL THE ADVENT OF MECHANICAL LOADING, IT WAS DEEMED CHEAPER TO HAVE MEN HAND PICK THE OBVIOUS WASTE FRAGMENTS FROM THE BLASTED ORE AND USE THEM FOR GOB UNDERGROUND AS OPPOSED TO TRANSPORTING THEM TO THE SURFACE, THEN TO DOUGLAS AND SMELTING, ALL OF WHICH WERE EXPENSIVE.

**COCHISE** — 1). A REFERENCE TO THE UNSUCCESSFUL, COCHISE MINE LOCATED IN DUBACHER CANYON AND DEVELOPED BY THE COCHISE DEVELOPMENT COMPANY, STARTING IN 1905. 2). THE COCHISE DRILL, A PLUGGER TYPE DRILL WITH A PATENTED LOW AIR CONSUMPTION VALVE FEATURE, WHICH WAS BOTH DEVELOPED AND PATENTED IN BISBEE. IT WAS WIDELY USED AT BISBEE, AND OTHER PLACES AS IT USED 32% LESS COMPRESSED AIR, A VERY IMPORTANT COST SAVINGS.

**COCONUT** — A NAME GIVEN TO CERTAIN, ALMOST SPHERICAL-SHAPED LINE OILERS MANUFACTURED BY THE GARDNER DENVER COMPANY AND WIDELY USED AT BISBEE.

**CODE OF SAFE PRACTICE** — A SERIES OF DETAILED AND SPECIFIC SAFETY BOOKLETS, PUBLISHED BEGINNING IN THE EARLY 1950s, COVERING EVERY JOB AND POSITION FOR ALL OF THE DEPARTMENTS. ALL EMPLOYEES WERE GIVEN COPIES OF THE CODE FOR THEIR JOB AND EXPECTED TO READ AS WELL AS UNDERSTAND THE HAZARDS ASSOCIATED WITH THEIR POSITION. WHEN A MAN CHANGED JOBS, HE WAS GIVEN A CODE COVERING HIS NEW DUTIES AND, AGAIN EXPECTED TO FAMILIARIZE HIMSELF WITH THE NEW JOB AND THE NECESSARY SAFETY PRECAUTIONS TO ADEQUATELY ADDRESS THE HAZARDS.

**COLE** — THE COLE MINE.

**COLE ADIT** — AN UNSUCCESSFUL EXPLORATION ADIT NEAR THE COLE SHAFT, DRIVEN BY PHELPS DODGE DURING THE LATE 1940S TO LOOK FOR EASTERN EXTENSIONS OF THE SHATTUCK ORES.

**COLE INTERIOR** — AN INTERIOR SHAFT IN THE COLE MINE, WHICH CONNECTED THE 500 AND 800 LEVELS AND PROVIDING SERVICE TO THE 600 AND 700 LEVELS. IT WAS DEVELOPED SO THAT THE “INTERIOR” AREA COULD BE DEVELOPED WITHOUT THE NEED TO RUN ALL OF THE ACCESS DEVELOPMENT FROM THE COLE SHAFT ON ALL OF THE LEVELS, A TREMENDOUS SAVINGS IN TIME AND MONEY. THE CAGE WAS AUTOMATED SO THAT THE RIDER COULD CONTROL THE HOIST, THUS ELIMINATING THE NEED FOR BOTH A HOISTMAN AND A CAGER.

**COLLAR** — 1). AT A MINESHAFT, THE FIRST WOOD FRAME OF THE SHAFT OR THE AREA IMMEDIATELY ADJACENT TO THE SHAFT OPENING AT THE SURFACE. AT BISBEE, THIS WAS THE AREA AROUND THE SHAFT, WHERE THE MEN WAITED TO BE LOADED ON THE CAGE AND BE LOWERED INTO THE MINE. 2). FOR A DRILL HOLE, IT IS THE INITIAL PORTION AT THE ROCK SURFACE. 3). THE ACT OF STARTING A DRILL HOLE OR MINE OPENING IS TO COLLAR.

**COLLAR BRACE** — A 4” X 6” X 5’ TIMBER PLACED ON WEDGES NAILED TO THE POST BETWEEN SETS AT THE POINT WHERE THE POST AND CAP MET TO PREVENT EITHER THE POST OR CAP FROM SHIFTING HORIZONTALLY.

**COLLAR TO COLLAR** — REFERRING TO THE TIME SPENT IN THE MINE. FROM THE SHAFT COLLAR GOING DOWN, TO THE SHAFT COLLAR COMING UP, THIS WAS TYPICALLY EIGHT HOURS AFTER 1912, WHEN THE "EIGHT HOUR LAW" WAS ENACTED, GOVERNING THE TIME A MAN COULD WORK UNDERGROUND, EXCEPT IN A DIRE EMERGENCY. SEE ALSO PORTAL TO PORTAL.

**COLLARING** — 1). THE PROCESS OF STARTING TO DRILL A BLASTHOLE OR DIAMOND DRILL HOLE AT THE ROCK FACE. 2). THE BEGINNING OF THE EXCAVATION FOR A MINESHAFT.

**COLUMN** — A ROUND, STEEL, PIPELIKE PILLAR WITH AN ADJUSTABLE, COURSE THREADED HEADPIECE, WHICH IS SET VERTICALLY OR HORIZONTALLY IN A HEADING TO SUPPORT A MACHINE DRILL, WHICH WOULD BE MOUNTED ON A HORIZONTAL BAR, WHEN SET VERTICALLY AS A PART OF A “BAR AND COLUMN” DRILL SETUP.

**COMBINATION MOTOR** — A FEW MOTORS WERE PURCHASED, WHICH WERE BOTH BATTERY AND TROLLEY POWERED. THE BATTERY CHARGED WHENEVER THE TROLLEY POLE WAS IN USE AND WHEN THE TROLLEY POLE WAS NOT IN CONTACT WITH THE WIRE, A SIMPLE SWITCH ALLOWED FOR THE OPERATION WITH BATTERY POWER.

**COMPANY HOSPITAL** — THE HOSPITAL OPERATED BY THE MINING COMPANY. BEFORE 1908, ONLY THE COPPER QUEEN OPERATED A HOSPITAL, WHEN THE C. & A. BUILT AND OPERATED ONE AS WELL. FOLLOWING THE MERGER IN 1932, THE C. & A. HOSPITAL WAS CLOSED AND THE PD HOSPITAL CONTINUED. THE COMPANY OFFERED THIS VITAL SERVICE TO THE COMMUNITY OF BISBEE UNTIL A FEW YEARS AFTER CLOSING THE MINES, WHEN IT WAS TURNED OVER TO LOCAL GOVERNMENT

**COMPANY HOUSE** — A HOUSE PROVIDED THE EMPLOYEE AT A NOMINAL RENT. THESE WERE RELATIVELY FEW IN NUMBER BEFORE THE LAVENDER PIT WITH ONLY THE MOST SENIOR OF MANAGERS HAVING HOMES PROVIDED BY THE COMPANY. WITH THE INCREASED NEED FOR HOUSING BROUGHT ABOUT BY THE DEVELOPMENT OF THE PIT AND CONCENTRATOR IN THE LATE 1940S, THE COMPANY BUILT JUST OVER 100 HOUSES FOR THE EMPLOYEES AT ALL LEVELS TO USE. WHILE THESE HOUSES WERE RELATIVELY SMALL, LESS THAN 1,000 SQUARE FEET, THEY WERE MORE THAN ADEQUATE AND WELL MAINTAINED BY THE COMPANY.

**COMPANY STORE** — ONLY THE COPPER QUEEN OPERATED A COMPANY OWNED STORE IN BISBEE. IT LATER BECAME THE PHELPS DODGE MERCANTILE COMPANY (PD MERC.) WITH STORES IN BISBEE, THEN IN LOWELL AND NACO AND LASTLY WARREN. THESE WERE NEVER OPERATED IN THE DOMINEERING, OBLIGATORY MANNER, WHICH MARKED SO MANY COMPANY STORES ELSEWHERE. THIS STORE ALWAYS CARRIED QUALITY MERCHANDISE AT COMPETITIVE PRICES AND OFFERED SERVICES, SUCH AS FREE HOME DELIVERY OF GROCERIES (AN IMPORTANT BENEFIT TO THE PEOPLE WHO HAD MANY STAIRS TO CLIMB), CREDIT TO EMPLOYEES AND EXTENDED, INTEREST FREE, PAYMENT TERMS ON LARGE PURCHASES.

**COMPARTMENT** — A SPACE OR DIVISION IN A SHAFT OR RAISE, FORMED BY CROSS BUNTONS. THE MAIN COMPARTMENTS IN A HOISTING SHAFT ARE TWO FOR CAGES OR SKIPS AND, TYPICALLY, A THIRD FOR THE MAIN AIR AND WATER LINES AS WELL AS FOR POWER CABLES. A LADDER WAY OR MANWAY IS OFTEN, BUT NOT ALWAYS IN THIS COMPARTMENT AS WELL. TYPICALLY, RAISES WERE DIVIDED INTO TWO COMPARTMENTS, ONE FOR BROKEN ROCK AND ONE FOR AIR AND WATER LINES, VENT PIPE, TIMBER SLIDE AND MANWAY.

**COMPETENT ROCK** — ROCK WHICH, BECAUSE OF ITS PHYSICAL AND GEOLOGICAL CHARACTERISTICS, IS CAPABLE OF SUSTAINING OPENINGS WITHOUT ANY STRUCTURAL SUPPORT EXCEPT PILLARS AND WALLS LEFT DURING MINING (STULLS, LIGHT PROPS, AND ROOF BOLTS ARE NOT CONSIDERED STRUCTURAL SUPPORT).

**COMPOSITE SAMPLE** — AN ASSAY SAMPLE COMPOSED OF MULTIPLE SAMPLES AND USED TO REPRESENT A PERIOD OF TIME OR MULTIPLE SOURCES.

**CONCENTRATE** — THE CLEAN PRODUCT, WHICH CONTAINS THE RECOVERED, METAL BEARING MINERALS FROM A FROTH FLOTATION OR GRAVITY SEPARATION CIRCUIT. FREQUENTLY REFERRED TO AS “CONS.”

**CONCENTRATE GRADE** — THE COPPER CONTENT OF THE CONCENTRATE EXPRESSED AS A PERCENTAGE. THE CONCENTRATES PRODUCED BY THE LAVENDER PIT CONCENTRATOR WERE LOW BY INDUSTRY STANDARDS, AS WAS THAT OF THE EARLIER SACRAMENTO PIT. BISBEE'S OPEN PIT ORES WERE DIFFICULT TO CONCENTRATE, AS THE COPPER MINERALS WERE SO TIGHTLY BOUND TO THE WORTHLESS PYRITE. TYPICALLY, THE LAVENDER PIT CONCENTRATE GRADE WAS BELOW 16% COPPER, WHILE THAT FROM THE SACRAMENTO CONCENTRATOR WAS OFTEN LESS THAN 10% COPPER. MINES WITH A MORE FAVORABLE MINERALOGY WILL PRODUCE CONCENTRATES OF SLIGHTLY GREATER THAN 30% COPPER.

**CONCENTRATE TABLE** — INCLINED TABLES USED IN THE GRAVITY SEPARATION OF ORE AND WASTE MINERALS BY TAKING ADVANTAGE OF THEIR DIFFERENT SPECIFIC GRAVITIES. THESE TABLES WERE EMPLOYED IN THE SACRAMENTO CONCENTRATOR WITH LIMITED SUCCESS AND WERE SOON REPLACED BY MORE EFFICIENT FROTH FLOTATION.

**CONCENTRATOR** — A MILLING PLANT THAT PRODUCES A CONCENTRATE OF THE VALUABLE MINERALS OR METALS. FURTHER TREATMENT SUCH AS SMELTING AND REFINING ARE REQUIRED TO RECOVER THE PURE, MARKETABLE METAL.

**CONGLOMERATE** — A SEDIMENTARY ROCK CONSISTING OF ROUNDED, WATER-WORN PEBBLES OR BOULDERS CEMENTED INTO A SOLID MASS. AT BISBEE, THE GLANCE CONGLOMERATE IS A CLASSIC EXAMPLE.

**CONS** — A TERM USED TO REFER TO CONCENTRATES.

**CONTACT** — 1). A GEOLOGICAL TERM USED TO DESCRIBE THE LINE OR PLANE ALONG WHICH TWO DIFFERENT ROCK FORMATIONS MEET. IT CAN ALSO BE USED TO DEFINE THE PLANE OR POINT AT WHICH THE ORE AND HOST ROCK MEET. 2). THE CONTACT MINE, NEAR DON LUIS WHICH WAS SUNK ON CONTACT BETWEEN AN INTRUSIVE AND LIMESTONE. IT WAS AN UNSUCCESSFUL PROSPECTING EFFORT.

**CONTACT BRECCIA** — WHEN THE SACRAMENTO STOCK INTRUDED THE LIMESTONES, IT BRECCIATED THE LIMESTONES ALONG ITS EDGES. THIS BRECCIA ZONE WAS FREQUENTLY REFERRED TO AS THE CONTACT BRECCIA. THE AREA WAS GENERALLY AN IMPORTANT SOURCE OF ORE, WHICH WAS MINED, FIRST BY THE UNDERGROUND OPERATIONS IN THE HOLBROOK, SPRAY AND GARDNER MINES, THEN BY THE HOLBROOK EXTENSION OF THE LAVENDER PIT.

**CONTACT METAMORPHISM** — METAMORPHISM OF COUNTRY ROCKS ADJACENT TO AN INTRUSION, CAUSED BY HEAT FROM THE INTRUSION. THE CONTACT METAMORPHISM AT BISBEE WAS RELATIVELY MODEST.

**CONTRACT** — FOR A BONUS MINER, THIS ENCOMPASSED THE TERMS AND CONDITIONS BY WHICH HE WAS PAID HIS BONUS. IT CONSIDERED THE PREVAILING CONDITIONS WHERE THE MINING WAS BEING PERFORMED, SUCH AS THE NATURE OF THE GROUND, THE TYPE AND AMOUNT OF SUPPORT REQUIRED, THE NEED TO ADVANCE PIPE, TRACK AND/OR VENTILATION; DISTANCE FROM THE SHAFT AND SERVICES, ETC. THESE FACTORS BECAME THE STANDARDS BY WHICH PERFORMANCE WAS GAUGED AND BONUS PAID.

**CONTRACT ENGINEER** — THE MINING ENGINEER RESPONSIBLE FOR ADMINISTERING THE MINER'S BONUS CONTRACT. THIS INCLUDES DETERMINING GROUND CONDITIONS, HEADING ADVANCE OR TONNAGE PRODUCED AND RELATED MATTERS, ALL OF WHICH DETERMINED THE BONUS TO BE PAID. ALSO CALLED BONUS ENGINEER, (SEE WHICH).

**CONTRACT DRILLER** — IT WAS A COMMON PRACTICE TO CONTRACT OUT LARGE EXPLORATORY DRILLING PROGRAMS, ON BOTH THE SURFACE AND UNDERGROUND TO EXTERNAL DIAMOND DRILLING COMPANIES. THE CONTRACTORS TYPICALLY HAD RIGS THAT CUT LARGER CORES AND USED A CORE RECOVERY SYSTEM THAT DID NOT REQUIRE PULLING THE RODS. ONLY A BIT CHANGE NECESSITATED THIS LABORIOUS TASK. THESE GUYS WERE PAID BY THE FOOT DRILLED AND THEY MADE MONEY, LOTS OF MONEY AND WERE THE ENVY OF THE COMPANY DIAMOND DRILL CREWS, WHICH LASTED UNTIL THE CONTRACT WAS FINISHED AND THEY HAD TO MOVE ON, SOMETIMES WITHOUT A NEXT JOB.

**CONVENTIONAL STEEL** — DRILL STEEL WITH THE BIT FORMED ON THE END AS AN INTEGRAL PART OF THE STEEL. EARLY DRILL STEEL WAS ALL OF THIS TYPE. ALSO CALLED INTEGRAL STEEL.

**CONVERTER** — IN COPPER SMELTING, A FURNACE USED TO SEPARATE COPPER METAL FROM MATTE.

**COPPER** — THIS TERM WAS TYPICALLY USED TO MEAN "NATIVE COPPER," A COMMON, NATURALLY OCCURRING FORM OF NEAR PURE COPPER, WHICH WAS LOCALLY ABUNDANT AND WIDELY COLLECTED BY THE MINERS AS MINERAL SPECIMENS.

**COPPER CZAR** — THE ORIGINAL NAME OF THE CZAR MINE WHEN IT WAS DEVELOPED IN 1884. IT WAS SOON SHORTENED TO CZAR BY LOCAL USAGE AND NOT BY DESIGN.

**COPPER PYRITE(S)** — A LOCAL TERM USED FOR THE COPPER MINERAL CHALCOPYRITE, WHICH STRONGLY RESEMBLES PYRITE.

**COPPER QUEEN** — A NAME USED TO REFER TO THE COPPER QUEEN CONSOLIDATED MINING COMPANY OR ANY OF ITS BUSINESS ENTITIES AT BISBEE.

**COPPER QUEEN BRANCH** — THE COPPER QUEEN CONSOLIDATED MINING COMPANY WAS FOLDED INTO PHELPS DODGE AND COMPANY IN 1917 WHEN P. D. BROUGHT ALL OF ITS VARIOUS OPERATIONS UNDER ONE COMPANY AS BRANCHES. THE BISBEE OPERATIONS WERE NAMED THE COPPER QUEEN BRANCH OF PHELPS DODGE AND COMPANY, LATER PHELPS DODGE CORPORATION.

**COPPER QUEEN MINE** — THIS MAY REFER TO THE ORIGINAL MINE OF THE COPPER QUEEN, WHICH CEASED OPERATION IN 1888 OR TO ANY OR ALL OF THE SEVERAL MINES OPERATED BY THE COPPER QUEEN CONSOLIDATED MINING COMPANY OR, LATER, THE COPPER QUEEN BRANCH OF PHELPS DODGE CORP. THE DESIGNATION OF SOMETHING COMING FROM OR HAVING BEEN USED IN THE COPPER QUEEN MINE IS WIDELY MISUSED.

**COPPER WATER** — A COLLECTIVE TERM FOR ANY LOW PH MINE WATER. SO CALLED, AS IT FREQUENTLY CONTAINED COPPER THAT QUICKLY PLATED ANY IRON OR STEEL ITEM THAT CAME INTO CONTACT WITH THE WATER. PROLONGED CONTACT OF STEEL TOOLS, TRACK OR PIPE WITH COPPER WATER SOON DESTROYED THE ITEM, THUS IT WAS SOMETHING TO BE AVOIDED. THESE WATERS WERE CHANNELED TO UNDERGROUND PRECIPITATION PLANTS OR PUMPED TO THE SURFACE BY SPECIAL PUMPS, THROUGH WOODEN OR STAINLESS STEEL PIPES, FOR COPPER RECOVERY.

**COPPER WATER BURN** — THE ACIDIC MINE WATERS WERE SOMETIMES STRONG ENOUGH TO CAUSE ACID BURNS TO THE SKIN. HOLES QUICKLY APPEARED IN THE CLOTHS OF THOSE WORKING IN COPPER WATER AREAS. IT ALWAYS BURNED THE EYES WHEN IT GOT INTO THEM, IN SOME CASES SEVERELY. UNDERGROUND WORKERS SOON GAINED A RESPECT FOR THIS COMMON AND TROUBLESOME WATER. EYE SHIELDS WERE USED AROUND COPPER WATER MORE OFTEN THAN WHEN BREAKING BOULDERS AND BOTH WERE HAZARDOUS.

**CORE** — THE CYLINDRICAL ROCK SAMPLE COLLECTED BY THE DIAMOND DRILL THAT CUT THE ROCK AT THE SIDES TO HAVE THE CORE SLIDE INTO THE CORE BARREL THAT WAS CONNECTED TO THE DIAMOND-SET BIT. MOST DIAMOND DRILL CORING UNDERGROUND AT BISBEE WAS SMALL, -  $\frac{3}{4}$  INCHES IN DIAMETER, BECAUSE OF THE SPACE CONSTRAINTS OF DRILLING IN CROSSCUTS, OFTEN AT AN ANGLE, ONLY SMALL EQUIPMENT COULD BE USED.

**CORE BARREL** — THE PART OF THE DIAMOND DRILL ROD WHICH IS JUST BEHIND THE BIT AND WHICH RECEIVES AND HOLDS THE CORE.

**CORE TRAY** — THESE WERE SHEET METAL TRAYS MADE IN THE TIN SHOP AND USED TO STORE THE DIAMOND DRILL CORE IN SEQUENTIAL ORDER UNTIL IT WAS LOGGED AND SAMPLED BY THE GEOLOGIST.

**CORNER SET** — IN A STOPE, THE TIMBER SET IN THE CORNER, USUALLY THE LAST SET IN ONE DIRECTION. IF THE GROUND WAS REASONABLY GOOD, THIS SET WAS NOT GOBBED, BUT CARRIED UP LIKE A RAISE FOR VENTILATION, ACCESS AND TO BRING IN GOB TO FILL THE ADJACENT SETS.

**CORNISH CHUTE** — A SMALL CHUTE MADE ENTIRELY OF MINE TIMBER WITH A WOODEN CHUTE DOOR AND USED IN AREAS WHERE ONLY SMALL AMOUNTS OF ORE WILL BE EXTRACTED.

**COUNTER WEIGHT** — 1). A WEIGHT SUSPENDED BY A CABLE ATTACHED TO A HOIST DRUM, WHICH IS BALANCED, WITH THE CAGE, TO AID IN LIFTING THE CAGE AS THE COUNTER WEIGHT DROPS WHILE THE CAGE IS LIFTED. 2). IN THE LAVENDER PIT, ALL OF THE ELECTRIC SHOVELS HAD VERY HEAVY COUNTER WEIGHTS ATTACHED TO THE BACK OF THE SHOVEL AS WELL AS A COMPARTMENT AT THE BACK OF THE SHOVEL FILLED WITH GRINDING BALLS TO OFFSET THE FORCE OF DIGGING AS WELL AS THE WEIGHT OF THE LOADED BUCKET.

**COUNTRY** — AN AREA OF A MINE WITH A SPECIFIC CHARACTERISTIC, SUCH AS "27 COUNTRY," WHICH IS THE AREA AROUND 27 STOPE OR "BROKEN COUNTRY," WHICH IS AN AREA OF BROKEN GROUND.

**COUPON BOOK** — SOME MAY DISPUTE THIS AS A MINING TERM, BUT COUPON BOOKS WERE SOLD ON CREDIT AT THE COMPANY STORE IN VALUES OF \$5.00, \$10.00 AND \$20.00. MINERS SHORT OF CASH WOULD CHARGE A BOOK AGAINST HIS NEXT CHECK AND SELL THE BOOK TO A FELLOW MINER AT A DISCOUNT OF TYPICALLY 15% (\$17.00 FOR A \$20.00 BOOK). THE BUYER COULD USE THE COUPONS LIKE CASH AT THE COMPANY STORE. MANY A BOOK CHANGED HANDS UNDERGROUND OR IN THE CHANGE ROOM, EITHER FOR CASH OR TO PURCHASE MINERALS FROM ANOTHER MINER.

**COURSE ORE STOCKPILE** — THE DISCHARGE FROM THE PRIMARY CRUSHER WAS TRANSPORTED BY CONVEYOR BELT ACROSS HIGHWAY 80 AND DROPPED ONTO A LARGE PILE TO FEED THE SECONDARY CRUSHERS. THIS PILE WAS THE COURSE ORE STOCKPILE. IT ALSO PROVIDED SOME SURGE CAPACITY SO THE CONCENTRATOR NEED NOT BE STOPPED IF MAINTENANCE WORK WAS TO BE PERFORMED ON THE PRIMARILY CRUSHER.

**COUSIN JACK** — A COLLECTIVE TERM FOR AN EXPERIENCED MINER FROM CORNWALL, ENGLAND WHO NORMALLY HAD A COUSIN OFTEN NAMED "JACK" BACK IN ENGLAND WHO NEEDED WORK AS A MINER. CORNISH MINERS WERE THE BEST IN THE BUSINESS DURING THE LAST HALF OF THE 19<sup>TH</sup> CENTURY AND HIGHLY SOUGHT AFTER BY MINING COMPANIES EVERYWHERE AND BISBEE WAS NO EXCEPTION.

**CREST** — THE TOP, FORWARD EDGE OF THE BENCH IN AN OPEN PIT.

**CRIB** — 1). A CONSTRUCTION OF TIMBERING MADE BY SETTING TIMBER HORIZONTALLY ONE ABOVE ANOTHER, WITH THE FRAMED NOTCHES HOLDING THEM CLOSELY TOGETHER, EACH LAYER BEING AT RIGHT ANGLES TO THOSE ABOVE AND BELOW IT. 2). ALSO, THE ACT OF PUTTING CRIBBING IN PLACE.

**CRIBBED RAISE** — A RAISE TIMBERED BY CRIBBING.

**CRIBBING** — THE CLOSE SETTING OF TIMBER SUPPORTS WHEN SHAFT SINKING THROUGH LOOSE GROUND OR RAISING THROUGH SIMILARLY BAD GROUND. THE TIMBER IS USUALLY SQUARE OR RECTANGULAR AND PRACTICALLY NO GROUND IS EXPOSED. THE METHOD IS ALSO USED FOR SUPPORTING RAISES IN BAD GROUND AND IN THE CONSTRUCTING ORE CHUTES.

**CROSS BIT** — A ROCK DRILL BIT IN THE SHAPE OF A CROSS OR X AND HAVING FOUR CUTTING EDGES. THESE CAME TO BISBEE WITH THE ADVENT OF PNEUMATIC DRILLING AND WERE FIRST USED AS PART OF INTEGRAL STEELS AND THEN AS SCREW ON AND FINALLY AS KNOCK OFF BITS. ALSO CALLED CRUCIFORM BITS.

**CROSSCUT** — AT BISBEE, MOST, IF NOT ALL HORIZONTAL WORKINGS ON A LEVEL OF THE MINE WERE REFERRED TO AS CROSSCUTS, EVEN THOUGH THE ACTUAL DEFINITION IS - "A

HORIZONTAL OPENING DRIVEN ACROSS THE COURSE OF A VEIN OR IN GENERAL ACROSS THE DIRECTION OF THE MAIN WORKINGS.”

**CROSSHEAD** — A RUNNER OR FRAMEWORK THAT RUNS ON SHAFT GUIDES, PLACED A FEW FEET ABOVE THE SINKING BUCKET TO PREVENT IT FROM SWINGING TOO VIOLENTLY WHEN HOISTED.

**CROWD** — THE ACT OF FORCING THE SHOVEL BUCKET INTO THE BROKEN MUCK TO FILL IT.

**CUÑA** — SPANISH FOR WEDGE, BUT USED COMMONLY BY ALL WORKERS ALIKE BECAUSE OF THE HUGE INFLUENCE OF THE MEXICAN AMERICAN MINERS.

**CUPELLATION** — THE PROCESS OF ASSAYING FOR PRECIOUS METALS WITH A CUPEL WITH THE OXIDATION OF MOLTEN LEAD CONTAINING GOLD AND SILVER TO PRODUCE LEAD OXIDE, THEREBY SEPARATES THE PRECIOUS METALS FROM THE BASE METAL.

**CUPRITE** — 1). A COPPER OXIDE MINERAL, WHICH WAS OF GREAT ECONOMIC IMPORTANCE IN THE OXIDE ORES AT BISBEE. MINERS FREQUENTLY COLLECTED SPECIMENS OF CUPRITE WHEN POSSIBLE, AS THE DEEP RED CRYSTAL WERE BEAUTIFUL. IT WAS OFTEN CALLED “RUBY COPPER.” PURE CUPRITE CONTAINS 88.9% COPPER, BUT WAS SELDOM FOUND IN LARGE, PURE MASSES, RATHER AS SCATTERED, SMALL PIECES IN GANGUE. 2). THE CUPRITE MINE.

**CUT** — A FULL MINING WIDTH. TO TAKE A CUT IS TO MINE A FULL WIDTH OR COMPLETE A FULL-LENGTH ADVANCE.

**CUT AND FILL STOPING** — A STOPING METHOD IN WHICH THE ORE IS EXCAVATED BY SUCCESSIVE FLAT OR INCLINED CUTS, WORKING UPWARD FROM THE LEVEL. HOWEVER, AFTER EACH CUT IS BLASTED DOWN, ALL BROKEN ORE IS REMOVED, AND THE STOPE IS FILLED WITH WASTE UP TO WITHIN A FEW FEET OF THE BACK BEFORE THE NEXT CUT IS TAKEN OUT, JUST ENOUGH ROOM BEING LEFT BETWEEN THE TOP OF THE WASTE PILE AND THE BACK OF THE STOPE TO PROVIDE WORKING SPACE. THE TERM CUT AND FILL STOPING IMPLIES A DEFINITE AND CHARACTERISTIC SEQUENCE OF OPERATIONS: (1) BREAKING A CUT OF ORE FROM THE BACK; (2) REMOVING THE BROKEN ORE; AND (3) INTRODUCING GOB (FILL).

**CUT BACK** — IN OPEN PIT MINING, STARTING AT THE TOP AND MINING A PREDETERMINED WIDTH, BENCH BY BENCH, DOWNWARD TO GAIN ACCESS TO ORE.

**CUT HOLES** — THE HOLES IN THE CENTER OF ANY PATTERN OF BLASTHOLES, WHICH ARE TO BE FIRED FIRST TO CREATE THE VOID INTO WHICH THE OTHER HOLES WILL BREAK WHEN FIRED.

**CUTOFF GRADE** — MINIMUM PERCENTAGE OF METAL OR VALUE OF AN ORE THAT CAN BE MINED AND PROCESSED PROFITABLY. IT MAY ACTUALLY BE DETERMINED BY INCLUDING THE VALUE OF BY PRODUCT METALS SUCH AS GOLD AND SILVER AS WELL. ANY MATERIAL BELOW THE CUTOFF GRADE WAS TREATED AS EITHER WASTE OR, IF APPLICABLE LEACH.

**CZAR** — THE CZAR MINE.

**DALLAS** — THE DALLAS MINE.

**DAMP** — OXYGEN DEFICIENT ATMOSPHERE, A NOT TOO UNCOMMON OCCURRENCE IN ABANDONED WORKINGS AT BISBEE AS TIMBER DECAY AND SULFIDE OXIDATION BOTH

CONSUMED OXYGEN. THE TERM BAD AIR WAS MORE COMMONLY APPLIED TO THIS CONDITION IN THE MINES AT BISBEE.

**DAY FOREMAN** — EVERY UNDERGROUND OPERATION HAD A FOREMAN IN OVERALL CHARGE OF THE MINE, INCLUDED SHIFT BOSSES ON EACH OF THE TWO SHIFTS (DAY SHIFT, NIGHT SHIFT). THESE WERE NON-ROTATING POSITIONS AND THE SAME MAN WAS ALWAYS ON DUTY DURING THE DAY SHIFT AND HIS COUNTERPART, DURING THE NIGHT SHIFT. THE DAY FOREMAN WAS THE SENIOR OF THE TWO AND WAS, IN FACT, THE DIRECT SUPERVISOR OF THE NIGHT FOREMAN. HE, IN TURN, REPORTED TO THE GENERAL MINE FOREMAN.

**DAY LIGHTED** — WHEN A MINE WORKING IS PERUSED TO THE SURFACE, IT IS SAID TO DAY LIGHT WHEN IT BREAKS THROUGH TO THE SURFACE.

**DAY SHIFT** — THE FIRST SHIFT OF THE DAY. FOR THE UNDERGROUND, IT RAN FROM 7:00 AM TO 3:00 PM. IT WAS THE SAME IN THE PIT AND CONCENTRATOR AS THEY WORKED AROUND THE CLOCK. IN THE SURFACE SHOPS, IT WAS 7:00 AM TO 3:30 PM AS LUNCH WAS NOT PAID TIME FOR THE SHOPS AS IT WAS UNDERGROUND OR IN THE ROUND THE CLOCK OPERATIONS.

**DAY'S PAY EMPLOYEES** — ALL NON-MANAGEMENT, NON-TECHNICAL STAFF WERE REFERRED TO AS DAY'S PAY EMPLOYEES AS THEY WERE PAID BASED ON EACH DAY WORKED.

**DEAD TIME** — TIME WORKED ON NON-PRODUCTIVE, BUT NECESSARY TASK SUCH AS CLEANUP OR MAINTENANCE, WHICH IS NOT CHARGED AGAINST THE MINER'S BONUS CONTRACT. BONUS MINERS SOUGHT TO HAVE AS MUCH TIME AS POSSIBLE CLASSIFIED AS DEAD TIME TO INCREASE BONUS PAYMENT.

**DEAD WORK** — WORK THAT IS NOT DIRECTLY PRODUCTIVE, SUCH AS THE REMOVAL OF ROCK, DEBRIS, OR OTHER MATERIAL THAT IS NOT DIRECTLY RELATED TO THE PRODUCTION OF ORE, THOUGH IT MAY BE NECESSARY FOR EFFICIENT OPERATION AND FUTURE PRODUCTION. BONUS MINERS AT BISBEE ALWAYS ATTEMPTED TO HAVE ANY NON-PRODUCTIVE, BUT NECESSARY WORK THUS CLASSIFIED TO MINIMIZE THE TIME CHARGED AGAINST THEIR CONTRACT IN ORDER TO EARN MORE BONUS.

**DECANT TOWER** — A PIPE COLUMN IN THE TAILINGS POND, THE TOP OF WHICH WAS CONTINUALLY EXTENDED VERTICALLY TO REMAIN AT A LEVEL SUCH THAT THE DECANTED WATER (WATER FROM WHICH THE FINES HAD SETTLED) FLOWED INTO THE TOP OF THE PIPE FOR RECOVERY AND REUSE.

**DEEP ENOUGH** — TIME TO STOP WORK FOR THE DAY. THE SAYING WAS "SHE'S DEEP ENOUGH," MEANING IT WAS THE END OF THE SHIFT.

**DENN** — THE DENN MINE.

**DENN SIDELINE** — RICH ORES WERE DISCOVERED ALONG THE DIVIDEND FAULT IN THE AREA ADJACENT TO THE SHATTUCK DENN/CALUMET AND ARIZONA PROPERTY LINE AND MINED BY BOTH COMPANIES FROM THEIR RESPECTIVE PARTS. THIS AREA WAS KNOWN AS THE "DENN SIDELINE" AS IT WAS NEAR OR ALONG THE SIDELINE OF CLAIMS OWNED BY THE DENN.

**DEPOSIT** — MINERAL DEPOSIT OR AN ORE DEPOSIT IS USED TO DESIGNATE A NATURAL OCCURRENCE OF A USEFUL MINERAL, OR AN ORE, IN SUFFICIENT EXTENT AND DEGREE OF CONCENTRATION TO INVITE EXPLOITATION.

**DEPTH** — THE WORD ALONE GENERALLY DENOTES VERTICAL DEPTH BELOW THE SURFACE. IN THE CASE OF INCLINE SHAFTS AND BOREHOLES IT MAY MEAN THE DISTANCE REACHED FROM THE BEGINNING (COLLAR) OF THE SHAFT OR HOLE, THE BOREHOLE DEPTH, OR THE INCLINED DEPTH, OR TOTAL LENGTH.

**DERAIL** — WHEN THE WHEELS OF THE MOTOR OR ONE OR MORE MINE CARS LEAVE THE TRACK. THIS CAN BE CAUSED BY MATERIALS ON THE TRACK, SUCH AS FALLEN ROCK, BAD TRACK SUCH AS A SPREADING BECAUSE OF LOST SPIKES OR ROTTEN TIES, BROKEN RAILS, OR EXCESSIVE SPEED. DERAILMENTS WERE COMMON UNDERGROUND AND USUALLY NOT TOO GREAT A PROBLEM. DERAILED LOADS WERE MORE DIFFICULT TO RERAIL THAN EMPTIES, OBVIOUSLY. ALSO CALLED DERAILMENT OR WRECK.

**DETACHABLE BIT** — A DRILL BIT WHICH COULD BE REMOVED FROM THE DRILL STEEL. THE FIRST DETACHABLE BITS WERE SCREW-ON TYPES WHILE LATER DETACHABLE BITS WERE KNOCK OFF. EARLY BITS WERE FORMED ON THE END OF THE DRILL STEEL. REQUIRING THE WHOLE STEEL BE HANDLED WHEN SHARPENED. DETACHABLE BITS WERE A MAJOR IMPROVEMENT, AS ONLY THE BITS WERE NOW HANDLED FOR RESHARPENING.

**DEVELOPMENT DRILLING** — DRILLING TO FIRST FIND, THEN ESTABLISH ACCURATE ESTIMATES OF THE LOCATION, SIZE AND GRADE OF MINERAL RESERVES IN A DEPOSIT.

**DIAMOND DRILL** — A ROTARY TYPE OF ROCK DRILL THAT CUTS A CORE OF ROCK THAT IS RECOVERED IN LONG CYLINDRICAL SECTIONS,  $\frac{3}{4}$  INCHES OR MORE IN DIAMETER. MOST UNDERGROUND DIAMOND DRILLING AT BISBEE WAS DONE USING SMALL DIAMETER BITS AND FIVE-FOOT LONG RODS BECAUSE OF SPACE CONSTRAINTS.

**DIAMOND DRILL FOREMAN** — THE SUPERVISOR OF THE DIAMOND DRILL CREWS IN ALL OF THE SEVERAL MINES. EVEN THOUGH THE GEOLOGIST DIRECTED THE DRILLING ACTIVITIES, THIS MAN SAW TO THE REGULAR FLOW OF SUPPLIES AND WAS RESPONSIBLE TO MAN THE CREWS WITH THE ASSISTANCE OF THE SEVERAL MINE FOREMEN.

**DIAMOND DRILL HELPER** — THE ASSISTANT TO THE DIAMOND DRILLER, WHO AIDED IN PULLING THE RODS TO RECOVER THE CORE, KEEP THE MACHINERY LUBRICATED AND IN GOOD REPAIR, COLLECTED THE SUPPLIES ETC.

**DIAMOND DRILLER** — A PERSON WHO OPERATES A DIAMOND DRILL WITH THE ASSISTANCE OF A HELPER.

**DIAMOND DRILLING** — THE ACT OR PROCESS OF OBTAINING A CORE SAMPLE OF ROCK MATERIAL USING A DIAMOND-INSET ANNULAR BIT AS THE CUTTING TOOL. THIS TUBULAR BIT AND ATTACHED CORE BARREL ARE ROTATED AT A SPEED UNDER CONTROLLED PRESSURE BY MEANS OF HOLLOW STEEL, FLUSH-JOINTED RODS THROUGH WHICH WATER IS PUMPED TO COOL THE BIT AND REMOVE ROCK CUTTINGS. WITH THE ADVANCE OF THE BIT, A CYLINDRICAL CORE OF ROCK PASSES UP INTO THE CORE BARREL, WHERE IT IS HELD BY A CORE BARREL OR OTHER DEVICE.

**DIGGERS** — THESE WERE THE WORK CLOTHES WORN UNDERGROUND AND TAKEN HOME AT THE END OF SHIFT ON SATURDAY, BY MOST, BUT NOT ALL, TO BE WASHED. WASHING THESE MUD-SOAKED CLOTHES WAS A CHALLENGE FOR THE WIFE AT HOME AS IT TOOK MORE TIME AND EFFORT TO CLEAN THE WASHING MACHINE AFTERWARD, THAN TO DO A WEEK'S WORTH OF

LAUNDRY. THESE SAME CLOTHS WERE USED WEEK AFTER WEEK UNTIL THEY LITERALLY FELL APART.

**DIGGING PIT** — IN OPEN PIT MINING, THE AREA WHERE A SHOVEL IS OPERATING.

**DILUTION** — THE CONTAMINATION OF ORE WITH BARREN OR LOW-GRADE WALL ROCK IN STOPPING OR BY WASTE, MIXED WITH THE ORE. BY THE ADDITION OF WASTE OR LOW-GRADE, THE OVERALL ORE GRADE IS LOWERED OR DILUTED.

**DINKY HOIST** — NOT THE PRINCIPAL HOIST. A SMALL, SINGLE DRUM HOIST USED AS A SERVICE HOIST IN A PIPE OR SERVICE COMPARTMENT.

**DIP** — THE ANGLE AT WHICH A FAULT, BED, STRATUM, OR VEIN IS INCLINED FROM THE HORIZONTAL, MEASURED PERPENDICULAR TO THE STRIKE AND IN THE VERTICAL PLANE. THE LIMESTONES AT BISBEE TYPICALLY DIP TO THE EAST AT BETWEEN 15 AND 25 DEGREES.

**DIPPER** — THE DIGGING BUCKET ON A POWER SHOVEL BE IT STEAM OR ELECTRIC. SEE ALSO BUCKET.

**DIRECT SMELTING ORES** — ORES, WHICH WERE SHIPPED DIRECTLY TO THE SMELTER WITHOUT ANY FORM OF TREATMENT OR CONCENTRATION. THE OXIDE ORES MINED AT BISBEE ALL FELL INTO THIS CATEGORY, AS THEY WOULD NOT RESPOND TO ANY TREATMENT OR CONCENTRATION TECHNIQUE AVAILABLE AT THE TIME. THIS NECESSITATED A MUCH HIGHER GRADE FOR THESE ORES TO COVER THE COST OF TRANSPORTATION AND SMELTING. SMELTING OXIDES WAS MORE EXPENSIVE THEN SULFIDES, AS SULFIDES BURNED AND LIBERATED HEAT, SOMETHING OXIDES DO NOT DO.

**DIRTY BOOTLEG** — A BOOTLEG, WHICH CONTAINS UNEXPLODED POWDER. THESE WERE A CONSTANT AND SERIOUS THREAT TO MINERS, SOMETHING ALL TOOK INTO CONSIDERATION, WHEN CLEANING AND INSPECTING THE WORKING FACE.

**DISPATCHER** — THE PERSON WHO DIRECTED TRAINS IN THE SAC PIT AND, LATER, TRUCKS IN THE LAVENDER PIT TO THE APPROPRIATE SITE TO DUMP ITS LOAD OR TO A SHOVEL TO BE LOADED. ORE WENT TO THE CRUSHER WHILE WASTE AND LEACH MATERIAL WERE SENT TO THEIR RESPECTIVE AREAS OF THE DUMPS. IN THE SACRAMENTO PIT, COMMUNICATION WAS BY TELEPHONE TO SWITCHMEN WHO THREW THE SWITCH TO DIRECT THE TRAINS TO THE SHOVEL IN NEED OF SERVICE OR TO THE TRACK LEADING TO THE DUMP FOR WASTE AND LEACH OR THE CRUSHER FOR ORE. IN THE LAVENDER PIT, TWO WAY RADIOS WERE USED WITH THE MUCK TRUCKS ALL RADIO EQUIPPED BY 1960.

**DISSEMINATED ORE** — ORE CARRYING SMALL PARTICLES OF VALUABLE MINERALS SPREAD MORE OR LESS UNIFORMLY THROUGH THE HOST ROCK. PORTIONS OF THE PORPHYRY MINED BY THE TWO PITS CONTAINED DISSEMINATED ORE MINERALS.

**DIVIDEND FAULT** — THE MAIN FAULT IN THE BISBEE AREA, WHICH WAS THE PRINCIPAL CONTROLLING FEATURE FOR INTRUSION BY THE SACRAMENTO STOCK COMPLEX AND SUBSEQUENT ORE DEPOSITION.

**DIVIDEND OREBODY** — A HUGE, BUT VERY SOFT OREBODY ALONG THE DIVIDEND FAULT, WHICH DEFIED ALL EFFORTS TO MINE IT FOR 25 YEARS UNTIL 1910 WHEN TOP SLICING WAS EMPLOYED, WITH REASONABLE SUCCESS. SUBSIDENCE RELATED TO MINING THIS

OREBODY REACHED THE SURFACE AND CAUSED PROBLEMS WITH THE STREETCAR TRACKS AND THE BISBEE – LOWELL ROAD. THE REMAINDER OF THIS DIFFICULT OREBODY WAS MINED WITH THE HOLBROOK EXTENSION OF THE LAVENDER PIT IN 1972.

**DIVISION** — THE UNDERGROUND MINING OPERATIONS HAD BECOME SO LARGE THAT THE INDIVIDUAL MINES WERE SEPARATED INTO UNITS FOR MANAGEMENT AND ACCOUNTING PURPOSES. BY WAY OF EXAMPLE, DIVISION 1 - SOUTHWEST, DIVISION 2 - CZAR, DIVISION 3 - HOLBROOK, DIVISION 4 - UNCLE SAM, DIVISION 5 - GARDNER, DIVISION 6 - LOWELL, DIVISION 7 - SACRAMENTO MINE DIVISION 8 - PORPHYRY BLOCK CAVING DIVISION (A PART OF THE SACRAMENTO MINE).

**DOCTOR'S RELEASE** — AN EMPLOYEE WHO HAD REPORTED AN ON THE JOB INJURY WAS REQUIRED TO RECEIVE MEDICAL TREATMENT AND BEFORE HE COULD GO BACK TO WORK. A RELEASE FROM THE ATTENDING PHYSICIAN (DOCTOR'S RELEASE), STATING HIS ABILITY TO RETURN TO HIS NORMAL OCCUPATION WAS REQUIRED. SIMILARLY, IF AN EMPLOYEE HAD REPORTED OFF DUE TO ILLNESS OR AN OFF THE JOB INJURY, HE WAS REQUIRED TO RECEIVE A RELEASE FROM A COMPANY DOCTOR TO RETURN TO WORK. IN EITHER CASE, THE FAILURE TO SECURE A RELEASE WOULD CREATE A PROBLEM FOR THE EMPLOYEE. AN INJURED MAN WOULD NOT BE ALLOWED TO RETURN TO WORK WITHOUT ONE, WHILE AN EMPLOYEE WHO REPORTED OFF DUE TO BEING SICK OR FROM AN OFF THE JOB INJURY WAS CONSIDERED TO HAVE BEEN AWOL WITHOUT SUCH A RELEASE.

**DOGHOUSE** — NEAR THE COLLAR OF EACH OF THE SHAFTS WAS A SMALL BUILDING TO AFFORD THE TOP CAGER PROTECTION FROM THE ELEMENTS. IT WAS HERE TOO THAT BOTH CAGERS TYPICALLY ATE LUNCH. THESE WERE RENOWNED FOR THE MANY, MANY PINUPS, WHICH DECORATED THE WALLS.

**DOGS** — ALSO CALLED SAFETY DOGS, THESE WERE HEAVY, CAM SHAPED STEEL MASSES WITH GEAR LIKE TEETH AND MOUNTED JUST ABOVE THE CAGE SHOE (GUIDE CHANNEL) AND ON A SPRING LOADED SHAFT ON THE CAGE WHICH, IF THE ROPE BECAME SLACK, WOULD ROTATE AND CAUSE THE DOGS TO DIG INTO THE SHAFT GUIDES AND, THUS, STOP THE CAGE SLOWLY AND COMPLETELY. SLACK ROPE WOULD OCCUR IF THE ROPE BROKE OR IF THE CAGE BECAME WEDGED IN THE SHAFT.

**DOUBLE JACK** — 1). A TWO-HAND HEAVY HAMMER, USUALLY WEIGHING BETWEEN 6 AND 10 POUNDS. IT WAS FORMALLY USED TO DRILL BLASTHOLES WITH HAND STEELS IN A TWO-MAN TEAM WHERE ONE MAN HELD AND TURNED THE STEEL WHILE THE OTHER HIT THE STEEL WITH THE HAMMER. THE DRILLING RATE FOR A PAIR OF SKILLED MINERS WAS 1.6 FEET PER HOUR IN BISBEE LIMESTONE. 2). LATER, HEAVIER DOUBLE JACKS OF ABOUT 20 POUNDS WERE USED TO BREAK BOULDERS ON GRIZZLIES AND IN STOPES. THE LATTER WERE ALSO CALLED SLEDGEHAMMERS.

**DOUBLE OVER** — TO STAY OVER AND WORK A SECOND CONSECUTIVE SHIFT, USUALLY BECAUSE SOMEONE ON THE FOLLOWING SHIFT DID NOT REPORT FOR WORK. THIS WAS POSSIBLE ON THE SURFACE ONLY, AS MEN WERE NOT ALLOWED TO WORK UNDERGROUND MORE THAN EIGHT CONSECUTIVE HOURS UNLESS IT WAS AN EXTREME EMERGENCY.

**DOUBLER** — A SECOND SET OF TIMBER INSTALLED NEXT TO AN EXISTING SET TO GIVE ADDITIONAL SUPPORT, USUALLY BECAUSE THE FIRST SET IS SHOWING SIGNS OF TAKING TOO MUCH WEIGHT OR FAILING.

**DOWN DROPPED** — THAT SIDE OF A FAULT ON WHICH THE STRATA AND ORE HAVE BEEN DISPLACED DOWNWARD IN RELATION TO THE OTHER, UPTHROWN OR UPCAST SIDE.

**DOWNCAST SHAFT** — THE SHAFT THROUGH WHICH THE FRESH AIR IS DRAWN OR FORCED INTO THE MINE; THE FRESH AIR INTAKE. THE JUNCTION, CAMPBELL, CONGDON AND COLE SHAFTS WERE DOWNCAST.

**DOZER**— A BULLDOZER AS USED IN THE OPEN PITS.

**DRÄGER** — THOUGH DRÄGER IS A TRADE NAME, IT WAS APPLIED TO ALL OF THE HAND OPERATED GAS DETECTION UNITS USED FOR THE DETECTION AND MEASUREMENTS OF TOXIC GASES, PARTICULARLY CARBON MONOXIDE (CO). THE TOOL WAS A SMALL HAND PUMP THAT WHEN SQUEEZED AND RELEASED DREW IN A SPECIFIC VOLUME OF AIR THROUGH A TUBE FILLED WITH MATERIAL WHICH RESPONDED TO VARYING LEVELS OF CO BY CHANGING COLOR. THESE WERE, BY NECESSITY, VERY SENSITIVE DEVICES, AS EVEN VERY SMALL CONCENTRATIONS OF CO WERE DANGEROUS TO LETHAL. THUS, IT WAS ESSENTIAL TO BE ABLE TO DETECT EVEN THE SMALLEST AMOUNT. SEE ALSO SNIFFER TUBE.

**DRAIN HOLE** — OCCASIONALLY, IT WAS NECESSARY OR DESIRABLE TO DRAIN AN AREA BY DRILLING A HOLE TO CONNECT WITH WORKINGS BELOW AND HAVE THE WATER FLOW THROUGH THE HOLE. THIS WAS ALSO DONE SEVERAL TIMES DURING SHAFT SINKING WHEN WATER WAS A REAL PROBLEM AS AT THE BRIGGS WHEN A DRILL HOLE WAS PUT IN THE SHAFT BOTTOM AND INTERCEPTED A DRIFT DRIVEN FROM THE HOATSON MINE.

**DRIFT** — A HORIZONTAL OPENING IN OR NEAR AN OREBODY AND PARALLEL TO THE COURSE OF THE LONG DIMENSION OF THE OREBODY. AT BISBEE, FEW WORKINGS WERE CALLED DRIFTS, EVEN THOUGH THEY WERE, BUT RATHER WERE REFERRED TO AS CROSSCUTS.

**DRIFT SET** — ONE SET, OR STANDARD LENGTH OF TIMBER PLACED IN THE MANNER USED IN DRIFTS OR CROSSCUTS WITH THE POST SLIGHTLY INCLINED AT THE TOP TOWARD THE CENTER OF THE CROSSCUT. THIS WOULD INCLUDE ALL SIDE AND BACK LAGGING, SPREADERS AND COLLAR BRACES AS WELL.

**DRIFTER** — A COMPRESSED AIR-DRIVEN, PERCUSSIVE ROCK DRILL, WHICH WAS GENERALLY USED TO DRILL HORIZONTALLY OR MODERATELY, INCLINED BLASTHOLES. THEY WERE ALSO CALLED LEYNER DRILLS, ALTHOUGH MANY WERE MANUFACTURED BY OTHER COMPANIES. THESE WERE TYPICALLY MOUNTED ON A BAR AND COLUMN SET UP, THEN LATER ON JUMBOS.

**DRILL** — 1). UNDERGROUND IT WOULD REFER TO ANY PNEUMATIC DRILL. ON THE SURFACE, ANY OF THE VARIOUS TYPES OF DRILLING RIGS EMPLOYED - BLASTHOLE OR DIAMOND DRILL. 2). ALSO USED AS A VERB FOR THE ACT OF DRILLING.

**DRILL COLUMN** — THE VERTICAL, TUBULAR STEEL COLUMN, WHICH EXTENDED FROM THE FLOOR TO THE BACK AND WAS STABILIZED AND MADE SECURE BY TIGHTENING JACK SCREWS ON THE BOTTOM. A HORIZONTAL BAR WAS CLAMPED TO THE COLUMN ON WHICH A DRILL WAS SET IN MOVABLE HOLDER. BY MOVING THE BAR AND THE DRILL, A COMPLETE ROUND COULD BE DRILLED FROM A SINGLE COLUMN SETTING BY SHIFTING THE BAR AND ADJUSTING THE DRILL POSITION. FREQUENTLY REFERRED TO AS A BAR AND COLUMN SETUP.

**DRILL DOCTOR** — THE REPAIR OF PNEUMATIC DRILLS WAS A SPECIALTY TASK PERFORMED IN THE MACHINE SHOP BY ONE OR MORE REPAIRMEN CALLED BY THIS NAME.

**DRILL STAGING** — IN ADVANCING A RAISE, THIS STAGING WAS CONSTRUCTED OF THREE INCH THICK LAGGING, ON TOP OF THE LAST SET, IF TIMBERED, OR ON HITCHED 4" X 6" TIMBER IF RAW. IT WAS NEVER SET CLOSER THAN SEVEN FEET TO THE BACK FOR DRILLING THE NEXT ROUND. THE DRILL STAGING WAS REMOVED PRIOR TO BLASTING.

**DRILL STATION** — AN ENLARGED OPENING, OR CHAMBER, CUT TO ALLOW FOR THE MORE EFFICIENT PULLING OF THE RODS BY DIAMOND DRILLERS. THIS WAS NOT A COMMON PRACTICE AND WAS ONLY DONE WHEN VERY LONG HOLES WERE TO BE DRILLED SO THAT TEN-FOOT LENGTHS COULD BE HANDLED INSTEAD OF THE FIVE FOOT RODS TYPICALLY HANDLED. THIS ACTUALLY REDUCED THE WORK OF PULLING, AND THE RE-INSERTION THE RODS BY HALF. AN IMPORTANT TIME AND LABOR SAVINGS ON ONE OR MORE HOLES OF PERHAPS SEVERAL THOUSAND FEET IN LENGTH.

**DRILL STEEL** — A ROUND, SQUARE OR HEXAGONAL STEEL ROD FOR USE IN ROCK DRILLS. IT CONSISTS OF SHANK, SHAFT, AND BIT; THE LATTER MAY OR MAY NOT BE DETACHABLE. IT HAS A SMALL HOLE PASSING THROUGH THE LENGTH TO ALLOW FOR WATER AND AIR TO PASS THROUGH TO CLEAN DRILL CUTTINGS AND SUPPRESS DUST. THEY ARE USED IN PLUGGERS, STOPERS, JACKLEGS AND DRIFTERS.

**DRILL STEEL SET** — A SERIES OF INTEGRAL DRILL-STEEL SIZES CONSISTING OF STARTER AND FOLLOWER BITS, NECESSARY FOR DRILLING A HOLE TO A CERTAIN DEPTH. THE LENGTH INCREMENT IS USUALLY DETERMINED BY THE WEAR OF THE BIT AND THE FEED LENGTH OF THE FEEDING DEVICE. TYPICALLY, THE STARTER STEEL WAS THREE FEET IN LENGTH, THE SECOND FOUR FEET AND THE THIRD STEEL SOME SIX FEET LONG.

**DRILL WATER** — THE WATER PIPED UNDERGROUND FOR USE IN DUST SUPPRESSION WHILE DRILLING. IT WAS ALSO USED FOR DUST SUPPRESSION BEFORE MUCKING BY WETTING DOWN THE MUCK PILE AS WELL AS THE BACK AND RIBS. THIS WATER WAS NEVER USED FOR DRINKING, AS IT WAS ANYTHING BUT POTABLE.

**DRILLING DRY** — DRILLING WITHOUT WATER TO SUPPRESS THE DUST. THIS WAS A FOOLHARDY THING TO DO UNDER NORMAL CIRCUMSTANCES, AS THE DUST FOGGED FROM THE HOLES AND EVEN RESPIRATORS WERE LESS THAN TOTALLY EFFECTIVE AND THE MINER'S LUNGS SUFFERED. DRY STOPERS WERE MOST COMMON FORM OF DRILLING DRY IN RAISES AS THE DRILL STEEL WAS SOLID AND DID NOT ACCOMMODATE WATER PASSAGE FOR SUPPRESSION. THE ONLY ACCEPTABLE REASON FOR DRILLING DRY, IN THE AUTHOR'S PERSONAL EXPERIENCE, WAS WHEN MINING BURNED GROUND, AS THE ROCK TEMPERATURE WAS ABOVE 212° F, AND THE DRILL WATER WOULD TURN TO STEAM INSTANTLY, CREATING A MORE HAZARDOUS ATMOSPHERE WHEN MIXED WITH SULFIDE DUST.

**DRIVING DOLLY** — A ROUND STEEL DEVISE THAT FIT ONTO THE THREADS OF A WEDGE-STYLE ROCK BOLT AND THEN PLACED ON THE ROCK DRILL, WHICH PUSHED THE SPLIT BOLT ONTO THE WEDGE, THUS SECURING IT. THE DOLLY WAS THEN REMOVED, THE TIE PLATE PUT ON THE BOLT FOLLOWED BY THE NUT, WHICH WAS THEN TIGHTENED, AGAIN USING THE DRILL.

**DROP A CHUTE** — THE ACT OF CAUSING A HUNG CHUTE TO FLOW AGAIN BY REMOVING THE CONSTRICTION, OFTEN BY BLASTING.

**DROP CARS** — THE SPACE UNDER MANY OF THE MINE SURFACE ORE STORAGE BINS WAS USUALLY LIMITED TO ONE OR TWO RAILROAD CAR LENGTHS. THUS, IT WAS NECESSARY TO MOVE LOADS OUT AND REPLACE THEM WITH EMPTY CARS WITHOUT THE AID OF A LOCOMOTIVE. THE TRACKS WERE PLACED ON A GRADIENT SUCH THAT BY LOOSENING THE HAND BREAK THE CARS WOULD ROLL. THUS, THE TOPLANDER WOULD LOOSEN THE HAND BREAK ON THE FIRST FULL CAR AND RIDE IT THE DISTANCE NEEDED TO ACCOMMODATE ALL OF THE CARS TO BE LOADED. HE WOULD RESET THE BREAK, WALK BACK AND DROP THE SECOND CAR, COUPLING IT WITH THE FIRST. HE THEN DID A SIMILAR THING WITH THE EMPTIES, DROPPING THEM INTO PLACE TO LOAD, REPEATING THE PROCESS UNTIL ALL AVAILABLE CARS WERE LOADED AND COUPLED. IF HE JUDGED WRONG WHILE PLACING CARS, THERE WAS A POWER WENCH STRONG ENOUGH TO PULL AN EMPTY BACK, BUT NOT A LOADED CAR. THIS WAS AN ART, AS HE HAD TO HAVE CONTROL OF THE CARS AT ALL TIMES. IN 1948, A TOPLANDER AT THE CAMPBELL, LOST

CONTROL OF FOUR LOADED CARS AND THEY ROLLED FOR ALMOST SIX MILES BEFORE DERAILING BECAUSE OF THE HIGH SPEED THEY HAD ATTAINED.

**DROP CUT** — WHEN OPERATIONS IN AN OPEN PIT MINE REQUIRE THAT THE NEXT LEVEL DOWN BE DEVELOPED, MINING OF A DOWNWARD, INCLINED RAMP, OR DROP CUT, IS STARTED.

**DRUM END** — THE END OF THE MAIN HOISTING CABLE THAT WAS ATTACHED TO THE HOIST DRUM. PERIODICALLY, A LENGTH EQUAL TO ONE AND A HALF DRUM DIAMETERS WOULD BE TRIMMED FROM THE DRUM END TO PREVENT UNEVEN WEAR ON THE CABLE BY CHANGING THE POINT OF THE CABLE WHERE THE SECOND AND SUBSEQUENT LAPS ON THE HOIST DRUM WOULD OCCUR.

**DRUMMY GROUND** — GROUND WHICH GIVES A HOLLOW SOUND WHEN TESTED BY POKING OR STRIKING WITH A BAR, A TREACHEROUS CONDITION. THIS INVARIABLY INDICATED THE NEED FOR ADDITIONAL BARRING DOWN OR SOME FORM OF GROUND SUPPORT.

**DRY** — A SPECIAL BUILDING AT A MINE WHERE WORKERS SHOWER THEMSELVES FOLLOWING THEIR SHIFT OR CHANGE FROM STREET TO WORK CLOTHES. IT WAS WELL VENTILATED AND HEATED TO ASSURE THAT THE MINERS SWEAT-SOAKED DIGGERS WOULD BE DRY WHEN HE RETURNED TO WORK 16 HOURS LATER. ALSO CALLED A CHANGE ROOM OR CHANGE HOUSE.

**DRY BONE** — A TERM USED TO REFERENCE THE POROUS NATURE OF SOME GOSSANS, BUT MORE COMMONLY TO SPONGY APPEARING SMITHSONITE, WHICH WAS OFTEN BONE COLORED.

**DRY STOPER** — STOPERS USED WITH SOLID DRILL STEELS, WHICH COULD NOT ACCOMMODATE WATER FOR DUST SUPPRESSION. THE EARLIEST STOPERS WERE OF THIS TYPE AND APPROPRIATELY NAMED “WIDOW MAKERS” AS THE DUST WHICH FOGGED FROM EACH HOLE, SLOWLY, BUT SURELY DUSTED (INFECTED WITH SILICOSIS) THE MINER, WHO WOULD BECOME DISABLED AND SOON DIE. DRY STOPERS WERE USED ALONG WET MACHINES UNTIL THE EARLY 1920S, BUT WITH RESPIRATORS TO REDUCE DUST INHALATION.

**DRY TONS** — THE NET WEIGHT, IN TONS, OF BROKEN ORE OR CONCENTRATES AFTER DEDUCTING THE WEIGHT OF THE CONTAINED MOISTURE.

**DUMMY HOLES** — THE TWO TO FOUR HOLES IN THE BURN, WHICH ARE NOT LOADED, BUT LEFT EMPTY TO GIVE HOLLOW SPACES FOR THE LOADED CENTER HOLE TO BREAK TO WHEN BLASTED.

**DUMP** — 1). A PILE OR HEAP OF ROCK WASTE AT OR NEAR A MINE. MAY CONTAIN PRIMARY WASTE (WHERE THIS COULD NOT BE DISPOSED OF UNDERGROUND AS GOB). 2). THE ACT OF EMPTYING A MINE CAR OR HAUL TRUCK IS DUMPING, REGARDLESS OF THE MATERIAL.

**DUMP RAMP** — CERTAIN TYPES OF LARGE, SIDE DUMPING MINE CARS (GRANBY) HAD A FIFTH WHEEL OPPOSITE THE DOOR WHICH, WHEN ROLLED UP A RAMP WOULD TILT THE CAR BODY THEREBY CAUSING IT TO DUMP. SEE ALSO CAMELBACK.

**DUSTED** — A MINER WHO IS SUFFERING FROM SILICOSIS (PNEUMOCONIOSIS), BECAUSE OF OVER EXPOSURE TO DUST, USUALLY DRILLING DUST HIGH IN SILICA, WAS SAID TO BE “DUSTED.” THIS WAS A DISABLING INDUSTRIAL LUNG DISEASE, ONE THAT WAS FREQUENTLY FATAL. WHILE SILICEOUS DUST WAS A SERIOUS THREAT FOR MINERS EVERYWHERE, IT WAS LESS SO AT BISBEE AS THE SILICA CONTENT OF THE ROCK WAS QUITE LOW, EXCEPT IN THE BLOCK CAVE AREA OF THE SACRAMENT MINE. HOWEVER, MORE THAN A FEW BISBEE MINERS SUFFERED FROM VARYING DEGREES OF THIS PREVENTABLE CONDITION. AS MINERS WERE TRANSIENT IN NATURE, MOST PROBABLE CAME TO BISBEE, ALREADY SUFFERING.

**EAST OREBODY** — THE EASTERN PORTION OF THE SACRAMENTO STOCK, WHICH WAS TOO DEEP TO BE MINED BY THE SACRAMENTO PIT. BLOCK CAVING WAS ATTEMPTED WITH LIMITED SUCCESS. IN THE END, THIS WAS THE PRINCIPAL OREBODY FOR THE LAVENDER PIT MINE.

**EDISON LAMP** — THE FIRST TYPE OF ELECTRIC CAP LAMP USED AT BISBEE. THEY WERE INTRODUCED IN THE CAMPBELL AND JUNCTION MINES IN 1938. THESE WERE ALKALINE, WET CELL BATTERY LAMPS, USING EDISON'S PATENTED BATTERY. INTERESTINGLY, THE WET CELL ALKALINE BATTERY WAS TO BE EDISON'S MOST PROFITABLE INVENTION.

**EIGHT (8) HOUR LAW** — A LEGISLATED ACT BY THE TERRITORIAL GOVERNMENT OF ARIZONA IN 1903 THAT FORBID NORMAL WORKING SHIFTS OF MORE THAN EIGHT HOURS FOR UNDERGROUND EMPLOYEES. THIS LAW MADE LITTLE DIFFERENCE AT BISBEE AS THE COPPER QUEEN HAD INSTITUTED EIGHT HOUR SHIFTS AS A COMPANY POLICY LONG BEFORE, WHILE THE C. & A. HAD PREEMPTIVELY MADE THE CHANGE A SHORT WHILE BEFORE THE LAW WAS PASSED.

**ELECTROLYTIC REFINING** — THE PROCESS OF PURIFYING METAL INGOTS THAT ARE SUSPENDED AS ANODES IN AN ELECTROLYTIC BATH, ALTERNATED WITH REFINED SHEETS OF THE SAME METAL, WHICH ACT AS STARTERS OR CATHODES. AFTER 1898, ALL BISBEE COPPER WAS THUS REFINED PRIOR TO MARKETING, GIVING A HIGHER QUALITY COPPER. THIS PROCESS ALSO ALLOWED FOR THE RECOVERY OF GOLD AND SILVER, BOTH OF WHICH WERE IMPORTANT BYPRODUCTS AT BISBEE.

**EMPLOYEE BENEFIT ASSOCIATION** — A VOLUNTARY INSURANCE SCHEME WITH COMPANY/EMPLOYEE CONTRIBUTIONS, WHICH PROVIDED FOR A DEGREE OF WAGE CONTINUATION IN THE EVENT OF DEATH OF DISABILITY. THE PROGRAM WAS INITIATED IN 1917 AND WAS OPEN TO ALL EMPLOYEES, WITH MOST SUBSCRIBING. IT WAS TERMINATED AT THE END OF 1944, WITH THE UNIONIZATION OF THE WORKFORCE, AND REPLACED BY A GROUP INSURANCE PROGRAM.

**EMPLOYMENT AGENT** — THIS WAS THE MAN WHO IT SEEMED, MADE THE DECISION AS WHOM TO HIRE WHEN THERE WERE VACANCIES. EXCEPT FOR THE WWII PERIOD, THERE WERE ALWAYS MORE MEN SEEKING WORK THAN JOBS AVAILABLE, THUS, IT WAS PERCEIVED BY MANY THAT HE WAS ALL-POWERFUL. THE REALITY WAS THAT MUCH OF THE TIME; THE MEN HIRED WERE PRESELECTED BY THE SUPERVISORS IN WHOSE DEPARTMENTS WHERE THE VACANCIES EXISTED.

**ENCLOSED HEADFRAME** — ALL OF THE VERY EARLY HEADFRAMES AT BISBEE WERE COMPLETELY ENCLOSED IN SHAFT HOUSES, WHICH EXTENDED BACK TO COVER THE HOIST AS WELL. THIS WAS A STYLE BROUGHT TO BISBEE BY ENGINEERS FROM ENGLAND AND THE MICHIGAN COPPER COUNTRY WHERE THE CLIMATE MADE THIS A NECESSITY. BY 1900, THIS CONSTRUCTION APPROACH HAD BEEN ABANDONED, YET THE SHAFTS WITH ENCLOSED HEADFRAMES RETAINED THEM UNTIL EITHER THEY CLOSED OR THE HEADFRAME WAS REPLACED, USUALLY WITH ONE OF STEEL.

**END DUMP** — THE SMALL MINE CARS USED FOR MANY YEARS HAD A DOOR AT ONE END AND WERE ROTATED THEN LIFTED TO DUMP FROM THE DOOR END OF THE CAR.

**END PLATES** — THE HEAVY HORIZONTAL TIMBERS IN A SHAFT SET WHICH RUN THE SHORT SIDE OF THE RECTANGULAR SHAFT. THESE WERE SUPPORTED BY SHAFT HANGERS FROM THE SET ABOVE AND CONNECTED TO THE WALL PLATES, WHICH TOGETHER, SUPPORTED THE POSTS.

**ENGINE HOUSE** — SYNONYMOUS WITH HOIST HOUSE. THE EARLY HOISTS AT BISBEE WERE STEAM OPERATED WITH A STEAM ENGINE RUNNING THE UNIT, THUS THE NAME.

**ENGINE ROOM** — THE PART OF THE SHAFT HOUSE WHERE THE STEAM ENGINE-RUN-HOIST WAS LOCATED. SYNONYMOUS WITH HOIST ROOM.

**ENGINEERING DEPARTMENT** — THE GROUP THAT CONTROLLED ALL FACETS OF MINE ENGINEERING. THESE INCLUDE SURVEYING, MAP MAKING, MINE LAYOUT DESIGN, MINE PLANNING, MINE VENTILATION AS WELL AS PUMPING AND ELECTRICAL LAYOUTS.

**ERUPTIVE** — A VERY EARLY TERM USED TO DENOTE THE INTRUSIVE UNITS OF THE SACRAMENTO STOCK COMPLEX.

**ESCABROSA** — A REFERENCE TO THE ESCABROSA LIMESTONE ROCK UNIT THAT WAS ONE OF THE SEVERAL PRODUCTIVE FORMATIONS AT BISBEE.

**ESCAPE ROUTE** — THE ROUTE TO BE FOLLOWED TO AN ESCAPE WAY IN THE EVENT OF AN EMERGENCY. DRILLS WERE PERIODICALLY CONDUCTED TO ASSURE FAMILIARITY WITH ESCAPE PROCEDURES AND ESCAPE ROUTES. ALSO CALLED EVACUATION ROUTES.

**ESCAPE WAY** — AN OPENING THROUGH WHICH THE MINERS MAY LEAVE THE MINE IF THE ORDINARY EXIT IS OBSTRUCTED OR IF AN EMERGENCY CONDITION EXIST WHICH MAY RENDER THE PRIMARY ENTRANCE INACCESSIBLE OR UNSAFE TO USE.

**EVACUATION MAPS** — MINE MAPS INDICATING THE EVACUATION OR ESCAPE ROUTE WERE POSTED IN CONVENIENT PLACES ON EVERY OPERATING LEVEL THROUGHOUT THE MINES TO AID THE MINERS, SHOULD AN EMERGENCY REQUIRING EVACUATION OCCUR.

**EXPLORATION** — PROSPECTING, SAMPLING, MAPPING, DIAMOND DRILLING AND OTHER WORK INVOLVED IN SEARCHING FOR ORE. BECAUSE OF THE SCATTERED NATURE OF THE REPLACEMENT ORE DEPOSITS AT BISBEE, SUBSTANTIAL UNDERGROUND EXPLORATION WORK WAS NECESSARY, MOSTLY BY DIAMOND DRILLING.

**EXPLOSIVE** — ANY RAPIDLY COMBUSTIVE OR EXPANDING SUBSTANCE. THE ENERGY RELEASED DURING THIS RAPID COMBUSTION OR EXPANSION CAN BE USED TO BREAK ROCK.

**EXTENSION** — 1). AN ADDITION TO A MINING AREA SUCH AS THE HOLBROOK EXTENSION OF THE LAVENDER PIT. 2). THE CONTINUATION OF AN OREBODY.

**EYE BOLT** — A ROD OR BOLT HAVING AN EYE OR LOOP AT ONE END AND THREADED AT THE OTHER END OR TAPERED SO AS TO RECEIVE AND BE HELD IN PLACE BY A STEEL WEDGE WHEN PLACED INTO A DRILL HOLE.

**EYE SHIELD** — A REPLACEABLE, TRANSPARENT, PLASTIC VISOR ON THE BRIM OF THE HARD HAT, WHICH WAS FOLDED DOWN TO COVER THE EYES, WHEN EYE PROTECTION WAS NEEDED. IT WAS OBLIGATORY TO HAVE EYE SHIELDS DOWN WHEN COLLARING A HOLE, USING A BLOW PIPE OR BREAKING BOULDERS WITH A DOUBLE JACK AS WELL AS ANY OTHER ACTIVITY, WHICH COULD CAUSE EYE INJURY.

**FACE** — THE SURFACE EXPOSED BY EXCAVATION. THE WORKING FRONT IS THE FACE AT THE END OF THE HEADING, OR AT THE END OF THE FULL-SIZE EXCAVATION.

**FACE UP** — IN THE OPEN PIT MINE, USING THE BUCKET OF A POWER SHOVEL TO REMOVE ANY LOOSE MATERIAL FROM THE BANK FACE.

**FALL OF GROUND** — A TERM THAT MEANS ROCK FALLING FROM OVERHEAD OR FROM THE SIDE. IT COULD BE A SINGLE ROCK OR A LARGE VOLUME AND THE REFERENCE WOULD REMAIN THE SAME. FALL OF GROUND ACCIDENTS WERE THE MOST COMMON TYPE OF ACCIDENTS UNDERGROUND AT BISBEE. MOST SUCH ACCIDENTS WERE THE RESULT OF THE MINER NOT TAKING THE TIME TO COMPLETELY REMOVE ALL LOOSE ROCK BY BARING DOWN OR FAILING TO PUT ADEQUATE SUPPORT UNDER LOOSE MATERIAL.

**FALSE CAP** — A PIECE OF 8" X 8" OR 10" X 10" TIMBER SPANNING THE DRIFT AND SUPPORTED BY LAGGING SPIKED VERTICALLY TO THE POST ON EITHER SIDE OF THE DRIFT. THESE WERE INSTALLED IN PAIRS ON SEQUENTIAL DRIFT SETS. THE FALSE CAP WAS PLACED TEN INCHES BELOW THE DRIFT SET CAP TO ALLOW FOR 11 FOOT LONG, 10" X 10" BOOM TIMBERS TO REST, UPON WHICH A SET CAP WOULD BE PLACED AT THE FORWARD END AND PUSHED FORWARD, ALLOWING FOR THE SAFE TIMBERING UNDER BAD GROUND CONDITIONS. POSTS WERE THEN SET UNDER THE CAP, THEN THE BOOM TIMBER AND FALSE CAPS REMOVED.

**FALSE SET** — WHEN IT WAS NECESSARY TO REPLACE A DRIFT SET, "FALSE SETS" OF 8" X 8" TIMBER WERE CONSTRUCTED ON BOTH SIDES OF THE SET TO BE REPLACED TO SUPPORT THE GROUND. ONCE THE SET HAD BEEN REPLACED, THE FALSE SETS WERE THEN REMOVED.

**FATALITY** — AN ACCIDENT THAT RESULTS IN THE DEATH OF SOMEONE. BISBEE'S MINES WERE AMONG THE SAFEST ANYWHERE, ALWAYS, BUT FATALITIES DID OCCUR. FORTUNATELY, BISBEE NEVER SUFFERED A MAJOR UNDERGROUND MINE DISASTER WHERE NUMEROUS MEN PERISHED IN A SINGLE EVENT.

**FAULT** — A BREAK IN THE EARTH'S CRUST CAUSED BY TECTONIC FORCES, WHICH HAVE MOVED THE ROCK ON ONE SIDE WITH RESPECT TO THE OTHER. THIS MOVEMENT CAN BE HORIZONTAL, VERTICAL OR A COMBINATION OF BOTH.

**FEED SCREW** — A LONG, COURSE THREADED STEEL ROD WHICH RUNS THE LENGTH OF THE DRILL CARRIAGE AND ALONG WHICH THE DRILL ADVANCES BY EITHER HAND CRANKING OR BY THE AUTOMATED FEED MOTOR IN THE NEWER DRILLS. THIS IS THE MANNER BY WHICH PRESSURE IS APPLIED TO THE DRILL BIT AT THE END OF THE DRILL STEEL.

**FIELD MAGAZINE** — IN THE LAVENDER PIT, A SMALL MAGAZINE USED FOR THE TEMPORARY STORAGE OF SMALL AMOUNTS OF POWDER OR, SEPARATELY, BLASTING CAPS.

**FILTER BULKHEAD** — A BULKHEAD BUILT OF BURLAP COVERED LAGGING, WHICH WAS CONSTRUCTED SOLELY TO CONTAIN HYDRAULICALLY PLACED SAND FILL GOB AND ALLOW THE CONTAINED WATER TO DRAIN. THESE WERE BOTH HORIZONTAL AND VERTICAL STRUCTURES.

**FINE ORE STORAGE BINS** — LARGE BINS IN THE CONCENTRATOR THAT RECEIVED THE DISCHARGE FROM THE SECONDARY CRUSHERS AND IN TURN, FED THE BALL MILLS. THESE WERE OFTEN REFERRED TO AS THE FINE ORE BINS.

**FINGER RAISE** — A SMALL DIAMETER RAISE, USUALLY CLOSELY SPACED USED TO DRAW BROKEN ORE FROM BLOCK CAVING STOPES.

**FINLAY** — PRONOUNCED “FINLEY” BY THE MINERS, BUT SPELLED AS FINLAY IN ALL COPPER QUEEN LITERATURE. THIS WAS A GENERIC TERM APPLIED TO MOST ANY OF THE SEVERAL BRANDS OF PNEUMATIC, RAIL MOUNTED, OVERSHOT MUCKING MACHINE USED AT BISBEE. THE NAME IS DERIVED FROM SOME OF THE VERY FIRST SUCH MACHINES, WHICH WERE DESIGNED EDWIN ROYLE AND JOHN FINLAY, EMPLOYEES OF THE ANACONDA MINING COMPANY AND MARKETED BY FINLAY.

**FINLAY STEP** — A DETACHABLE STEP, WHICH WAS MOUNTED ON THE LEFT SIDE OF THE MUCKING MACHINES AND BELOW THE CONTROLS SO THAT THE OPERATOR COULD RIDE THE UNIT AS IT MOVED ABOUT DURING MUCKING AS WELL AS THE LOADING AND CHANGING OF CARS.

**FIRE ASSAY** — THE ASSAYING OF METALLIC ORES, USUALLY GOLD AND SILVER, BY METHODS REQUIRING A FURNACE HEAT; COMMONLY INVOLVES THE PROCESSES OF SCORIFICATION, CUPELLATION, ETC.

**FIRE COUNTRY** — THAT PART OF THE MINE, WHICH HAD EXPERIENCED A MINE FIRE OR WAS EVEN STILL BURNING. A MINE COULD HAVE SEVERAL DIFFERENT AREAS SO DESIGNATED SUCH AS THE IN THE CAMPBELL WITH THE “2700 FIRE COUNTRY” OR THE “1200 FIRE COUNTRY” WHERE THE LEVEL FURTHER DEFINED THE AREA.

**FIRE DOOR** — DOORS PLACED TO CONTROL THE AIRFLOW IN THE EVENT OF A FIRE. NEAR SHAFTS, THEY WERE USUALLY STEEL DOORS IN CONCRETE FRAMES WITH HEAVY WEIGHTS AND A COMPRESSED AIR ACTIVATED CYLINDER CATCH, WHICH COULD BE CLOSED REMOTELY FROM A POINT ON THE SURFACE BY DRAINING THE COMPRESSED AIR FROM THE LINE. AWAY FROM THE SHAFT, THEY WERE USUALLY WOODEN, BUT ALSO WITH REMOTE CLOSING CAPACITY.

**FIRE FUSE** — A CORD-LIKE SUBSTANCE USED IN THE IGNITION OF EXPLOSIVES. BLACK POWDER IS ENTRAINED IN THE CORD AND, WHEN LIT, BURNS ALONG THE CORD AT A SET RATE PER FOOT. A FUSE CAN BE SAFELY USED TO IGNITE A BLASTING CAP, WHICH IS THE PRIMER FOR AN EXPLOSIVE. FIRE FUSE WAS USED ALMOST EXCLUSIVELY IN THE UNDERGROUND MINES AT BISBEE, FROM THE BEGINNING UNTIL THE MINES CLOSED. SEE ALSO SAFETY FUSE.

**FIREBUG** — A PERSON DESIGNATED TO EXAMINE THE HIGH-RISK AREAS OF THE MINE ON A DAILY BASIS, FOR INDICATIONS OF POSSIBLE FIRE SUCH AS ODOR AND HEAT AS WELL AS OTHER DANGERS. THIS INSPECTION WAS TYPICALLY PERFORMED ON THE GRAVEYARD OR THIRD SHIFT WITH DEFINED RUNS FOR EACH FIREBUG. THEY WERE ALMOST ALWAYS OLDER, WELL EXPERIENCED MINERS WHO COULD NO LONGER STAND THE STRENUOUS WORK OF MINING.

**FISH PLATE** — A STEEL STRAP WITH OVAL SHAPED HOLES SPECIFICALLY MADE FOR JOINING RAIL. DIFFERENT RAIL SIZES USED DIFFERENT SIZE FISH PLATES.

**FLANGE** — 1). THE INSIDE EDGE OF A MINE CAR OR RAILROAD WHEEL, WHICH KEPT THE WHEEL ON THE RAIL. 2). A WIDE EDGE, PERPENDICULAR TO AND ON PIPE OR PIPE FITTINGS, SUCH AS VALVES, WITH BOLT HOLES TO FASTEN THE PIECES TOGETHER, USUALLY WITH A RUBBER GASKET PLACED BETWEEN THE TWO FLANGES. 3). TO FORM OR TO ADD AN EDGE AT A RIGHT ANGLE TO SOMETHING TO KEEP IT IN PLACE.

**FLASK** — A CARBIDE MINER’S LAMP WITH A FULL CHARGE OF FRESH CARBIDE WOULD BURN FOR BETWEEN FOUR TO SIX HOURS, DEPENDING ON THE LAMP TYPE. THUS, THE MINER NEEDED TO CARRY ADDITIONAL CARBIDE WITH HIM TO RECHARGE HIS LAMP AT SOME POINT DURING THE SHIFT. WHILE A NUMBER OF CONTAINER TYPES WERE USED TO CARRY THIS WATER REACTIVE MATERIAL, THE MOST COMMON WAS A CURVED, METAL POCKET FLASK WITH

A SLIDING TOP, WHICH HELD ABOUT SEVEN OUNCES OF CARBIDE, SUFFICIENT TO FINISH THE SHIFT. THE MINER HAD TO BUY THE FLASK OR WHATEVER HE CHOSE TO USE, WHILE THE MINING COMPANY FURNISHED THE CARBIDE.

**FLAT ROPE** — A STEEL ROPE MADE UP OF A NUMBER OF LOOSELY TWISTED FOUR-STRAND ROPES PLACED SIDE BY SIDE, THE LAY OF THE ADJACENT STRANDS BEING IN OPPOSITE DIRECTIONS TO SECURE UNIFORMITY IN WEAR AND TO PREVENT TWISTING DURING HOISTING. THE STRANDS ARE SEWN TOGETHER WITH SOFT STEEL WIRE. THESE ROPES WERE MADE IN THE SHOPS OF BOTH MINING COMPANIES AT BISBEE AND WERE USED UNTIL THE 1930s.

**FLOAT** — A MINERAL, WHICH RESPONDS POSITIVELY TO FROTH FLOTATION, IS SAID TO FLOAT.

**FLOAT CELL** — A LARGE, OPEN BOX-LIKE STRUCTURE IN WHICH FLOTATION TAKES PLACE. THIS IS SYNONYMOUS WITH FLOTATION CELL.

**FLOTATION** — A FLOTATION PROCESS IN WHICH THE MINERALS FLOATED GATHER IN AND ON THE SURFACE OF BUBBLES OF AIR OR GAS DRIVEN INTO OR GENERATED IN THE LIQUID IN SOME CONVENIENT MANNER. IT IS THE SEPARATING OF FINELY CRUSHED MINERALS FROM ONE ANOTHER BY CAUSING SOME TO FLOAT IN A FROTH AND OTHERS TO REMAIN IN SUSPENSION IN THE PULP. OILS AND VARIOUS CHEMICALS ARE USED TO ACTIVATE, MAKE FLOATABLE, OR DEPRESS THE VARIOUS MINERALS. FROTH FLOTATION WAS A PATENTED PROCESS AND EXPENSIVE TO USE. THE FIRST RECOVERY PLANT OF THE SACRAMENTO PIT ATTEMPTED TO BYPASS THIS EXPENSE BY EMPLOYING GRAVITY RECOVERY OF THE COPPER MINERALS. IT WAS MODERATELY SUCCESSFUL, AT BEST, AND SOON REPLACED BY FLOTATION, PAYING THE REQUIRED ROYALTY.

**FLOTATION CELL** — SEE FLOAT CELL.

**FLOOR** — 1). THE SPACE BETWEEN LEVELS IN ALL OF THE MINES WAS DIVIDED INTO INTERVALS CALLED "FLOORS." EACH FLOOR WAS 7½ FEET HIGH, THE STANDARD MINING HEIGHT, EXCEPT FOR THE FLOOR COINCIDENTAL WITH THE LEVEL AND IT WAS TEN FEET HIGH AND CALLED THE SILL. EACH FLOOR WAS SEQUENTIALLY NUMBERED. THUS, A 100 FOOT INTERVAL WOULD CONSIST OF THE SILL AND 12 FLOORS WHILE A 133 FOOT INTERVAL SUCH AS FOUND IN THE JUNCTION, CAMPBELL AND DENN MINES BELOW THE 2300 WOULD CONSIST OF A SILL AND 16 FLOORS. 2). ALSO, A FLOOR COULD REFER TO A MUCKING SURFACE IN A CUT AND FILL STOPE WHERE MAT BOARDS HAVE BEEN LAID DOWN ON TOP OF THE WASTE FILL TO PREVENT CONTAMINATION OF THE ORE AS IT IS BLASTED DOWN AND MUCKED.

**FLUE DUST** — A VERY FINE DUST FORMED IN THE FLUES OF A SMELTER OR METALLURGICAL FURNACE AND WHICH, UNLESS CAUGHT, PASSES OUT INTO THE ATMOSPHERE CARRYING FINE, PARTICULATES HIGH IN METALS. THIS REPRESENTED A LOSS OF GOLD, SILVER AND COPPER AT BISBEE. HOWEVER, THE LONG STACKS UP THE SIDE OF QUEEN HILL CAUSED THE SMOKE TO COOL SUBSTANTIALLY AND MUCH OF THE PARTICULATE MATTER FELL OUT OF THE SMOKE, TO BE CAPTURED IN A "DUST CHAMBER" AT THE BOTTOM. WHILE IT WAS DIFFICULT TO HANDLE, THE MATERIAL WAS RETREATED. AT THE DOUGLAS SMELTER, COTTRELL PRECIPITATORS WERE INSTALLED ABOUT 1920 TO CAPTURE THIS TROUBLESOME, BUT VALUABLE MATERIAL.

**FLUME** — A WOODEN TROUGH USED TO CONDUCT MINE WATERS. THESE WERE USED UNDERGROUND WHEN PASSING WATER OVER RAISES AND STOPES AS WELL AS TO KEEP HEAVY FLOWS OFF THE TRACK. ON THE SURFACE, FLUMES CARRIED DISCHARGE FROM THE MINES TO A DESIRED POINT, IN SOME CASES MILES AWAY SUCH AS THE ONE FROM THE JUNCTION SHAFT TO THE WARREN AREA. THESE WERE PARTICULARLY GOOD FOR CONDUCTING ACIDIC MINE WATER AS THE WOOD DID NOT CORRODE, BUT IT WAS NECESSARY TO USE NAILS MADE OF

COPPER, AS IRON NAILS WOULD SOON BE CORRODED. A FLUME FOR ACID WATERS EXTENDED FROM THE CZAR SHAFT TO A PERCIP PLANT AT THE BASE OF SAC HILL.

**FLUX** — A HIGH SILICA ROCK ADDED DURING SMELTING WHICH REACTS WITH GANGUE MINERALS TO FORM SLAGS, WHICH ARE LIQUID AT FURNACE TEMPERATURE AND LOW ENOUGH IN DENSITY TO FLOAT ON THE MOLTEN BATH OF METAL OR MATTE AND THUS, EASILY REMOVED. HIGH GOLD SILICA WAS PREFERRED AS IT PROVIDED BOTH A FLUX AND REVENUE FROM THE GOLD. THE EASTER SUNDAY AND WADE HAMPTON MINES WERE BOTH SOURCES OF PRECIOUS METAL BEARING FLUX AT BISBEE. THE VERY HIGH SILICA, BUT BARREN QUARTZITE FOUND IN QUARRY CANYON WAS USED AS A FLUX FOR SOME TIME DURING BISBEE'S FIRST YEARS AND IT WAS THE MINING OF THIS MATERIAL THAT GAVE THE NAME TO THE STREET, QUARRY CANYON, WHICH LED TO THE SILICA QUARRIES.

**FLY ROCK** — ROCK THROWN BY BLASTING. BLAST IN THE PITS, PARTICULARLY SECONDARY BLASTING OFTEN CREATED SUBSTANTIAL FLY ROCK THAT REPRESENTED A VERY REAL SAFETY CONCERN AS THE ROCK COULD TRAVEL HUNDREDS OF FEET.

**FLYING A SWITCH** — RUNNING A MOTOR AND/OR TRAIN THROUGH A RAIL SWITCH WITHOUT FIRST SETTING THE SWITCH FOR THE DIRECTION OF TRAVEL. THIS WAS A COMMON, THOUGH FORBIDDEN PRACTICE AS IT LEFT THE SWITCH PARTIALLY OPEN, SOMETHING THAT WOULD CAUSE A DERAILMENT IF NOT NOTICED. ALSO CALLED SPLITTING A SWITCH.

**FOOT BOARD** — 1.) A PIECE OF 2" X 12" X 2' PLANKING PLACED UNDER A POST IN SOFT GROUND TO HELP KEEP IT FROM BEING PUSHED INTO THE SOFT MATERIAL BY THE PRESSURE FROM ABOVE ON THE TIMBER. 2.) VERDE CHUTES HAD A HINGED BOARD, WHICH FOLDED DOWN AND CROSSED THE DRIFT, RESTING ON THE LOADING PLATFORM TO ALLOW BETTER ACCESS TO THE CHUTE WHILE LOADING CARS WITHOUT HAVING TO STEP ON THE MINE CAR FOR SUPPORT.

**FOOT BLOCK** — A PIECE OF TIMBER 4" X 10" X 3' PLACED ON THE DRIFT FLOOR AND UNDER A DRILL COLUMN. THE JACK SCREWS OF THE COLUMN ARE TIGHTENED AGAINST THE FOOT BLOCK TO SECURE THE COLUMN.

**FOOTWALL** — 1). THE PART OF THE COUNTRY ROCK THAT LIES BELOW THE ORE IN RELATION TO THE INCLINED DIP OF AN ORE DEPOSIT. 2). ALSO, THE BOTTOM WALL OF AN INCLINED FAULT

**FORMATION** — ANY ASSEMBLAGE OF ROCKS THAT HAVE SOME CHARACTER IN COMMON, WHETHER OF ORIGIN, AGE, OR COMPOSITION. OFTEN, THE WORD IS LOOSELY USED TO INDICATE ANYTHING THAT HAS BEEN FORMED OR BROUGHT INTO ITS PRESENT SHAPE.

**FRACTION** — THE PERCENTAGE OF A PORTION, SEPARATED BY SIZE, FOLLOWING CRUSHING AND/OR GRINDING.

**FRAGMENTATION** — A TERM USED TO DESCRIBE THE DEGREE OF ROCK BREAKAGE BY A BLAST. GOOD FRAGMENTATION MEANT THE ROCK WAS BROKEN TO A DEGREE THAT ALLOWED FOR OPTIMAL LOADING AND CRUSHING. CONVERSELY, POOR FRAGMENTATION IMPLIED THE PRESENCE OF OVERSIZED MATERIAL, WHICH MUST BE BROKEN BY SECONDARY BLASTING.

**FRAMING** — THE SPECIALIZED CUTTING OF TIMBER ENDS IN SUCH A WAY SUCH THAT THEY FIT TOGETHER IN AN INTERLOCKING MANNER SO THAT NAILS ARE NOT REQUIRED AND THAT SIMPLE PRESSURE DERIVED FROM THE USE OF WOODEN BLOCKS AND WEDGES WILL HOLD IT IN PLACE. EACH TIMBERING SCHEME REQUIRED ITS OWN, PARTICULAR FORM OF FRAMING.

**FRAMING SHOP** — THE MINE SHOP WHERE THE ENDS OF STANDARD MINE TIMBERS WERE CUT TO THE NEEDED SHAPES FOR SQUARESET, SHAFT, RAISE, CRIBBING ETC. APPLICATIONS. THIS SHOP WAS USUALLY CLOSELY ASSOCIATED WITH THE MINE SAWMILL.

**FROG** — THE POINT OF INTERSECTION OF THE INNER RAILS, WHERE A TRAIN CROSSES FROM ONE SET OF RAILS TO ANOTHER OR IN A SWITCH. THE FROG IS IN THE FORM OF A V.

**FRASCO BOARD** — SEE HOLD DOWN BOARD.

**FROTH** — THE FOAM ON THE TOP OF FLOATATION CELLS CONTAINING THE DESIRABLE MINERALS AND WHICH IS RECOVERED FOR FURTHER CLEANING OR TO FORM THE CONCENTRATE.

**FUSE** — AN IGNITING OR EXPLOSIVE DEVICE IN THE FORM OF A CORD, CONSISTING OF A FLEXIBLE FABRIC TUBE AND A CORE OF LOW EXPLOSIVE (SAFETY FUSE) OR HIGH EXPLOSIVE. SEE ALSO FIRE FUSE.

**FUSE CAN** — PRIMED FUSES WERE TRANSPORTED FROM THE FUSE HOUSE TO THE UNDERGROUND POWDER MAGAZINES IN SPECIALLY MADE STEEL, COPPER LINED AND SPARK-FREE, CONTAINERS, MANUFACTURED IN THE TIN SHOP AND PAINTED RED TO DENOTE THE POTENTIALLY DANGEROUS CONTENTS.

**FUSE CUTTER** — EVERY MINE USED THOUSANDS OF FEET OF FIRE FUSE EVERY SHIFT. THIS FUSE CAME IN LARGE ROLLS OF SEVERAL THOUSAND FEET THAT NEEDED TO BE CUT INTO STANDARD LENGTHS AND A BLASTING CAP ATTACHED TO ONE END. EARLY ON, THIS WAS DONE AT THE MINING FACE BY THE MINERS, BUT IT WAS SOON FOUND THAT IT WAS FAR MORE EFFICIENT AND LESS WASTEFUL TO PROVIDE THE MINERS WITH PROPER LENGTH OF FUSE WITH THE CAP CRIMPED ON ONE END. THIS WORK WAS PERFORMED BY THE FUSE CUTTER, USUALLY A PARTIALLY DISABLED MINER, AT EACH MINE OR ON A SINGLE LEVEL OF THE MINE, IF THE DEMAND WAS SUFFICIENT. THIS ACTIVITY WAS CENTRALIZED AT A SINGLE MINE FOR EACH COMPANY BY 1930.

**FUSE HOUSE** — BY 1930, ALL BLASTING CAPS WERE SENT UNDERGROUND CRIMPED ON FIRE FUSE, WHICH HAD BEEN CUT INTO STANDARD LENGTHS. THESE PREPARED FUSES WERE THEN PLACED IN SPECIAL FUSE CANS MADE IN THE TIN SHOP AND SET UNDERGROUND. THIS PREPARATION OF THE FUSES WITH CAPS WAS CARRIED OUT IN THE FUSE HOUSE IN THE JUNCTION MINE YARD.

**GALENA** — 1). THE MOST ECONOMICALLY IMPORTANT LEAD MINERAL MINED AT BISBEE. IT IS A LEAD SULFIDE. 2). ALSO, THE NAME OF THE CLUSTER OF COMPANY HOUSES CONSTRUCTED NEAR LOWELL IN THE VERY EARLY 1950s. 3). THE GALENA MINE.

**GANG BOSS** — A WORK GANG SUPERVISOR WHO WAS USUALLY A WORKING BOSS AS HE WORKED ASIDE HIS MEN.

**GANGUE** — THE WASTE OR NON-MINERALIZED ROCK OR VALUELESS MINERALS ASSOCIATED WITH ORE AND ORE MINERALS.

**GAUGE** — 1). SPACING DISTANCE BETWEEN THE INSIDE OF THE BALLS (TOP PART) OF THE TWO PARALLEL RAILS IN THE MINE. THE C. & A. USED A GAUGE OF 18 INCHES WHILE THE COPPER QUEEN USED 20 INCHES. FOLLOWING THE MERGER WITH C. & A., PD ADAPTED THE 18 INCH GAUGE. 2). THE WIDTH OF A DRILL STEEL AT THE BIT END. EACH SUBSEQUENT STEEL USED HAD A SLIGHTLY NARROWER GAUGE TO ASSURE THAT ONE STEEL COULD FOLLOW THE

PREVIOUS, AS THE HOLE DIAMETER DRILLED BY THE PREVIOUS WAS SLIGHTLY LARGER THAN THE GAUGE OF THE STEEL TO FOLLOW.

**GENERAL MANAGER** — THE MOST SENIOR MANAGEMENT PERSON AT BISBEE TO WHOM ALL OTHERS REPORTED. TYPICALLY, THIS INDIVIDUAL WAS A MINING ENGINEER WHO HAD BEEN WITH THE COMPANY FOR MOST OF HIS CAREER AND HAD WORKED HIS WAY UP THROUGH THE ORGANIZATION. HE REPORTED TO THE VICE-PRESIDENT OF WESTERN OPERATIONS IN DOUGLAS.

**GENERAL OFFICE** — THE MAIN COMPANY OFFICE WHERE THE SENIOR MANAGEMENT, INCLUDING THE GENERAL MANAGER, MAINTAINED OFFICES. ACCOUNTING AND PAYROLL WERE ALSO HERE AS WERE A LIMITED NUMBER OF CLERICAL SUPPORT STAFF.

**GENERAL SUPERINTENDENT** — THIS POSITION WAS USUALLY THE NUMBER TWO AT THE COPPER QUEEN BRANCH. IT WAS NOT ALWAYS OCCUPIED AND TOWARDS THE END OF OPERATIONS AT BISBEE, IT WAS A GENERAL SUPERINTENDENT WHO WAS TOTALLY IN CHARGE, WITH THE GENERAL MANAGER'S POSITION LEFT VACANT.

**GEOLOGIST** — ONE WHO IS TRAINED IN AND WORKS IN ANY OF THE GEOLOGICAL SCIENCES. AT BISBEE, THE GEOLOGIST WAS RESPONSIBLE FOR ORE DISCOVERY. TO DO THIS, THEY GEOLOGICALLY MAPPED ALL RAISES AND CROSSCUTS AS WELL LOGGED ALL DIAMOND DRILL CORE, LOOKING FOR CLUES REGARDING ORE DEPOSITION. THE INFORMATION DERIVED FROM THESE EFFORTS WAS TRANSFERRED TO THE MAIN MINE MAPS FOR A MORE COMPLETE UNDERSTANDING. GEOLOGIST FIRST BECAME INVOLVED ON A FULL TIME BASIS AT BISBEE JUST AFTER 1900. DR. JAMES DOUGLAS, AN EDUCATED MAN AND PRESIDENT OF THE COPPER QUEEN, OFTEN NOTED THAT MORE ORE WAS FOUND BY A GOOD MINER WHO COULD READ THE GROUND THAN ANY GEOLOGIST.

**GEOHERMAL GRADIENT** — THE NATURAL RISE IN ROCK TEMPERATURE WITH DEPTH. WHILE THE GEOHERMAL GRADIENT IS EXTREMELY VARIABLE WORLDWIDE, IT IS TYPICALLY CONSISTENT IN A GIVEN AREA. AT BISBEE, THE GEOHERMAL GRADIENT IS CLOSE TO 1° F PER 60 FEET OF VERTICAL DEPTH. HOWEVER, DECOMPOSING SULFIDES OFTEN RAISED THE TEMPERATURE WELL ABOVE THIS LEVEL, WHILE GOOD VENTILATION TYPICALLY LOWERED THE TEMPERATURE, THEREBY MAKING THIS SUBTLE CHANGE LESS OBVIOUS.

**GIANT CAPS** — A TERM COMMONLY USED TO REFER TO BLASTING CAPS BEFORE 1930 AS MOST BLASTING CAPS USED TO THIS POINT WERE OF THE "GIANT" BRAND. THESE CAME IN VARIOUS STRENGTHS AS INDICATED BY NUMBERS 5, 6, 8, WITH THE HIGHER NUMBER BEING THE MORE POWERFUL.

**GILMAN CUT AND FILL SYSTEM** — A VARIATION OF CUT AND FILL STOPING DEVELOPED BY OSCAR GILMAN, A DIVISION FOREMAN FOR THE C & A IN 1914. IT ALLOWED FOR MORE ORE RECOVERY IN AREAS AFFECTED BY NEARBY MINING.

**GILMAN DRIFTER** — A LOCALLY MODIFIED DRIFTER STYLE ROCK DRILL USED FOR A SHORT TIME IN THE COPPER QUEEN BRANCH MINES DURING THE EARLY 1930s, BEFORE CONTINUED MECHANICAL PROBLEMS CAUSED IT TO BE REPLACED BY THE MORE RELIABLE INGERSOLL-RAND ROCK DRILLS.

**GIN POLE** — 1). IN RAISE MINING, IT WAS HEAVY, THICK WALLED TUBING POINTED AT THE BOTTOM END AND WITH A CLAMP-HELD EYE TO ATTACH A BLOCK PULLEY AT THE TOP END. IT WAS WEDGED BETWEEN THE DRILL STAGING AND THE BACK WITH THE POINT ON THE STAGING TIMBER AND THE BLOCK OVER THE TIMBER SLIDE, THROUGH WHICH A ROPE OR CABLE WAS THREADED FOR HOISTING TIMBER AND OTHER SUPPLIES. 2). ON THE SURFACE OR IN WIDE

SPACES UNDERGROUND, IT WAS A HEAVY BEAM SUSPENDED BY ROPES OR CABLES TO SERVE AS A POINT TO PLACE A BLOCK FOR LIFTING HEAVY ITEMS.

**GIRT** — IN THE ASSEMBLY OF A SQUARESET OF TIMBER, THE GIRT IS THE TOP PIECE, PLACED HORIZONTALLY AND PARALLEL TO THE DIRECTION OF ADVANCE. IT IS CUT TO THE LENGTH OF THE STANDARD DISTANCE BETWEEN THE POST OF THE PREVIOUS SET AND THE NEXT.

**GLANCE** — 1). A NAME COMMONLY APPLIED TO CHALCOCITE BY THE MINERS. 2). THE COPPER GLANCE MINE LOCATED ON THE EASTERN EDGE OF THE WARREN MINING DISTRICT. 3). THE CRETACEOUS AGE GLANCE CONGLOMERATE ROCK UNIT, SO COMMON IN THE EASTERN PORTIONS OF THE WARREN MINING DISTRICT.

**GLORY HOLE** — 1). A FUNNEL-SHAPED EXCAVATION, THE BOTTOM OF WHICH IS CONNECTED TO A RAISE DRIVEN FROM AN UNDERGROUND HAULAGE LEVEL. THE ORE IS BROKEN BY DRILLING AND BLASTING IN BENCHES AROUND THE PERIPHERY OF THE FUNNEL. THE LAST ORES RECOVERED FROM THE BOTTOM OF THE SACRAMENTO PIT WERE MINED BY THIS METHOD. 2). THE TERM ALSO APPLIES TO A SURFACE HOLE MADE THROUGH THE EXTRACTION OF A RICH ORE MASS AT THE SURFACE, SUCH AS THE “GLORY HOLE” OF THE COPPER QUEEN MINE.

**GO DEVIL** — THE NAME GIVEN TO A CAGE OR OTHER CONVEYANCE THAT WENT THROUGH A COMPARTMENT WITHOUT SHAFT GUIDES. THESE WERE VERY WOBBLY THINGS TO RIDE AS THEY BOUNCED OFF OF THE SHAFT WALLS WHEN MOVING. THE NUMBER FOUR COMPARTMENT AT THE DALLAS MINE WAS EQUIPPED WITH A GO DEVIL AND ALWAYS GAVE AN EXCITING RIDE.

**GOB** — 1). WASTE ROCK TO BE USED AS BACKFILL. 2). ALSO, THE ACT OF BACKFILLING OR PLACING WASTE IN WORKED OUT OPENINGS TO ADD TO THE SUPPORT OF THE TIMBER. THE OPENINGS WERE TYPICALLY GOBBED AS COMPLETELY AND TIGHTLY AS POSSIBLE.

**GOB DRIFT** — IT WAS NOT UNCOMMON TO LACK SUFFICIENT WASTE ROCK TO USE AS GOB FOR STOPE BELOW A GIVEN LEVEL. IN THESE INSTANCES, RAISES OR DRIFTS WERE DRIVEN IN BARREN LIMESTONE FOR THE SOLE PURPOSE OF GENERATING CLEAN, SUITABLE MATERIAL FOR GOBBING. OBVIOUSLY, WHEN POSSIBLE, THESE HEADINGS WERE DRIVEN IN PROSPECTIVE AREAS WITH THE HOPE OF HITTING ORE.

**GOB HOLE** — THE HOLE INTO WHICH GOB WAS DUMPED FOR BACKFILLING OF A STOPE. THESE WERE USUALLY SMALL, FAIRLY CLOSELY SPACED RAISES TO MINIMIZE THE AMOUNT OF SHOVELING IN THE STOPE NECESSARY TO FILL THE OPENING AS TIGHT AS POSSIBLE. THESE WERE TYPICALLY SINGLE COMPARTMENT RAISES AND STRIPPED OF TIMBER WHEN POSSIBLE.

**GOB FENCE** — A FENCE-LIKE BARRIER, USUALLY MADE FROM SPLIT LAGGING. TO HOLD GOB BACK FROM AN OPENING SUCH AS A CROSSCUT OR ACCESS WAY THROUGH A BACKFILLED STOPE.

**GOB RAISE** — IT WAS NOT UNCOMMON TO HAVE INSUFFICIENT WASTE ROCK AVAILABLE TO USE AS GOB FOR STOPE BELOW A GIVEN LEVEL. IN THESE INSTANCES, RAISES OR DRIFTS WERE DRIVEN IN BARREN LIMESTONE FOR THE SOLE PURPOSE OF GENERATING CLEAN SUITABLE MATERIAL FOR GOBBING. OBVIOUSLY, WHEN POSSIBLE, THESE HEADINGS WERE DRIVEN IN PROSPECTIVE AREAS WITH THE HOPE OF HITTING ORE.

**GOB WALL** — IT WAS COMMON TO BUILD ROCK WALLS FROM THE LARGER WASTE PIECES REMOVED WHILE HAND-SORTING ORE TO CONTAIN GOB. GOB WAS PLACED BEHIND THESE ROCK WALLS WHEN THE STOPE WAS BACKFILLED. WHEN THE ORE WAS NO LONGER HAND SORTED, GOB FENCES WERE BUILT TO SERVE THE SAME PURPOSE.

**GOBBING** — THE ACT OF PLACING WASTE IN A MINE OPENING TO HELP SUPPORT THE SURROUNDING ROCK.

**GOOD FRIDAY** — A COMMON REFERENCE TO PAYDAY FRIDAY, WHICH WAS EVERY OTHER FRIDAY.

**GOOSE NECK** — A CONNECTOR FOR THE WATER HOSE TO A ROCK DRILL. IT WAS A SHORT, 90° PIECE OF 1/2 STEEL TUBING WITH ADAPTORS ON EACH END, ON TO ACCEPT THE WATER HOSE AND THE OTHER A FLANGED COUPLING TO ATTACH TO THE DRILL BODY TO ALLOW IT TO ROTATE IN A FULL CIRCLE.

**GOSSAN** — THE RUST-COLORED, IRON OXIDE RICH CAPPING OR STAINING OF A MINERAL DEPOSIT, GENERALLY FORMED BY THE OXIDATION OR ALTERATION OF IRON SULFIDES. THE REDDISH CAPPING ON SACRAMENTO HILL AS WELL AS THE HILLS NEAR THE PIT AND NORTH OF THE DIVIDEND FAULT ARE A GOSSAN.

**GOUGE** — FINE, OFTEN PUTTY-LIKE MATERIAL COMPOSED OF GROUND-UP ROCK FOUND ALONG A FAULT AND CAUSED BY GRINDING OF THE ROCK THROUGH THE MOVEMENT OF THE FAULTED ROCKS. ALSO CALLED FAULT GOUGE.

**GRAB ASS** — ANOTHER TERM FOR HORSEPLAY, PARTICULARLY WITH SENSITIVE INDIVIDUALS ON A CROWDED CAGE, SOMETHING STRICTLY FORBIDDEN BECAUSE OF THE POTENTIAL DANGER, YET FREQUENTLY PRACTICED.

**GRAB SAMPLE** — A RANDOMLY TAKEN SAMPLE OF MATERIAL FROM A MUCK PILE THAT IS ASSAYED TO DETERMINE THE COPPER CONTENT OF THE MATERIAL. A GRAB SAMPLE IS NOT INTENDED TO BE REPRESENTATIVE OF THE WHOLE OF THE MATERIAL AS IT IS USUALLY BIASED WITH THE BEST-LOOKING MATERIAL SELECTED. IT DOES SERVE AS A GENERAL GUIDE TO METAL CONTENT OF THE BROKEN MUCK.

**GRADE** — 1). THE RELATIVE QUANTITY OR THE PERCENTAGE OF ORE-MINERAL OR METAL CONTENT IN THE MATERIAL BEING MINED. ALSO CALLED ORE GRADE. 2). A DEGREE OF INCLINATION OR A RATE OF ASCENT OR DESCENT, WITH RESPECT TO THE HORIZONTAL USUALLY EXPRESSED AS A PERCENTAGE.

**GRAVEYARD SHIFT** — THE THIRD SHIFT THAT OPERATED FROM 11:00 PM TO 7:00 AM. UNDERGROUND, FEW WORKED THIS SHIFT, FIRE BUGS, PUMPMEN AND A FEW MOTOR CREWS. HOWEVER, IN THE PITS AND CONCENTRATORS, IT WAS A REGULAR FULL SHIFT THROUGH WHICH MOST OF THE EMPLOYEES ROTATED ON A REGULAR BASIS.

**GRAVITY SEPARATION** — SEPARATION OF MINERAL PARTICLES, WITH THE AID OF WATER OR AIR, ACCORDING TO THE DIFFERENCES IN THEIR SPECIFIC GRAVITIES. ORE MINERALS ARE TYPICALLY HEAVIER THAN GANGUE MINERALS. ONCE CRUSHING AND GRINDING HAD BEEN ACCOMPLISHED, THE FINE PARTICLES WERE PASSED OVER AN INCLINED TABLE WITH WATER OR LOW FLOWS OF COMPRESSED AIR TO CAUSE THE SEPARATION. THIS WAS THE FIRST RECOVERY METHOD EMPLOYED ON THE ORES FROM THE SACRAMENTO PIT, BUT ONLY WITH MODEST SUCCESS AND WAS SOON REPLACED BY FLOATATION.

**GRIND** — A REFERENCE TO THE DEGREE OF FINENESS TO WHICH A MATERIAL IS GROUND DURING MILLING OPERATIONS.

**GRINDING** — THE SIZE REDUCTION OF CRUSHED ROCK INTO FINE, POWDER-LIKE PARTICLES, FOR FEED TO THE FLOAT CELLS. ALSO CALLED COMMINUTION. AT BISBEE, THIS WAS ALWAYS ACCOMPLISHED USING BALL OR ROD MILLS.

**GRINDING BALLS** — STEEL BALLS INTRODUCED INTO THE BALL MILLS TO GRIND THE ORE.

**GRIZZLY** — A SERIES OF IRON OR STEEL BARS, OFTEN USED RAILROAD RAILS, SPACED SO AS TO SIZE, SORT, OR SEPARATE THE BROKEN MATERIAL AS IT IS MUCKED OR DUMPED INTO THE ORE CHUTES OR POCKETS. THE INTENT IS TO KEEP OVERSIZE ROCKS FROM ENTERING THE SYSTEM AND POTENTIALLY PLUGGING IT. THE GRIZZLY'S BARS WERE TYPICALLY SPACED TO ALLOW A 10-INCH ROCK TO PASS WHILE STOPPING ANYTHING LARGER. ALSO CALLED BREAKERS IN THE STOPES, AS THIS WAS WHERE THE LARGER BOULDERS WERE BROKEN WITH DOUBLE JACKS.

**GROUND** — 1). ROCK AT THE SIDE OF AN OREBODY; COUNTRY ROCK, FREQUENTLY USED TO REFER TO THE ROCK IN GENERAL AS IN "BAD GROUND." 2). A GROUND IS A CONDUCTING CONNECTION, WHETHER INTENTIONAL OR ACCIDENTAL, BETWEEN AN ELECTRICAL CIRCUIT OR EQUIPMENT AND EITHER THE EARTH OR SOME CONDUCTING BODY SERVING IN PLACE OF THE EARTH.

**GRUBSTAKE** — FINANCES OR SUPPLIES OF FOOD, ETC., FURNISHED TO A PROSPECTOR IN RETURN FOR AN INTEREST IN ANY DISCOVERIES MADE. GEORGE WARREN WAS GRUBSTAKED BY DUNN AND RUCKER, THE DISCOVERERS OF BISBEE'S FIRST MINERALIZATION, TO LOCATE MORE CLAIMS IN THE AREA. WARREN STAKED A NUMBER OF ADDITIONAL CLAIMS, BUT NEVER HONORED HIS PART OF AGREEMENT. NEITHER DUNN NOR RUCKER WERE EVER LISTED ON THE CLAIM NOTICES WARREN FILED.

**GUARD** — 1). TO PROTECT A BLAST AREA FROM ENTRY UNTIL THE BLAST HAS GONE OFF. ALL POSSIBLE ACCESS POINTS TO A BLAST AREA WERE GUARDED BY THE MINERS TO PREVENT ENTRY. 2). A PROTECTIVE COVER PLACED OVER MOVING MACHINERY PARTS, SUCH AS GEARS, TO PREVENT A WORKER FROM PUTTING A HAND OR OTHER BODY PARTS WHERE INJURY COULD OCCUR.

**GUARDRAIL** — A SHORT SEGMENT OF RAIL PLACED PARALLEL TO THE RAIL OF A SWITCH FROG TO GUIDE THE WHEEL FLANGE AWAY FROM THE FROG POINT. GUARDRAILS WERE OFTEN USED ON TIGHT CURVES AS WELL TO KEEP THE WHEEL FLANGE CLOSE TO THE OUTSIDE RAIL TO REDUCE DERAILMENTS.

**GUIDES** — THE WIDE WOODEN OR STEEL TRACKS THAT SUPPORT AND DETERMINE THE PATH OF A SKIP OR CAGE. SEE ALSO SHAFT GUIDES.

**GUNITE** — A CEMENT MIXTURE APPLIED, BY SPRAYING, TO THE BACK AND RIBS OF A MINE PASSAGE TO PREVENT OR RETARD SLACKING OF THE ROCK BECAUSE OF EXPOSURE TO AIR.

**GYRATORY CRUSHER** — PRIMARY CRUSHER CONSISTING OF A VERTICAL SPINDLE, THE FOOT OF WHICH IS MOUNTED IN AN ECCENTRIC BEARING WITHIN A CONICAL SHELL. THE TOP CARRIES A CONICAL CRUSHING HEAD REVOLVING ECCENTRICALLY IN A CONICAL MAW. THERE ARE THREE TYPES OF GYRATORIES—THOSE THAT HAVE THE GREATEST MOVEMENT ON THE SMALLEST LUMP ON THE CAM, THOSE THAT HAVE EQUAL MOVEMENT FOR ALL LUMPS ON THE CAM, AND THOSE THAT HAVE GREATEST MOVEMENT ON THE LARGEST LUMP. THE PRIMARY CRUSHER IN THE LAVENDER PIT WAS A GYRATORY CRUSHER.

**HAND** — A GENERAL TERM FOR A WORKER, PARTICULARLY A NEW ONE AS IN “THE NEW HAND.”

**HAND DRILLING** — A HISTORICAL METHOD OF DRILLING BLASTHOLES IN ROCK BY HAMMER AND A HAND-HELD STEEL. SINGLE -JACK DRILLING WAS DONE BY ONE MINER. IN DOUBLE-JACK DRILLING, ONE MINER HELD THE STEEL FOR ONE OR TWO STRIKERS WITH HAMMERS.

**HAND PROTECTOR** — THE MOTOR SWAMPER RODE THE LAST CAR OF THE TRAIN STANDING ON A STEP WITH HIS HANDS GRASPING A STEEL BAR COVERED BY AN INCLINED STEEL PLATE CALLED A HAND PROTECTOR. THE UNIT WAS SLOTTED TO FIT OVER THE EDGE OF THE MINE CAR AND PROTECTED HANDS FROM LARGE ROCKS IN THE LOADED CARS, WHICH OFTEN SHIFTED DURING TRANSPORT.

**HAND STEEL** — THE CHISEL SHAPED STEELS OF VARYING LENGTHS, WHICH ARE USED FOR DRILLING BLASTHOLES BY HAND WHEN HIT WITH EITHER A SINGLE JACK OR DOUBLE JACK AND ROTATED SLIGHTLY BETWEEN BLOWS TO PREVENT STICKING AND MAKE THE HOLE ROUND. HAND STEELS CAME IN SETS, WITH EACH LONGER THAN THE PREVIOUS. ALSO, THE DIAMETER OF EACH SUBSEQUENT STEEL WAS SLIGHTLY LESS TO ASSURE THAT ONE STEEL COULD FOLLOW THE PREVIOUS, AS THE GAUGE (BIT WIDTH) WOULD WEAR QUICKLY.

**HAND SORTING** — THE ORES AT BISBEE WERE SELDOM TRULY CLEAN AND FREE OF INCLUDED WASTE. UNTIL THE ADVENT OF MECHANICAL LOADING, IT WAS DEEMED CHEAPER TO HAVE MEN HAND PICK THE OBVIOUS WASTE FRAGMENTS FROM THE BLASTED ORE AND USE THEM FOR GOB UNDERGROUND, AS OPPOSED TO TRANSPORTING THE WASTE TO THE SURFACE, THEN SHIPPING IT TO THE SMELTER, ALL OF WHICH WERE EXPENSIVE. HAND SORTING OF THE ORES UNDERGROUND IS ALSO ONE REASON SO MANY MINERAL SPECIMENS WERE SAVED — SO MUCH OF THE ORE WAS LOOKED AT CLOSELY. INCREASED LABOR COSTS AND MECHANIZED LOADING DID AWAY WITH HAND SORTING BY THE END OF THE 1920s. ALSO, SEE COBBING.

**HAND TRAMMING** — THE MOVEMENT OF MINE CARS BY MANUALLY PUSHING THEM. THIS MODE OF MOVING ORE AND WASTE WAS PARTIALLY REPLACED FIRST, BY ANIMAL TRAMMING, USING MULES, THEN BY ELECTRIC TROLLEY MOTORS, BOTH OF WHICH WERE FAR MORE EFFICIENT. HAND TRAMMING WAS COMPLETELY REPLACED BY 1930.

**HANG FIRE** — A BLAST, WHICH DELAYS EXPLODING, EITHER COMPLETELY OR PARTIALLY, BECAUSE OF A PROBLEM OF SOME SORT SUCH AS A KINKED FIRE FUSE. THESE WERE EXTREMELY DANGEROUS CONDITIONS AS MINERS WERE TEMPTED TO SEE WHAT THE PROBLEM MIGHT BE. THE SAFETY RULES MANDATED A 30 MINUTE WAIT BEFORE REENTERING A BLAST AREA THAT HAS FAILED TO EXPLODE. SOME DID NOT WAIT AND A FEW KILLED BECAUSE OF THEIR IMPATIENCE.

**HANGERS** — STEEL ROD BRACKETS OR CABLES FOR SUSPENDING TIMBER. COMMONLY USED IN SHAFT SINKING.

**HANGING SETS** — TIMBER SETS, TYPICALLY IN SQUARESET FORMS, WHICH ARE SUSPENDED OVER AN OPENING AND WHICH WILL SERVE TO SUPPORT THE NEXT SET ABOVE. CABLES ARE USED TO SUSPEND THE HANGING SETS.

**HANGING WALL** — THE UPPER OR OVERLYING SIDE OF AN OREBODY, FAULT, OR MINE WORKING, SUCH AS THE WALL ROCK ABOVE AN INCLINED OREBODY OR A FAULT.

**HARD BOILED** — THE TYPICAL UNDERGROUND HARDHAT USED AT BISBEE WAS THE HARD BOILED TYPE. IT WAS MADE BY STEAMING CANVAS WITH RESIN, GLUING SEVERAL LAYERS

TOGETHER THAT PROVIDED THE HARD MOLDED SHAPE. INTRODUCED IN THE MID-1930S, THIS VERY FUNCTIONAL DESIGN WAS STILL IN USE WHEN THE MINES CLOSED IN MID-1975.

**HARD FACING** — HIGH WEAR SURFACES ON SLUSHER RAKES, MUCKING MACHINE BUCKETS, PIT SHOVEL BUCKET TEETH, HAUL TRUCK BED LINERS ETC. WERE FREQUENTLY MADE MORE DURABLE BY WELDING THE CONTACT SURFACES WITH CLOSELY SPACED ROWS OR PATCHES WITH SPECIAL, HARD STEEL WELDING RODS.

**HARDHAT** — THE SAFETY HATS DESIGNED TO ABSORB A BLOW. THEY CAME INTO USE IN BISBEE IN ABOUT 1935 AND IT WAS ALWAYS THE EMPLOYEE'S RESPONSIBILITY TO PURCHASE HIS HARD HAT, BEFORE REPORTING TO WORK THE FIRST DAY, OR A REPLACEMENT. THIS WAS DONE THROUGH THE SUPPLY DEPARTMENT (WAREHOUSE) AND DEDUCTED FROM THE EMPLOYEES PAY. THOSE USED UNDERGROUND, WERE THE HARD BOILED TYPE, CREATED THROUGH STEAMING CANVAS WITH RESIN, GLUING SEVERAL LAYERS TOGETHER WHICH PROVIDED THAT HARD MOLDED SHAPE. THESE HARD HATS, WHEN NEW, WERE VERY LIGHT IN COLOR, USUALLY THE MARK OF A NEW EMPLOYEE. ON THE SURFACE, MANY CHOSE ALUMINUM HARD HATS, PARTICULARLY IN THE LAVENDER PIT. ALUMINUM HATS COULD NOT BE USED UNDERGROUND BECAUSE THEY WOULD CONDUCT ELECTRICITY IF THEY CAME INTO CONTACT WITH THE OVERHEAD, BARE TROLLEY WIRE.

**HARD TOE** — IN THE OPEN PIT, IT WAS NOT UNCOMMON FOR A HARD SPOT TO REMAIN AT THE BOTTOM OF A BLAST AND BETWEEN THE BLASTHOLES. IT WAS TOO HARD FOR THE SHOVEL TO MINE, SO IT WAS DRILLED BY SECONDARY DRILLING EQUIPMENT AND BLASTED AT THE SAME TIME OF THE DAY THE REGULAR BLASTS WERE SHOT.

**HARD TOED BOOTS** — THE SAFETY BOOTS USED IN ALL PARTS OF THE OPERATIONS STARTING IN ABOUT 1940. THEY HAD A SIMPLE STEEL TOE GUARD BUILT INTO THE BOOT. SURFACE BOOTS WERE LEATHER AND FREQUENTLY REFERRED TO AS "SHOES" WHILE THE UNDERGROUND BOOTS WERE RUBBER AND CAME IN TWO TYPES, THE REGULAR 12-INCH HIGH AND 16-INCH HIGH FOR WORK IN WET AREAS. IT WAS ALWAYS THE EMPLOYEE'S RESPONSIBILITY TO BUY HIS OWN SAFETY BOOTS, USUALLY THROUGH THE SUPPLY DEPARTMENT, LIKE THE HARDHAT.

**HAUL** — 1). TO HAUL IS TO TRANSPORT THE BROKEN MATERIAL. 2). IT IS ALSO USED TO DESCRIBE THE DISTANCE OR NATURE OF SUCH TRANSPORT AS IN A "SHORT HAUL" OR A "FLAT HAUL."

**HAUL ROAD** — THE ROADS IN THE PIT USED BY THE HAUL TRUCKS FOR THE TRANSPORT OF ORE, LEACH AND WASTE.

**HAULAGE** — THE MORE OR LESS HORIZONTAL TRANSPORT OF ORE, SUPPLIES, AND WASTE. THE VERTICAL TRANSPORT OF THE SAME IS CALLED HOISTING.

**HEAD BLOCK** — A SHORT, 10" X 10" BLOCK OF TIMBER PLACED BETWEEN THE TOP OF THE DRILLING COLUMN AND THE BACK. THE COLUMN IS THEN TIGHTENED AGAINST THE BLOCK, WHICH IS IN CONTACT WITH THE ROCK, FOR STABILITY.

**HEAD GRADE** — THE ORE GRADE AS IT ENTERS THE PROCESS PLANT, EXPRESSED AS A PERCENTAGE OF THE METALS OF INTEREST. SEE ALSO MILL HEADS OR MILL HEAD GRADES.

**HEADBOARD** — THE TOP PIECE OF HEAVY TIMBER IN A T OR UMBRELLA STULL, WHICH IS SET HORIZONTALLY, AND IN CONTACT WITH THE BACK (T STULL) OR SUPPORTING THE DOUBLE LAGGING IN AN UMBRELLA STULL APPLICATION.

**HEADFRAME** —THE STEEL OR TIMBER FRAME AT THE TOP OF AND SET OVER A SHAFT, WHICH SUPPORTS THE SHEAVE FOR THE HOISTING ROPE AND SERVES VARIOUS OTHER PURPOSES. ALSO CALLED GALLOWS FRAME.

**HEADING** — IN A DRIFT OR CROSSCUT, A DIGGING FACE AND ITS WORK AREA; THE END OF A DRIFT OR GALLERY THAT IS BEING ADVANCED BY THE MINING OPERATION.

**HEAVY GROUND** — GROUND WHICH MUST BE SUPPORTED, OFTEN WITH LARGE AND CLOSELY SPACED TIMBER. THE PHRASE IMPLIES DIFFICULT, EVEN DANGEROUS MINING CONDITIONS.

**HEAVE** — THE UPWARD MOVING OF A DRIFT FLOOR IN SOFT MATERIAL CAUSED BY THE SURROUNDING PRESSURE. HEAVE WAS A CONSTANT PROBLEM IN THE SOFT OXIDE ORE AREAS IN THE CZAR AND HOLBROOK MINES.

**HELMET CREW** — THE SPECIALLY TRAINED FIRE FIGHTING/RESCUE CREW, WHICH WORKED USING SELF-CONTAINED BREATHING APPARATUS, FORMERLY IN A HELMET LIKE FORM, MUCH LIKE DEEP-SEA DIVERS USED. THOSE USED LATER DID NOT HAVE A TRUE HELMET, BUT THE NAME STUCK ANYWAY.

**HIGGINS** — THE HIGGINS MINE.

**HIGGINS CAVE** — A VERY BEAUTIFUL CAVE THAT IS ACTUALLY LOCATED ABOVE THE 7<sup>TH</sup> LEVEL OF THE SOUTHWEST MINE, WHICH WAS FIRST DISCOVERED IN 1926. RECENT (POST 2002) VANDALISM HAS SIGNIFICANTLY DAMAGED THIS CAVE

**HIGGINS TUNNEL** — THE ADIT LEVEL OF THE HIGGINS MINE WHICH CONNECTS TO THE 7<sup>TH</sup> LEVEL OF THE SOUTHWEST MINE THAT HAD ENTRANCES IN BOTH UNCLE SAM AND HENDRICKS GULCHES. TECHNICALLY, THE COMBINED WORKINGS DID INDEED FORM A TUNNEL IN THE TRUE SENSE OF THE WORD.

**HIGH EXPLOSIVE** — AN EXPLOSIVE THAT IS CAPABLE OF DETONATING. THERE ARE TWO MAIN TYPES: (1) PRIMARY EXPLOSIVES, WHICH DETONATE NO MATTER WHAT TYPE OF STIMULUS IS GIVEN - THESE USUALLY ARE VERY SENSITIVE AND (2) SECONDARY EXPLOSIVES, WHICH DETONATE NORMALLY ONLY WHEN THE STIMULUS IS A STRONG SHOCK-UNDER OTHER TYPES OF STIMULUS THEY MAY MERELY DEFLAGRATE.

**HIGH-GRADE** — 1). RICH ORE. 2). AS A VERB, IT REFERS TO SELECTIVE MINING OF THE BEST ORE IN A DEPOSIT. 3). TO COLLECT MINERAL SPECIMENS.

**HIGH-GRADER** — 1). AT BISBEE, THIS WAS SOMEONE WHO COLLECTED AND TOOK HOME MINERALS, AN INFRACTION OF COMPANY RULES, THOUGH SELDOM ENFORCED, AS THERE WAS LITTLE METAL VALUE IN THE MINERAL SPECIMENS REMOVED. IN THIS REGARD, BISBEE ALWAYS HAD MANY "HIGH-GRADERS." 2). A MORE COMMON DEFINITION IS ONE WHO STEALS RICH ORE, ESPECIALLY GOLD, FROM A MINE AND THIS DID HAPPEN IN THE SHATTUCK MINE IN THE 1930S WHEN VERY RICH GOLD WAS HIT. ONE MAN WAS ACTUALLY SET TO PRISON FOR THE CRIME.

**HIT** — TO ENCOUNTER OR FIND DURING MINING OR DRILLING, SUCH AS TO HIT ORE OR WATER.

**HITCH** — A STEP CUT IN ROCK TO HOLD TIMBER SUPPORT IN AN UNDERGROUND WORKING.

**HOATSON** — THE HOATSON MINE. IT MAY ALSO BE A REFERENCE TO CAPTAIN JIM HOATSON WHO RECOMMENDED THE PURCHASE OF THE IRISH MAG CLAIM, WHICH SET THE STAGE FOR THE C. & A. TO BECOME A MAJOR COPPER COMPANY.

**HOIST** — 1). A STEAM, COMPRESSED AIR OR ELECTRIC POWERED ENGINE AT THE TOP OF A SHAFT THAT POWERS THE HOIST DRUM, THUS HOISTING AND LOWERING A CAGE OR SKIP BY MEANS OF A HOISTING ROPE. 2). ALSO, THE ACT OF RAISING SOMETHING UP AN OPENING IS TO HOIST. 3). IN THE USE OF POWER SHOVELS, HOIST IS WHEN THE FILLED BUCKET IS LIFTED PRIOR TO SWINGING TO TRIP AND EMPTY.

**HOIST DRUM** — FOR HAULAGE TO THE SURFACE THROUGH A MINE SHAFT, THE SURFACE GEAR INCLUDES A HOIST DRUM OF CYLINDRICAL FORM ON WHICH THE ROPE (HOISTING ROPE) WOULD WIND AS THE CAGE OR SKIP IS RAISED, AND FROM WHICH IT IS PAID OFF AS THE RETURN JOURNEY IS MADE. TWO SUCH RECEPTACLES ARE USUALLY WORKED SIMULTANEOUSLY IN BALANCED HOISTING, ONE RISING AS THE OTHER DESCENDS, FROM A COMPOUND DRUM. THE DRUM IS DRIVEN BY THE HOIST MOTOR OR ENGINE.

**HOIST ENGINEER** — ONE WHO OPERATES A HOISTING ENGINE. IN MINING, A PERSON WHO OPERATES STEAM OR ELECTRIC HOISTING MACHINERY USED TO LOWER CAGES AND SKIPS INTO A MINE AND TO RAISE THEM TO THE SURFACE FROM DIFFERENT LEVELS. THIS WAS A VERY RESPONSIBLE POSITION, AS ALL WHO BOARDED THE CAGE PLACED THEIR LIVES IN THE HANDS OF THE HOIST ENGINEER. APPROPRIATELY, IT WAS ONE OF THE HIGHEST PAID JOBS IN THE MINES, AS ONLY A SELECT FEW EVER BECAME HOIST ENGINEERS AND THEN ONLY AFTER MANY YEARS OF A TYPE OF APPRENTICESHIP AS THE HOIST OILER.

**HOIST INDICATOR DIAL** — A LARGE, EASILY VISIBLE, DIAL PLACED IN VIEW OF THE HOIST ENGINEER WITH INDICATOR POINTS FOR EACH LEVEL, SHAFT POCKETS, SUMP, SKIP DUMP POINT ETC. THE INDICATOR WOULD SHOW THE HOIST ENGINEER WHERE THE CAGE/SKIP WAS AT A GLANCE. THESE INDICATORS WERE APPROXIMATE AT BEST. THE ACTUAL AND EXACT POINT OF EACH LOCATION WAS PAINTED INSIDE OF THE HOIST DRUM WITH A STATIONARY MARKER TO INDICATE WHEN THE CAGE/SKIP WAS AT THE EXACT POINT. IT WAS ALL VISUAL, BUT QUITE ACCURATE.

**HOIST OILER** — THE APPRENTICE HOIST ENGINEER WHO WAS RESPONSIBLE FOR LUBRICATION OF THE HOIST MACHINERY, THUS THE NAME. HE WAS ALSO RESPONSIBLE FOR MINOR MAINTENANCE AS WELL AS KEEPING THE WHOLE OF THE HOIST HOUSE ABSOLUTELY SPOTLESS, WHICH WAS A PART OF THE TEACHING OF RESPONSIBILITY. AFTER SOMETIME IN SERVICE, THE OILER WOULD TAKE THE HOIST ENGINEER'S PLACE DURING LUNCH OR OTHER ESSENTIAL BREAKS.

**HOISTING ROPE** — THE STEEL WIRE CABLE, WHICH IS WOUND ON THE HOIST DRUM AND CONNECTED TO THE CAGE OR SKIP AND IS USED TO RAISE OR LOWER THE CONVEYANCE.

**HOISTING SPEED** — MEASURED IN FEET PER MINUTE, IT IS THE SPEED AT WHICH A CAGE OR SKIP IS RAISED OR LOWERED. FOR SAFETY REASONS, THE RATE FOR THE HOISTING OF MEN WAS SLOWER THAN THAT FOR THE HOISTING OF MUCK.

**HOISTMAN** — SEE HOISTING ENGINEER.

**HOLBROOK** — THE HOLBROOK MINE.

**HOLBROOK EXTENSION** — FOLLOWING SURFACE EXPLORATION WORK AND UNDERGROUND SAMPLING THROUGH THE GARDNER MINE, THE LAVENDER PIT WAS EXTENDED TO ENCOMPASS MUCH OF THE AREA MINED UNDERGROUND BY THE HOLBROOK MINE, MANY YEARS BEFORE.

**HOLD DOWN BOARD** — ALSO CALLED A KICK BACK BOARD, THESE WERE VERTICALLY HUNG, HINGED 4" X 6" BOARDS AT ALL DUMP POCKETS WHICH PREVENTED A CAR FROM KICKING BACK WHEN ONLY PARTIALLY EMPTIED DURING DUMPING. THE CAR WAS HELD IN THE DUMP POSITION BY THE HOLD DOWN BOARD, SO THAT THE CAR BOTTOM COULD BE HIT WITH A DOUBLE JACK TYPE HAMMER TO FORCE THE REMAINING MUCK OUT OF THE CAR. THESE WERE SOMETIMES CALLED "FRASCO" BOARDS AFTER BERT FRASCO, THE SHIFT BOSS THAT CAME UP WITH THE IDEA IN THE 1930S.

**HOLDING GROUND** — KEEPING A MINING AREA OPEN WITH APPROPRIATE TYPE OF TIMBER SUPPORT IS REFERRED TO AS "HOLDING THE GROUND."

**HOLE PUNCHING** — WHEN DRILL STEEL WAS RETURNED TO THE BLACKSMITH SHOP FOR SHARPENING, THE CENTER HOLE, THROUGH WHICH WATER AND AIR WERE TO PASS, WAS OFTEN PLUGGED. CLEANING THESE HOLES WAS A TIME CONSUMING TASK AS WAS CALLED "HOLE PUNCHING."

**HOLE THROUGH** — WHEN TWO UNDERGROUND OPENINGS ARE CONNECTED, SUCH AS WHEN A RAISE IS BROUGHT UP TO A CROSSCUT OR TWO CROSSCUTS ARE MADE TO INTERSECT BY BLASTING. THE MOMENT OF CONNECTION IS REFERRED TO AS HOLING THROUGH.

**HORSE** — A TERM USED BY THE CORNISH MINERS TO DENOTE A BLOCK OF WASTE OR LOW GRADE INCLUDED WITHIN AN OREBODY.

**HORSEPLAY** — THE PUSHING, SHOVING OR POKING OF OTHERS IN A PLAYFUL MANNER. THIS WAS FORBIDDEN BEHAVIOR BECAUSE OF SAFETY CONCERNS, ESPECIALLY WHEN ON THE CAGE, BUT IT STILL OCCURRED WHEN SOMEONE WAS UNUSUALLY SENSITIVE AS THE OTHERS TOOK GREAT DELIGHT IN MAKING HIM JUMP.

**HORSE WHIM** — A TYPE OF SMALL HOIST USED IN VERY SHALLOW SHAFTS, WHICH HAD A RADIATING BEAM TO WHICH A HORSE WAS YOKED TO PROVIDE POWER AS IT WALKED IN A CIRCLE AROUND THE WHIM.

**HOST ROCK** — THE ROCK SURROUNDING AND CONTAINING AN ORE DEPOSIT.

**HOST** — TO BE THE SOURCE OF A MATERIAL OR TO CONTAIN SUCH AS TO HOST OREBODIES.

**HOSTLER** — THE HELPER TO THE LOCOMOTIVE ENGINEER ON THE LOCOMOTIVES IN THE SACRAMENTO PIT. HE WOULD RUN THE LOCOMOTIVE ON OCCASION AND SWITCH CARS ETC. EVENTUALLY, THE HOSTLER WOULD BECOME A QUALIFIED LOCOMOTIVE ENGINEER.

**HOUSEKEEPING** — ORDERLINESS AND CLEANLINESS OF A WORK AREA. GOOD HOUSEKEEPING WAS AN IMPORTANT PART OF A SAFE WORK AREA.

**HOT WIRE IGNITERS** — SEE SPITTER.

**HUNG CHUTE** — THE CHUTES WITH STOPE ORE AND TRANSFER RAISES OFTEN BECAME CHOKED (HUNG) ABOVE THE CHUTE DOOR WHEN THE MATERIAL WAS EITHER STICKY OR VERY COARSE. THIS CONDITION OFTEN REQUIRED SUBSTANTIAL WORK WITH A PUNCH BAR, BLOWPIPE OR EVEN EXPLOSIVES TO REMEDY.

**HURRICANE DECK** — A REPAIR DECK WITH A PROTECTIVE BONNET, WHICH WAS PLACED ABOVE THE CAGE TO FACILITATE SHAFT REPAIR WORK.

**HYDROMETALLURGY** — THE TREATMENT OF ORE BY WET PROCESSES, SUCH AS LEACHING, RESULTING IN THE SOLUTION OF A METAL AND ITS SUBSEQUENT RECOVERY. THE LEACHING OF LOW-GRADE MATERIALS FROM THE TWO PITS FOR COPPER RECOVERY WAS A HYDROMETALLURGICAL PROCESS.

**I. W. W.** — AN ACRONYM FOR THE MUCH DESPISED INTERNATIONAL WORKERS OF THE WORLD, A RADICAL, NATION-WIDE INDUSTRIAL UNION, WHICH FOMENTED A STRIKE AT BISBEE IN 1917 THAT LED TO THE BISBEE DEPORTATION.

**IN THE BANK** — A PHRASE USED BY DIAMOND DRILLERS TO REFER TO CORE IN EXCESS OF THE 30 FEET PER DAY THEY WERE EXPECTED TO DRILL. IF DRILLING WAS GOOD, A CREW COULD “BANK” EXTRA FOOTAGE FOR THOSE INEVITABLE DAYS WHEN THINGS WENT BAD OR FOR WHEN THEY WANTED TO REST. IT WAS NOT UNCOMMON FOR THE GEOLOGIST TO ASK TO SEE WHAT THEY HAD IN THE BANK, IF THE LAST BIT OF CORE LOOKED INTERESTING. THE ADDITIONAL CORE WAS FREELY SHOWN TO THE GEOLOGIST WITH THE UNDERSTANDING AND TRUST THAT IT WOULD NOT BE REPORTED AND THAT THEY COULD STILL TAKE IT EASY, WHEN DESIRED.

**INCLINED RAISE** — WHILE MOST RAISES AT BISBEE WERE VERTICAL, A NUMBER WERE DRIVEN AT BETWEEN 90° AND 70° A VERY FEW WERE FLATTER, BUT NEVER LESS THAN 45°.

**INCLINED SHAFT** — ANY ENTRY TO A MINE FROM THE SURFACE THAT IS NOT VERTICAL OR HORIZONTAL. THE INCLINED SHAFT OF THE COPPER QUEEN MINE IS THE BEST KNOWN OF THE SEVERAL INCLINED SHAFTS DEVELOPED AT BISBEE.

**IN SITU** — IN THE NATURAL OR ORIGINAL POSITION. APPLIED TO A ROCK, ORE, OR MINERAL WHEN OCCURRING IN THE SITUATION IN WHICH IT WAS ORIGINALLY FORMED OR DEPOSITED.

**INTEGRAL STEEL** — DRILL STEEL WITH THE BIT FORMED ON THE END AS AN INTEGRAL PART OF THE STEEL. EARLY MACHINE DRILL STEEL WAS ALL OF THIS TYPE. ALSO CALLED CONVENTIONAL STEEL.

**INTERIOR SHAFT** — A SMALLER SHAFT INSIDE THE MINE WITHOUT ANY VERTICAL CONNECTION TO THE SURFACE. THE SEVERAL SOUTHWEST SHAFTS, WHICH EXTENDED FROM THE 5<sup>TH</sup> LEVEL OF THE SOUTHWEST MINE (ABOUT 5,500' ELEVATION) DOWN TO THE 200 LEVEL OF THE CZAR MINE (ABOUT 5,100' ELEVATION), WERE INTERIOR SHAFTS AND THERE WAS ALSO ONE IN THE SACRAMENTO BETWEEN THE 1200 AND 1400 LEVELS. THERE WAS AN INTERIOR SHAFT IN THE COLE FROM THE 500 LEVEL TO THE 800 LEVEL, WHICH WAS USED FOR MEN AND MATERIALS ONLY AND AS RIDER OPERATED BY A HAND CONTROL ON THE CAGE. ANOTHER INTERIOR WAS BETWEEN THE 2966 LEVEL CAMPBELL AND 3100 DENN, WHICH WAS USED JUST FOR ACCESS, AND MINOR MATERIAL HANDLING SO THAT THE DENN HOIST AND CAGERS COULD CONCENTRATE ON WASTE HOISTING.

**INTERMEDIATE LEVEL** — A LEVEL DEVELOPED BETWEEN TWO REGULAR LEVELS. THE 4½ LEVEL OF THE SOUTHWEST MINE, DEVELOPED OFF OF THE SOUTHWEST SHAFT, BETWEEN THE 4<sup>TH</sup> AND 5<sup>TH</sup> LEVELS. FEW SUCH LEVELS WERE DEVELOPED. THE 4½ LEVEL OF THE SOUTHWEST MINE WAS ONE SUCH LEVEL, WHICH WAS DEVELOPED BECAUSE OF VERY BAD GROUND ON THE 5<sup>TH</sup> LEVEL. THUS, IT WAS DEEMED BETTER TO DRIVE NEW ACCESS HEADINGS A BIT LOWER THAN TO BATTLE HEAVY, BROKEN GROUND IN ORDER TO MINE THE REMAIN ORES.

**INTERMEDIATE RAISE** — A RAISE DRIVEN FROM WITHIN A STOPE TO THE LEVEL ABOVE. THESE WERE USUALLY DRIVEN TO PROVIDE A MEANS TO GOB A STOPE, WHICH CANNOT BE BACKFILLED FROM THE MAIN RAISE, OR FOR VENTILATION IN HOT GROUND.

**IRON PYRITE** — A COMMON NAME GIVEN BY MINERS TO THE VERY COMMON MINERAL PYRITE.

**IRRIGATION** — THE DIRECTING OF WATER OR LEACH SOLUTIONS TO ROCK PILES ON THE SURFACE OR INTO CLOSED STOPES FOR THE PURPOSE OF RECOVERING COPPER THROUGH PRECIPITATION WITH IRON, FROM THE SOLUTIONS WHICH REPORT TO THE COLLECTION POINT. IT WAS A COMMON PRACTICE TO IRRIGATE CLOSED STOPES OR FIRE AREAS TO RECOVER THE COPPER FROM THE REMAINING SULFIDES.

**JACKHAMMER** — A HAND HELD PNEUMATIC DRILL, WHICH WAS COMMONLY CALLED A PLUGGER AT BISBEE.

**JACKLEG** — A PERCUSSION DRILL USED FOR DRILLING BLASTHOLES, USUALLY IN STOPES. IT WAS MOUNTED ON A TELESCOPIC PNEUMATIC LEG THAT HAS AN EXTENSION OF ABOUT EIGHT FEET. THE LEG AND MACHINE ARE HINGED SO THAT THE DRILL NEED NOT BE POINTED IN THE SAME DIRECTION AS THE LEG, EVEN THOUGH THE LEG IS PROVIDING THE FORWARD PRESSURE NEEDED TO DRILL.

**JACK ARM** — THE OUTRIGGER-LIKE BRACE, ON BOTH SIDES AND NEAR THE FRONT OF THE RAILROAD TYPE, STEAM SHOVEL, WHICH WERE SET TO STABILIZE THE SHOVEL AS THE BOOM SWUNG TO DIG OR LOAD. THESE WERE MANUALLY SET BY TIGHTENING THE COURSE THREAD SCREWS TO THE GROUND.

**JACK BAR** — A ¾ DIAMETER STEEL BAR WITH A SLIGHT BEND OF THE LAST TWO INCHES, AND USED TO TIGHTEN THE JACKSCREWS OF A DRILL COLUMN.

**JACK SCREW** — THE BOTTOM OF DRILL COLUMNS HAD TWO COURSE THREADED SCREWS SET IN A HORIZONTAL BAR. THESE SCREWS WERE TIGHTENED AGAINST THE FOOT BLOCK, WITH A BAR PASSED THROUGH THE TOP FLANGE OF THE SCREW, IN ORDER TO SECURE AND STABILIZE THE COLUMN.

**JIGGER BOSS** — A BOSS OF A SMALL WORK CREW, WHO WAS USUALLY A WORKING BOSS IN THAT HE WOULD WORK ALONGSIDE THE MEN.

**JIM CROW** — A U SHAPED, PORTABLE HAND-OPERATED APPLIANCE FOR BENDING OR CURVING RAILS. IT INCORPORATES A STRONG BUTTRESS SCREW THREAD.

**JITNEY** — SMALL COVERED TRUCKS WITH BENCH SEATS USUALLY USED TO TRANSPORT MAINTENANCE PERSONNEL FROM THE MINE SHOPS TO AND FROM THE VARIOUS MINES.

**JOKER CHUTE** — A SMALL, TEMPORARY CHUTE INSTALLED WHEN STARTING A RAISE TO ALLOW THE BLASTED MATERIAL TO BE LOADED INTO MINE CARS AS OPPOSED TO SHOVELING IT OFF OF A MUCK SHEET.

**JOKER SHEET** — A SUBSTITUTE FOR A SWITCH WHERE CARS ARE HAND TRAMMED. IT CONSISTED OF A FIVE BY FIVE FOOT TURNSHEET TO WHICH FOUR PAIRS OF RAILS WERE ATTACHED, WITH EACH PAIR AT RIGHT ANGLES AND A SPACE IN THE CENTER OF THE TURNSHEET SUFFICIENTLY WIDE TO ROTATE THE CAR. THUS, THE CAR COULD CHANGE DIRECTION OF TRAVEL BY 90°, THOUGH WITH SOME EFFORT.

**JUMBO** — A TRACK MOUNTED, DRILL CARRIAGE ON WHICH TWO DRILLS OF THE DRIFTER TYPE WERE MOUNTED. THESE WERE ONLY USED IN DRIVING CROSSCUTS AT BISBEE.

**JUMPER** — A COAT WORN BY A MAN WORKING UNDERGROUND, USUALLY USED ONLY WHEN RIDING THE CAGE AND HUNG IN A DRY SPOT NEAR HIS WORKING PLACE DURING THE SHIFT. THERE WERE FEW PLACES WHERE A COAT WAS NEEDED UNDERGROUND, BUT RIDING THE CAGE OUT OF A DOWNCAST SHAFT WAS ONE SUCH PLACE, EVEN IN THE SUMMER.

**KICK SWITCH** — A SWITCH USED IN LOW TRAFFIC AREAS AND WITH SMALL RAILS THAT THE SWITCH POINTS ARE MOVED WITH A FOOT INSTEAD OF USING A MECHANICAL LEVER SUCH AS A SWITCH THROW. THESE WERE SOMETIMES REFERRED TO AS KICK POINTS AS IT WAS THE SWITCH POINTS THAT WERE KICKED TO MOVE THEM TO THE DESIRED POSITION.

**KICKED OUT** — POST IN DRIFT SETS WERE ALWAYS SET WITH A SLIGHT INCLINATION WITH THE BOTTOM WIDER THAN THE TOP TO COMPENSATE FOR THE HORIZONTAL PRESSURE FROM THE SUPPORTED ROCK. IT WAS COMMON FOR THE POST BOTTOMS TO BE FORCED INTO THE CROSSCUT BY HORIZONTAL PRESSURE IN THE CLAYLIKE MATERIALS, SO COMMONLY MINED. WHEN THIS OCCURRED TO AN EXTREME, THE POST WAS SAID TO HAVE KICKED OUT AND A REPAIR WAS USUALLY NECESSARY.

**KNEE BRACE** — AN ADDITIONAL SUPPORT TIMBER PLACED AT AN ANGLE AGAINST A POST OR CAP THAT IS FAILING. SEE ALSO ANGLE BRACE.

**KNOCK OFF** — A TYPE OF DETACHABLE ROCK DRILL BIT WHICH IS REMOVED FROM THE DRILL STEEL BY STRIKING IT WITH A BIT KNOCKER OR A BIT HAMMER. THESE BITS WERE SINGLE USE ITEMS AND NOT RESHARPENED.

**LADDER HANGER** — SPECIAL “J” SHAPED SPIKES WERE USED TO SECURE LADDERS TO THE RAISE TIMBER WITHOUT DRIVING A SPIKE IN THE LADDER. THIS WAS WHEN LADDERS WERE PLACED VERTICALLY. BY 1930, SAFETY CONCERNS CAUSED LADDERS TO BE SOMEWHAT INCLINED AND THESE HANGERS WERE NO LONGER USED.

**LADDERWAY** — THE COMPARTMENT ADJACENT TO A SHAFT OR RAISE IN WHICH ACCESS LADDERS HAVE BEEN PLACED. AN INFREQUENTLY USED SYNONYM FOR MANWAY.

**LAGGED OFF** — HEAVY PLANKING (LAGGING) WAS OFTEN USED TO COVER OPENINGS FOR SAFETY REASONS OR TO CONTAIN LOOSE MATERIAL. WHEN AN OPENING WAS THUS CLOSED, IT WAS SAID TO BE LAGGED OFF.

**LAGGING** — HEAVY PLANKS OR TIMBERS USED AS A PART OF THE SUPPORT OF THE RIBS OR BACK, OR FOR FLOORS OF CUT AND FILL STOPES. MOST LAGGING WAS TWO INCHES THICK AND ROUGH CUT. THREE INCH LAGGING WAS USED FOR STAGING OR AREAS WHERE MEN WERE TO BE SUPPORTED, FOR SAFETY REASONS.

**LAMP** — THE MINER'S LAMP. WITH THE INTRODUCTION OF CARBIDE LAMPS, EACH MINERWORKER NOW CARRIED A LAMP INSTEAD OF A CANDLE. MINERS WERE RESPONSIBLE TO BUY THEIR OWN LAMPS AND ANY NEEDED REPAIR PARTS. HOWEVER, THE COMPANIES PROVIDED THE CARBIDE FOR THE LAMPS. WHEN ELECTRIC LAMPS CAME INTO THE MINES IN 1938, THE MINING COMPANY PURCHASED THE LAMPS. EACH MINER HAD AN ASSIGNED LAMP WITH ITS OWN SPACE IN THE CHARGING RACK. THE MINER WAS PERSONALLY RESPONSIBLE TO SEE THAT HE USED ONLY HIS LAMP AND THAT AT SHIFT'S END IT WAS PLACED IN THE RACK IN ITS SPOT AND IN SUCH A MANNER THAT IT WOULD CHARGE.

**LAMP BELT** — WITH THE INTRODUCTION OF ELECTRIC CAP LAMPS CAME THE BELT WITH WHICH TO HOLD THE LAMP. THESE WERE TYPICALLY WEBBED FABRIC WITH A MILITARY BELT TYPE CLASP. A SINGLE LEATHER STRAP ONE INCH WIDE WITH A TYPICAL BUCKLE SECURED THE LAMP BEHIND THE MINER. LATER, WHEN SELF-RESCUERS WERE INTRODUCED, THE STRAP WAS LENGTHENED AND RIVETED IN THE MIDDLE AND A SECOND BUCKLE ADDED TO ACCOMMODATE THE LAMP ON ONE SIDE AND THE SELF-RESCUER ON THE OTHER. BEFORE THE MINES CLOSED, EVERY LAMP BELT ALSO HAD A RIVETED, BRASS NAMETAG FOR BODY IDENTIFICATION IN THE EVENT OF A MINE DISASTER AS MANDATED BY FEDERAL LAW. FORTUNATELY, THESE NAMETAGS WERE NEVER NEEDED. EVERY UNDERGROUND EMPLOYEE WAS RESPONSIBLE FOR BUYING HIS OWN LAMP BELT.

**LAMP RACK** — A DEVICE USED FOR HOLDING BATTERIES FOR MINING LAMPS AND FOR CONNECTING THEM TO A POWER SUPPLY WHILE THE BATTERIES ARE BEING RECHARGED.

**LAMPMAN** — IN MINING, ONE WHO CLEANS, TESTS, AND REPAIRS LAMPS USED UNDERGROUND BY MINERS. THIS WAS A FULL TIME JOB WHERE TYPICALLY AN OLDER OR INJURED MINER WHO COULD NO LONGER STAND THE RIGORS OF UNDERGROUND MINING WORKED. EACH OPERATING UNDERGROUND MINE HAD AN ASSIGNED, FULL TIME, LAMPMAN.

**LANDING** — A PLATFORM IN THE MANWAY COMPARTMENT OF A RAISE OR SHAFT ON WHICH A LADDER IS SET TO GAIN ACCESS TO THE NEXT SET OF TIMBER ABOVE. THE ACCESS HOLES IN LANDINGS WERE OFFSET FROM LANDING TO LANDING TO PREVENT A PERSON FROM FALLING MORE THAN THE 7½ FEET BETWEEN FLOORS, SHOULD HE SLIP WHILE CLIMBING.

**LANDING CHAIR** — BRACE OR BRACKET ON WHICH THE CAGE REST IN A FIXED POSITION DURING THE LOADING OR UNLOADING OF HEAVY ITEMS AS THE CABLE WILL STRETCH DURING LOADING, CAUSING THE CAGE TO DROP AND WILL CONTRACT DURING UNLOADING AND CAUSE THE CAGE TO MOVE UPWARD, EVEN RAPIDLY, THEREBY CREATING A HAZARD. SEE ALSO CHAIR.

**LANDING MAT** — AFTER WORLD WAR II, SURPLUS LANDING MATS, AS USED TO MAKE AIR FIELDS IN THE PACIFIC THEATER, FOUND AN IMPORTANT NEW USE UNDERGROUND IN ROCK SUPPORT. SEVERAL ROCK BOLTS WITH TIE PLATES WERE USED TO PIN THESE TEN-FOOT LONG, LIGHT WEIGHT, PIERCED STEEL PLANKS TO THE AREA IN NEED OF SUPPORT, A MOST EFFECTIVE WAY TO SUPPORT A LONG AREA WITH BUT A FEW WELL PLACED ROCK BOLTS.

**LAW OF THE APEX** — THIS REFERENCES A COURT RULING FROM EUREKA, NEVADA WHICH ESTABLISHED THE PRECEDENT THAT THE OWNER OF THE HIGHEST PART OF THE VEIN, LODE OR ORE BEARING FORMATION HAD THE LEGAL RIGHT TO MINE ALL ORES IN THAT VEIN, LODE OR FORMATION EVEN IF THEY PASSED ONTO VALID MINING CLAIMS HELD BY OTHERS. THIS WAS TESTED AND UPHELD AT BISBEE BY THE SUCCESSFUL SUIT BY THE ARIZONA PRINCE MINING COMPANY, WHEN IT SUED THE COPPER QUEEN FOR MINING ORES ON THE COPPER QUEEN CLAIM, BUT WHICH WERE A DOWN DIP EXTENSION OF THE ORES THE ARIZONA PRINCE WAS MINING. THE ENTRANCE OF THE C. & A. INTO BISBEE BROUGHT WITH IT THE THREAT OF MORE OF THE SAME TYPE OF LITIGATION, BUT DR. DOUGLAS LED THE WAY TO A VERTICAL

SIDELINE AGREEMENT WHERE THE CLAIM BOUNDARIES WERE THE VERTICAL LIMIT TO WHICH ORES COULD BE MINED.

**LEACH** — 1). REFERS TO LOWER GRADE MATERIAL FROM THE PIT TO BE SENT TO THE DUMP FOR EXTRACTION OF THE COPPER BY LEACHING. 2). ALSO, THE PROCESS OF LEACHING.

**LEACH CELLS** — CELLS BUILT ON TOP OF THE LEACH DUMPS BY PUSHING UP FOUR TO SIX FOOT HIGH EARTH DAMS WITH A DOZER. THE CELLS WERE FLOODED WITH BARREN LEACH SOLUTIONS TO PERCOLATE INTO THE ROCK MATERIAL BELOW.

**LEACH DUMPS** — DUMPS BUILT FOR LEACHING OR DUMPS PLACED UNDER LEACHING.

**LEACH LINES** — THE DISTRIBUTION LINES ON THE TOP OF THE LEACH DUMPS TO DISTRIBUTE THE BARREN SOLUTIONS.

**LEACH SOLUTIONS** — THE LOW PH SOLUTIONS, WHICH ARE APPLIED TO THE LEACH DUMPS IN ORDER TO EXTRACT THE CONTAINED COPPER.

**LEACHING** — 1). A HYDROMETALLURGICAL, CHEMICAL PROCESS FOR THE EXTRACTION OF VALUABLE MINERALS FROM LOW-GRADE MATERIAL. THIS WAS A VERY IMPORTANT PART OF THE PROCESS AT BISBEE AS MILLIONS OF TONS OF LOW-GRADE MATERIAL FROM THE TWO PITS WERE LEACHED. 2). ALSO, A NATURAL PROCESS ASSOCIATED WITH SUPERGENE ACTIVITY, BY WHICH GROUND WATERS DISSOLVE MINERALS, THUS LEAVING THE ROCK WITH A SMALLER PROPORTION OF SOME OF THE MINERALS THAN IT CONTAINED ORIGINALLY.

**LEAD** — A HEADING DRIVEN IN A STOPE, USUALLY TO TEST THE DIMENSIONS OF THE OREBODY.

**LEAD SET** — THE FIRST SET OF TIMBER OFF A RAISE WHEN OPENING A STOPE OR BEGINNING MINING ON A NEW FLOOR.

**LEASER** — A COMMON, GENERIC TERM APPLIED TO THOSE WHO LEASED A SECTION OF A MINE FROM ONE OF THE MINING COMPANIES TO OPERATE UNDER CERTAIN TERMS AND CONDITIONS, A MOST COMMON OCCURRENCE AT BISBEE. THE CORRECT TERM SHOULD BE LESSEE, BUT THE REALTY WAS DIFFERENT.

**LEDGE MATTER** — A VERY EARLY AND GENERAL TERM USED TO DESCRIBE THE PERVASIVE, IRON STAINED, CLAYLIKE MASSES SO COMMONLY ASSOCIATED WITH THE THOROUGHLY OXIDIZED ORES, MOSTLY MINED BEFORE 1910. THIS MATERIAL WAS NOT OF ORE GRADE.

**LETTER FROM HOME** — A CORNISH MINER TERM COMMONLY USED AS A REFERENCE TO A PASTY, THE FOLDED MEAT PIE OFTEN TAKEN UNDERGROUND FOR LUNCH. THIS WAS A WIDELY USED TERM IN THE U. S. MINING INDUSTRY FOR THESE DELIGHTFULLY TASTY, ALL IN ONE MEAL.

**LEVEL** — A MAIN UNDERGROUND PASSAGE DRIVEN ALONG A LEVEL COURSE TO AFFORD ACCESS TO STOPES OR WORKINGS AND TO PROVIDE VENTILATION AND A HAULAGEWAY FOR THE REMOVAL OF ORE. LEVELS ARE COMMONLY SPACED AT REGULAR DEPTH INTERVALS AND ARE DESIGNATED BY THEIR DEPTH BELOW THE TOP OF THE SHAFT. AT BISBEE, THE SPACING

WAS TYPICALLY 100 FEET VERTICALLY APART, EXCEPT IN THE LOWER JUNCTION, CAMPBELL AND DENN MINES WHERE IT WAS EXPANDED TO 133 FEET TO SAVE ON DEVELOPMENT COSTS.

**LEYNER** — A TRADE NAME, BUT GENERALLY APPLIED TO DESCRIBE A COMPRESSED AIR-DRIVEN, PERCUSSIVE ROCK DRILL, WHICH WAS USUALLY USED TO DRILL HORIZONTALLY, OR MODERATELY INCLINED BLASTHOLES. THEY WERE MORE OFTEN CALLED DRIFTERS.

**LIFT** — LEACH MATERIAL FROM THE OPEN PIT WAS TYPICALLY PLACED IN LIFTS (LAYERS) OF A DEFINED THICKNESS TO ALLOW FOR LEACHING TO OPTIMIZE RECOVERY BEFORE COVERED WITH ANOTHER LAYER OR LIFT.

**LIFTERS** — THE BOTTOM HOLES IN A ROUND AND THE LAST TO FIRE, WHICH WERE INTENDED TO BOTH BRING THE WORKING FACE TO GRADE AND THROW THE BROKEN ROCK BACK FROM THE FACE AN ONTO MUCK SHEETS FOR EASIER HANDLING.

**LIGHT DUTY** — A TEMPORARY ASSIGNMENT TO A LESS PHYSICALLY DEMANDING JOB BECAUSE OF AN ON THE JOB ACCIDENT WHICH HAS PREVENTED THE PERSON FROM BEING ABLE TO PERFORM HIS NORMAL DUTIES. THIS WAS DONE TO PREVENT MORE “LOST TIME” FROM THE ACCIDENT, AS TIME WORKING IN THE “LIGHT DUTY “ JOB WAS NOT CONSIDERED AS LOST TIME FOR RECORD KEEPING PURPOSES.

**LIME** — 1). AN EARLY TERM TO REFERENCE THE LIMESTONE HOST ROCK. 2). ALSO, THE SLACKED LIME USED FOR PH CONTROL OF MINE WATERS TO REDUCE PUMP AND PIPE CORROSION AS WELL AS A REAGENT IN THE FROTH FLOTATION PROCESS FOR PH CONTROL.

**LIME CRYSTALS** — A COLLOQUIAL TERM USED TO REFER TO CALCITE AND ARAGONITE AS THEY FORMED FROM WATER PASSING THROUGH LIMESTONE.

**LIMONITE** — A GENERIC TERM APPLIED TO ANY OF THE COMMON YELLOWISH/BROWN IRON OXIDES. MOST “LIMONITE” FROM BISBEE IS ACTUALLY GOETHITE.

**LINEN** — A TERM USED TO REFER TO THE PERMANENT, MASTER MINE MAPS AS THESE WERE ALL DRAWN ON A SPECIALLY PREPARED LINEN DRAFTING MATERIAL, AS IT DID NOT SHRINK OR EXPAND WITH TIME AND USE, THEREBY RETAINING THE CORRECT SCALE. IT WAS ALSO SUFFICIENTLY TRANSLUCENT TO ALLOW BLUE PRINT-TYPE COPIES TO BE MADE FOR FIELD USE.

**LINES** — A PAIR OF PLUMB LINE SPADS, IN THE BACK OF A MINE OPENING, FOR CONTROLLING THE DIRECTION IN WHICH THE HEADING IS DRIVEN. LINES WERE PLACED (GIVEN) TO THE CROSSCUT AND RAISE CREWS ON A FREQUENT BASIS BY THE SURVEY CREW FROM THE ENGINEERING DEPARTMENT. THE CROSSCUT CREW WOULD SIGHT ALONG THE LINES TO DETERMINE THE CORRECT CENTER OF THE HEADING, AND THUS THE DIRECTION.

**LOAD** — 1). THE ACT OF PLACING BROKEN ROCK IN A MINE CAR OR HAUL TRUCK. 2). THE MATERIAL IN THE CAR OR TRUCK IS ALSO CALLED A LOAD. 3). IN BLASTING, TO PLACE THE EXPLOSIVES IN THE BLASTHOLES.

**LOADING BOARD** — EARLY LOADING STANDS WERE LITTLE MORE THAN A FOOT ABOVE THE TRACK AND EXPOSED THE MOTOR SWAMPER OR TRAMMER TO THE RISK OF INJURY FROM ROCKS OVER SHOOTING THE CAR. LOADING BOARDS WERE CLIPPED TO THE SIDE OF THE CAR AND IN FRONT OF THE TRAMMER TO TAKE THE IMPACT OF FAST FLOWING MATERIALS. A COMBINATION OF LOADING BOARDS NOT BEING USED AND THEIR NOT TRULY BEING EFFECTIVE, CAUSED THE LOADING PLATFORMS TO BE ELEVATED SO THAT THE INDIVIDUAL WAS ABOVE THE TOP OF THE CAR. THIS DID AWAY WITH THE NEED FOR LOADING BOARDS. SEE ALSO SIDE BOARD.

**LOADING PLATFORM** — OPPOSITE THE CHUTE WAS A WOODEN PLATFORM FOR THE MOTOR SWAMPER TO STAND ON WHILE LOADING THE MINE CARS. EARLY LOADING STANDS WERE LITTLE MORE THAN A FOOT ABOVE THE TRACK AND EXPOSED THE MOTOR SWAMPER OR TRAMMER TO THE RISK OF INJURY FROM ROCKS OVER SHOOTING THE CAR. LOADING BOARDS WERE CLIPPED CARS IN FRONT OF THE TRAMMER TO TAKE THE IMPACT OF FAST FLOWING MATERIALS, BUT A COMBINATION OF THEM NOT BEING USED AND NOT TRULY BEING EFFECTIVE, CAUSED THE LOADING PLATFORMS TO BE ELEVATED SO THAT THE INDIVIDUAL WAS ABOVE THE TOP OF THE CAR. THIS MADE A HUGE DIFFERENCE AND CAR LOADING ACCIDENTS WERE DRAMATICALLY REDUCED. ALSO CALLED LOADING STAND. SEE ALSO CHUTE STAND.

**LOADING STICK** — POWDER WAS PLACED (LOADED) INTO BLASTHOLES BY PUSHING IT IN WITH THE LOADING STICK AND LIGHTLY TAMPING IT IN PLACE. WOODEN STICKS WERE USED BECAUSE THEY WOULD NOT CREATE SPARKS WHEN USED. THEY WERE 1 1/4 INCH IN DIAMETER AND ABOUT EIGHT FEET LONG.

**LOADING TRACK** — IN THE SACRAMENTO PIT, THE TRACK ON WHICH THE RAIL CARS WERE POSITIONED TO BE LOADED BY RAIL MOUNTED THE STEAM SHOVEL, WHICH WAS OPERATING FROM A PARALLEL TRACK.

**LOCATE** — 1). TO PLACE THE MARKERS IN THE FIELD DELINEATING THE BOUNDARIES OF A MINING CLAIM. 2). ALSO USED TO MEAN THE ACT OF STAKING A MINING CLAIM. SEE ALSO STAKING.

**LOCATION** — A MINING CLAIM. IT DOES NOT REFER TO THE PHYSICAL SITE OF THE CLAIM.

**LODE** — A MINERAL DEPOSIT CONSISTING OF A ZONE OF VEINS, VEINLETS, DISSEMINATIONS, OR PLANAR BRECCIAS; A MINERAL DEPOSIT IN CONSOLIDATED ROCK AS OPPOSED TO AN ALLUVIAL PLACER DEPOSIT.

**LOGGING** — THE PROCESS OF RECORDING GEOLOGICAL OBSERVATIONS OF DRILL CORE IN A FIELD BOOK FOR LATER TRANSFER TO THE MAIN MAPS, ALONG WITH THE ASSAY DATA.

**LONG CHANGE** — THE CHANGE OF SHIFT WHERE THE ROTATION IS FROM DAYSHIFT SATURDAY TO NIGHTSHIFT MONDAY, ALMOST TWO DAYS OFF FOR THE UNDERGROUND CREWS AS THERE WAS NO SUNDAY WORK UNDERGROUND.

**LONG HOLE** — UNDERGROUND BOREHOLES AND BLASTHOLES EXCEEDING 10 FT IN DEPTH OR REQUIRING THE USE OF TWO OR MORE LENGTHS OF DRILL STEEL OR RODS COUPLED TOGETHER TO ATTAIN THE DESIRED DEPTH. THESE WERE TYPICALLY USED FOR SAMPLING BY CATCHING AND ASSAYING THE CUTTINGS. LONG HOLES WERE ALSO USED TO TEST FOR WATER AHEAD OF DEVELOPMENT IN AREAS WHERE THE RISK OF HITTING A HEAVY FLOW EXISTED.

**LOST TIME** — AN ACCIDENT SEVERE ENOUGH THAT THE INJURED PERSON WAS UNABLE TO WORK FOR A PERIOD, THUS WORK TIME WAS LOST.

**LOW-GRADE** — PERTAINING TO ORES THAT HAVE A RELATIVELY LOW CONTENT OF METAL COMPARED WITH OTHER RICHER MATERIAL FROM THE SAME GENERAL AREA.

**LOWELL** — THE LOWELL MINE.

**MACHINE** — THIS WAS A PNEUMATIC ROCK DRILL AND NOTHING ELSE, IN SPITE OF ALL THE OTHER EQUIPMENT AND MACHINERY IN THE MINE.

**MACHINE MAN** — THE MAN WHO OPERATED THE PNEUMATIC ROCK DRILL; ALMOST A SPECIALTY AT THE BEGINNING, AS IT TOOK A WHILE FOR MEN TO ADAPT TO THE NEW, PNEUMATIC DRILLS. SOME GOOD MINERS COULD NEVER QUITE MAKE THE CHANGE, NOTABLY THE VERY SKILLED HAND DRILLERS, A FACT MUCH DISCUSSED IN THE LITERATURE OF THE DAY.

**MAG** — THE IRISH MAG MINE.

**MAIN LINE** — 1). THE PERMANENT TRACK OUTSIDE OF THE MINING AREAS OF THE SACRAMENTO PIT FROM WHICH ALL OF THE BENCH TRACKS ORIGINATED. BECAUSE OF ITS RELATIVELY LONG LIFE AND HIGH USE, THIS TRACK WAS CAREFULLY INSTALLED AND WELL BALLASTED, UNLIKE TEMPORARY BENCH TRACK. 2). THE PRINCIPAL HAULAGE ROUTE ON AN UNDERGROUND LEVEL WHICH WAS LARGELY DEDICATED TO ORE AND WASTE TRANSPORT. AN EXAMPLE IS THE HAULAGE TRACK ON THE 1400 LEVEL COLE/DALLAS OVER WHICH LARGER MOTORS WITH GRANBY-TYPE CARS HAULED ORE AND WASTE TO THE DALLAS FOR HOISTING.

**MALACHITE** — A GREEN COPPER CARBONATE, WHICH WAS ABUNDANT AT BISBEE AND WAS ONE OF THE MOST IMPORTANT OXIDE ZONE ORE MINERALS. MALACHITE SPECIMENS FROM BISBEE ARE AMONG THE FINEST IN THE WORLD AND ARE COVETED BY COLLECTORS FOR THEIR STRIKING BEAUTY, PARTICULARLY WHEN ASSOCIATED WITH AZURITE, THE BLUE COPPER CARBONATE.

**MAN CAR** — A CAR DESIGNED FOR THE TRANSPORT OF MINERS TO AND FROM THE WORKING AREAS. THOSE AT BISBEE WERE WOODEN BENCH-LIKE WITH A STEP ON BOTH SIDES, WHICH WERE STRADDLED WHEN RIDDEN. THESE FIRST CAME INTO USE IN THE LATE 1940S ON THE 2966 CAMPBELL TO TRANSPORT MINERS FROM THE SHAFT TO WORKING AREAS NEAR THE DENN. LATER, THEY WERE EMPLOYED TO TAKE MEN FROM THE COLE SHAFT TO THE COLE INTERIOR ON THE 800 LEVEL. THESE SAME CARS ARE STILL IN USE AT THE QUEEN MINE TOURS.

**MAN TAG** — ANOTHER NAME FOR THE BRASS CHECK WITH THE EMPLOYEE'S PAYROLL NUMBER AND USED TO DETERMINE IF HE HAD REPORTED FOR WORK OR HAD COME OUT OF THE MINE. SEE ALSO BRASS.

**MAN TRIP** — WHEN PRODUCTION HOISTING OR MATERIAL HANDLING IS TEMPORALLY SUSPENDED TO USE THE CAGE TO MOVE MEN FROM LEVEL TO LEVEL OR TO OR FROM THE SURFACE. MAN TRIPS WERE TYPICALLY SCHEDULED TO CORRESPOND WITH SPECIFIC TIMES, SUCH AS LUNCH. THE SAME WAS SAID OF WHEN A MOTOR CREW WAS PULLING MAN CARS AS OPPOSED TO ORE CARS.

**MANCHA MOTOR** — A SMALL TYPE OF BATTERY POWERED LOCOMOTIVE USED TO HANDLE SMALL LOADS AND SERVICE CROSS CUTS WITH EMPTY MINE CARS, WHILE REMOVING LOADS.

**MANWAY** — A COMPARTMENT, VERTICAL OR INCLINED, FOR THE ACCOMMODATION OF ACCESS LADDERS, PIPES, AND TIMBER SLIDES. THE DRIVAGE MAY BE A SHAFT, WINZE OR A RAISE AND ITS PURPOSE IS TO GIVE CONVENIENT ACCESS. ALSO CALLED A LADDERWAY.

**MAPPING** — THE ALMOST ALWAYS REFERRED TO THE GEOLOGIC MAPPING OF OPENINGS OR PIT FACES, TO SCALE, WITH A BRUNTON AND TAPE, WHICH INDICATED FEATURES SUCH AS ROCK TYPE, BEDDING, MINERALIZATION, ALTERATION AND STRUCTURE.

**MARTIN** — A REFERENCE TO THE MARTIN LIMESTONE ROCK UNIT, WHICH WAS THE MOST PRODUCTIVE FORMATION IN THE UNDERGROUND MINES.

**MASTER MECHANIC** — EFFECTIVELY, THE SUPERINTENDENT OF THE MAINTENANCE DIVISION OR MECHANICAL DEPARTMENT.

**MAT** — THE MASS OF BLASTED TIMBER AND BROKEN ROCK, WHICH ACCUMULATES ABOVE A TOP SLICE STOPE AS IT ADVANCES DOWNWARD. ALSO, A LAGGING (PLANK) FLOOR PLACED DURING UNDERHAND MINING WHICH WILL SERVE AS THE BACK LAGGING WHEN THE NEXT CUT IS TAKEN BELOW.

**MAT BOARDS** — FLOORING IN AN UNDERHAND STOPE MADE OF LAGGING WITH THE EXPECTATION OF MINING UNDERNEATH THE FLOOR WITH THE NEXT CUT. THE MAT BOARDS ARE TO PROVIDE A SAFER BACK, KEEP WASTE ROCK OR GOB FROM MIXING WITH THE ORE AND/OR CONTAIN SAND FILL GOB ABOVE.

**MATCH SAFE** — A METAL, WATER PROOF CYLINDER CARRIED IN THE POCKET IN WHICH WOODEN MATCHES ARE KEPT DRY. IT WAS MANDATORY TO HAVE MATCHES AT ALL TIMES FOR ALL UNDERGROUND EMPLOYEES, THUS MOST MINERS HAD MATCH SAFES. CERTAIN CANDLE STICKS HAD A MATCHSAFE BUILT INTO THE HANDLE.

**MATTE** — A PRODUCT OF A SMELTER, CONTAINING METAL AND SOME SULFUR, WHICH MUST BE FURTHER SMELTED TO OBTAIN A NEAR PURE METAL.

**MEASURING DAY** — THE FORTNIGHTLY MEASURING OF THE ADVANCE OF CROSSCUTS AND RAISES BY THE BONUS ENGINEER, TO DETERMINE THE PROGRESS MADE DURING THE PREVIOUS TWO WEEKS. THIS MEASUREMENT WAS THE BASIS FROM WHICH THE MINER'S BONUS WAS CALCULATED, TAKING INTO CONSIDERATION DEAD WORKS AND OTHER CONSIDERATIONS. NEEDLESS TO SAY, THIS WAS AN IMPORTANT EVENT FOR THE MINERS INVOLVED, WHO USED EVERY POSSIBLE EXCUSE AND CONCEIVABLE TRICK TO REDUCE THE TIME CHARGED TO THE CONTRACT AND/OR TO INCREASE THE APPARENT ADVANCE.

**MECHANICAL DEPARTMENT** — THE MAINTENANCE DEPARTMENT, WHICH INCLUDED ALL OF THE REPAIR SHOPS, SUCH AS THE BOILER, BLACKSMITH, ELECTRICAL, MACHINE AND PIPE SHOPS.

**MELACONITE** — A GENERIC TERM TO DESCRIBE ANY OF THE NONDESCRIPT, BLACK COPPER OXIDES, MOST OF WHICH WERE BLACK CHRYSOCOLLA.

**METALLURGY** — *1).* THE APPLIED SCIENCE OF EXTRACTING METALS FROM THEIR ORES. *2).* A REFERENCE AS TO HOW A PARTICULAR ORE RESPONDS TO A RECOVERY PROCESS AS IN "THE METALLURGY OF THE ORE."

**MEXICAN SET UP** — USING A PLUGGER TO DRILL A BLAST ROUND WHILE SUSPENDED FROM THE BACK BY A ROPE HELD BY AN EYE BOLT IN THE BACK. LOCAL LORE HAS IT THAT A MEXICAN WORKING FOR A LEASER TIRED OF HOLDING THE HEAVY DRILL AND CAME UP WITH A SOLUTION, WHICH WAS WIDELY EMPLOYED UNTIL THE EARLY 1960S.

**MILL** — *1).* A PLANT IN WHICH ORE IS TREATED AND METALS ARE RECOVERED IN A CONCENTRATE FORM READY FOR SMELTING. THE CONCENTRATOR AT BISBEE WAS JUST AS OFTEN REFERRED TO AS "THE MILL." *2).* ALSO A REVOLVING DRUM USED FOR THE GRINDING OF ORES IN PREPARATION FOR TREATMENT, SUCH AS THE BALL MILLS IN THE LAVENDER PIT CONCENTRATOR. *3).* A TERM USED TO REFER TO THE LAVENDER PIT CONCENTRATOR — "THE MILL."

**MILL HEADS** — THE ORE GRADE OF THE MATERIAL ENTERING THE MILL. SEE ALSO MILL HEAD GRADE AND HEAD GRADES.

**MILL HEAD GRADE** — THE GRADE OF THE ORE AS IT GOES INTO THE MILL AND IS PROCESSED. SYNONYMOUS WITH HEAD GRADE AND MILL HEADS.

**MILL SITE CLAIM** — A FORM OF MINING CLAIM, BUT LOCATED FOR THE PURPOSE OF PLACING A MILL OR SOME OTHER SUPPORT FACILITY FOR THE MINE. THESE ARE LIMITED TO FIVE ACRES IN AREA.

**MILL TAILINGS** — THE FINELY GROUND PRODUCT, FROM WHICH AS MUCH OF THE ORE MINERAL, AS POSSIBLE, HAVE BEEN RECOVERED, BY A MILL OR CONCENTRATOR, WHICH ARE HYDROLOGICAL DEPOSITED IN A TAILINGS STORAGE FACILITY.

**MILL TAILINGS GRADE** — THE COPPER CONTENT OF THE MILL TAILINGS AS THEY LEAVE THE MILL FOR DISPOSAL.

**MILLING ORE** — ORE THAT CONTAINS SUFFICIENT VALUABLE MINERAL TO BE TREATED BY MILLING PROCESS OR MUST BE SO TREATED TO RECOVER THE METALS OF VALUE.

**MINABLE RESERVES** — ORE RESERVES THAT ARE KNOWN TO BE EXTRACTABLE USING A GIVEN MINING PLAN, MINING AND PROCESSING COSTS AND METAL PRICE.

**MINE** — 1). A MINING AREA. IT WILL INCLUDE ALL OF THE LAND AND PROPERTY USED UNDERGROUND, OR ON THE SURFACE AND THE LAND OR PROPERTY THAT IS USED IN THE WORK OF EXTRACTING METAL ORE OR MINERALS FROM THEIR NATURAL DEPOSITS. ALSO INCLUDED WILL BE ALL OF THE OPENINGS DEVELOPED DURING FOR EXPLOITATION OF THE ORES SUCH AS TUNNELS, SHAFTS, LEVELS, DRIFTS, CROSSCUTS, WINZES AND RAISES AS WELL AS OPEN PITS AND SECONDARY RECOVERY OF METAL FROM LOW-GRADE LEACH FACILITIES. IT WILL INCLUDE ALL WASTES, OR ROCK DUMPS AND MILL TAILINGS DERIVED FROM THE MINING AND CONCENTRATION OF THE ORES. 2). A SPECIFIC OPENING OR EXCAVATION IN THE GROUND FOR EXAMPLE THE CAMPBELL OR THE LAVENDER PIT OR MINE. 3). THE ACT OF REMOVING ROCK FOR THE RECOVERY OF A VALUABLE MATERIAL IS TO "MINE."

**MINE DEVELOPMENT** — THE TERM EMPLOYED TO DESIGNATE THE PROCESSES INVOLVED IN PREPARING A MINE FOR EXPLOITATION. THESE OPERATIONS INCLUDE THE TUNNELING, SINKING, CROSSCUTTING, DRIFTING, AND RAISING NECESSARY TO BEGIN THE EXPLOITATION OF ORE. IN AN OPEN PIT MINE, THIS WOULD INCLUDE THE NEEDED PRESTRIPPING OF WASTE, CONSTRUCTION OF MINE HAUL ROADS AND RELATED SHOP FACILITIES.

**MINE FIRE** — A GENERIC TERM TO DESCRIBE ANY TYPE OF UNDERGROUND FIRE, REGARDLESS OF CAUSE OR MATERIAL BURNING. AT BISBEE, SULFIDE MINE FIRES WERE COMMON, WHERE THE HEAT GENERATED BY THE NATURAL DECOMPOSITION OF SULFIDES ON EXPOSURE TO OXYGEN WAS SUFFICIENT TO SET THE TIMBER ON FIRE OR TO EVEN IGNITE THE SULFIDE ROCK. FIRES CAUSED BY CARELESSNESS OCCURRED AS WELL, WITH CANDLES LEFT UNATTENDED ON MINE TIMBER THE MOST COMMON CAUSE, FOLLOWED BY CIGARETTES. CANDLES WERE REPLACED WITH OTHER LIGHT FORMS AND THE USE OF MANUFACTURED (TAILOR-MADE) CIGARETTES WAS FORBIDDEN, BUT ROLL-YOUR-OWN CIGARETTES WERE ALLOWED, AS THEY WOULD QUICKLY GO OUT IF DISCARDED OR LEFT UNATTENDED.

**MINE GRADE** — THE GRADE OF THE ORE AS IT LEAVES THE MINE FOR THE MILL OR SMELTER.

**MINE INSPECTOR** — AT BISBEE, “MINE INSPECTOR” MEANT SOMEONE FROM THE STATE MINE INSPECTOR’S OFFICE, WHICH HAD THE REGULATORY RESPONSIBILITY FOR MINE SAFETY. THE STATE MINE INSPECTORS OFFICE WAS ESTABLISHED BY THE ARTICLE 19 OF THE STATE CONSTITUTION IN 1912. A DEPUTY STATE MINE INSPECTOR WOULD VISIT THE MINES ON A REGULAR BASIS AS A PART OF MANDATED EFFORTS TO ENHANCE SAFETY. IN 1973, FEDERAL MINE INSPECTORS (MESA) WERE AUTHORIZED TO DO THIS AS WELL AND A FEW VISITED BISBEE JUST BEFORE IT CLOSED.

**MINE MILL** — THE TERM USED TO REFER TO THE INTERNATIONAL UNION OF MINE, MILL AND SMELTER WORKERS, A SUCCESSOR TO THE WESTERN FEDERATION OF MINERS. THE MINE MILL WAS THE UNION, WHICH REPRESENTED THE UNION MEMBERS OF THE UNDERGROUND MINES FROM 1946, UNTIL IT WAS ASSIMILATED BY THE STEELWORKERS IN A 1967 MERGER. SEVERAL OTHER UNIONS REPRESENTED THE TRADECRAFTS AND OPEN PIT EMPLOYEES AT BISBEE.

**MINE OFFICE** — EVERY MINE HAD AN OFFICE, BUT IT WAS RARE TO FIND ANYONE OTHER THAN THE TIMEKEEPER IN IT. NO OTHER CLERICAL STAFF WAS USED. THE MINE FOREMAN USED THE OFFICE AT THE BEGINNING OF EACH SHIFT TO LINE OUT HIS SHIFT BOSSES AND, AT THE END OF THE SHIFT, TO RECEIVE THE REPORTS FROM THE SHIFTERS AS WELL AS TO DO HIS PAPER WORK AND LINE OUT THE ONCOMING SHIFT BOSSES. THE REST OF THE TIME, HIS CHAIR WAS EMPTY, AS THE REAL WORK WAS IN THE MINE.

**MINE PHONES** — EVERY LEVEL IN THE MINES WAS EQUIPPED WITH HAND CRANK PHONES. IN A NUMBER OF INSTANCES, PHONES WERE PLACED IN WORK AREAS AS WELL. WHEN ONE PHONE WAS CRANKED, ALL RANG, JUST LIKE THE OLD TIME TELEPHONES. TO CALL A LEVEL, THE NUMBER OF RINGS WERE THE SAME AS THE BELL SIGNAL FOR THAT LEVEL. THE FIRST PHONES WERE WOODEN, WHILE THE LATER UNITS WERE MADE OF HEAVY CAST IRON.

**MINE SUPERINTENDENT** — ALSO REFERRED TO AS THE “MINE SUPER.” THE INDIVIDUAL IN CHARGE OF THE OPERATIONS AT ALL OF THE MINES. ALL OF THE EMPLOYEES IN THE MINE DEPARTMENT REPORTED TO THIS INDIVIDUAL, DIRECTLY OR INDIRECTLY. WHEN THE LAVENDER PIT WAS STARTED TWO SUPERINTENDENT POSITIONS WERE CREATED, ONE FOR THE UNDERGROUND AND ONE FOR THE PIT. AS THE MINE SUPER TYPICALLY HAD COME THROUGH THE RANKS, OFTEN FROM THE BOTTOM; EVEN THOUGH HE WAS A DEGREED MINING ENGINEER, HE WAS RESPECTED, INDEED EXTRAORDINARILY SO.

**MINE WATER** — ANY NON-ACID WATER FROM THE MINE. THE DISTINCTION WAS IMPORTANT, AS MINE WATER WAS WIDELY USED UNDERGROUND, MOSTLY FOR DUST CONTROL, YET IT WAS NEVER CONSIDERED AS POTABLE. EVEN THE CLEANEST APPEARING MINE WATER WAS CONTAMINATED, AS IT HAD PASSED THROUGH MILES OF UNDERGROUND WORKINGS IN WATER DITCHES, OFTEN USED AS URINALS. FOR A WHILE, EXCESS MINE WATER WAS PIPED TO THE HOMES IN THE WARREN TOWN SITE FOR USE IN THE YARDS AND GARDENS. A VERY SUITABLE APPLICATION.

**MINE YARD** — THE AREA SURROUNDING A MINE THAT WAS ALSO THE SITE OF THE CHANGE HOUSE, MINE OFFICE, POWER PLANT, THE AFFILIATED SHOPS, TIMBER YARD AND SUPPLY STORAGE. AFTER THE UNIVERSAL INTRODUCTION OF ELECTRICITY, THE STEAM POWER PLANTS WERE GENERALLY REMOVED. MOTORIZED TRANSPORTATION BROUGHT WITH IT A CENTRALIZATION OF TIMBER STORAGE AND SHOPS. IN THE END, THE YARD WAS LARGELY USED

TO KEEP A FEW HIGH TURNOVER SUPPLIES SUCH AS MODEST AMOUNTS OF TIMBER, SPARE SLUSHER BUCKETS AND MINE CARS.

**MINED GRADE** — THE GRADE OF THE ORE AS ACTUALLY MINED INCLUDING THE DILUTION EFFECT OF THE INCLUDED WASTE AND/OR WALL ROCK.

**MINER** — TECHNICALLY, ONE WHO IS ENGAGED IN THE BUSINESS OR OCCUPATION OF EXTRACTING ORE, PRECIOUS SUBSTANCES, OR OTHER NATURAL MATERIALS FROM THE EARTH'S CRUST. MINERS WERE CRAFTSMEN IN THE TRUEST SENSE OF THE WORD. AT BISBEE, A MINER WAS EXPECTED TO EFFICIENTLY RUN A ROCK DRILL, SAFELY BLAST THE ROCK, READ THE GROUND AND SUPPORT IT AS NECESSARY, MUCK OUT THE BROKEN ROCK, THEN ADVANCE PIPE AND TRACK, WHILE STAYING ON THE LINES SET BY THE ENGINEERS, A WIDE RANGE OF COMPLEX, INTERRELATED AND ABOVE ALL, PHYSICALLY DEMANDING TASKS. IT HAS LONG BEEN EASIER TO FIND A GOOD MINING ENGINEER THAN A GOOD MINER AND MANY MORE OF THE LATTER ARE REQUIRED.

**MINERAL** — 1). A NATURALLY OCCURRING, INORGANIC ELEMENT OR COMPOUND HAVING AN ORDERLY INTERNAL STRUCTURE AND CHARACTERISTIC CHEMICAL COMPOSITION, CRYSTAL FORM, AND PHYSICAL PROPERTIES. 2). AT BISBEE, THE TERM WAS ALSO APPLIED TO MINERAL SPECIMENS. 3). OFTEN USED TO MEAN ORE.

**MINERALIZED** — CONTAINING MINERALS AS A RESULT OF SOME EXTERNAL FORCE SUCH AS INTRUSIONS OF A PORPHYRY STOCK AS AT BISBEE, WHICH WERE EMPLACED, FREE OF ORE MINERALS, BUT MINERALIZED BY LATER HYDROTHERMAL FLUIDS.

**MINING CLAIM** — A SECTION OF LAND WHICH HAS BEEN LOCATED AS PRESCRIBED BY LAW AND THE ACCEPTED CONVENTIONS OF THE MINING DISTRICT IN WHICH IT IS LOCATED, AND RECORDED WITH THE COUNTY REORDER, WITH THE EXPRESS HOPE OR INTENT OF EXTRACTING MINERALS FROM THE LAND.

**MINING CANDLE** — TO ASSURE THAT THE CANDLES USED BY MINERS UNDERGROUND WERE DURABLE AND WOULD NOT BECOME SOFT OR DEFORM UNDER THE OFTEN-HOT WORKING CONDITIONS, MINING CANDLES WERE MADE WITH A HIGH CONTENT OF STEARIC ACID. THIS RAISED THE MELTING TEMPERATURE OF THE WAX AND REDUCED THE POOLING OF MELTED WAX AROUND THE FLAME AS WELL AS REDUCING THE SOOT FROM THE BURNING CANDLE. THE CANDLES WERE MARKETED AS "STEARIC ACID MINING CANDLES" AND "ADAMANTINE CANDLES." EACH MINER WAS ISSUED FOUR TO SIX CANDLES PER SHIFT BY THE COMPANY, BUT WAS RESPONSIBLE TO PROVIDE HIS OWN CANDLESTICK.

**MINING DISTRICT** — RICKETTS (1943) DEFINED A MINING DISTRICT AS "A SECTION OF COUNTRY USUALLY DESIGNATED BY NAME, HAVING DESCRIBED OR UNDERSTOOD BOUNDARIES WITHIN WHICH MINERALS ARE FOUND AND WORKED UNDER RULES AND REGULATIONS PRESCRIBED BY THE MINERS THEREIN. THERE IS NO LIMIT TO ITS TERRITORIAL EXTENT AND ITS BOUNDARIES MAY BE CHANGED IF VESTED RIGHTS ARE NOT THEREBY INTERFERED WITH." BISBEE'S MINES ARE WITHIN THE WARREN MINING DISTRICT.

**MINING ENGINEER** — A PERSON QUALIFIED BY EDUCATION, TRAINING, AND EXPERIENCE IN ENGINEERING AS APPLIED TO MINING. A TRAINED ENGINEER WITH KNOWLEDGE OF THE GEOSCIENCES, ECONOMICS, MINERAL EXTRACTION, CONCENTRATION AND SALE, AS WELL AS THE ADMINISTRATIVE AND FINANCIAL PROBLEMS OF PRACTICAL IMPORTANCE IN CONNECTION WITH THE PROFITABLE CONDUCT OF MINING.

**MISFIRE** — THE COMPLETE OR PARTIAL FAILURE OF A BLASTING CHARGE TO EXPLODE AS PLANNED.

**MISSED HOLE** — A DRILL HOLE CHARGED WITH EXPLOSIVES, IN WHICH ALL OR PART OF THE EXPLOSIVE HAS FAILED TO DETONATE. MINERS WERE REQUIRED TO COUNT THE HOLES AS THEY FIRED, SEQUENTIALLY, BEFORE LEAVING THE GENERAL WORK AREA. IF ALL THE HOLES DID NOT FIRE, THEY WERE TO REPORT THIS TO THE SHIFT BOSS AS WELL AS NOTING THE WORKPLACE AND THE NUMBER OF MISSED HOLES ON THE MISSED HOLE BOARD LOCATED ON THE SHAFT STATION, SO THAT THE ONCOMING SHIFT WOULD BE ADVISED AND BE CAUTIOUS AS THEY BEGAN THEIR WORK. IDEALLY, THE MISSED HOLE COULD BE RE-PRIMED AND FIRED. IF NOT, IT WAS CAREFULLY CLEANED OF POWDER USING A COPPER SPOON MADE OF TROLLEY WIRE SPECIFICALLY FOR THIS REASON.

**MISSED HOLE BOARD** — EACH SHAFT STATION HAD A BLACKBOARD-LIKE BOARD WITH A GRID PATTERN WITH ALL WORK PLACES LISTED. MINERS WERE REQUIRED TO NOTE MISSED HOLES IN THEIR WORK PLACE, IF ANY, TO ADVISE THE ONCOMING SHIFT OF THE POTENTIAL DANGER.

**MITCHELL SLICE** — A METHOD FOR MINING A SUPPORTING PILLAR OF ORE BETWEEN TWO ALREADY MINED AND GOBBED STOPES. THIS ORE RECOVERY TECHNIQUE WAS DEVELOPED BY M. W. MITCHELL.

**MITCHELL TOP SLICE CAVING SYSTEM** — A VARIATION OF TOP SLICE MINING DEVELOPED BY M. W. MITCHELL, A MOST INNOVATIVE MINER AND DIVISION FOREMAN FOR THE C & A. THIS SYSTEM EMPLOYED AN INCLINED EXTRACTION TECHNIQUE WHEREBY MUCH OF THE BROKEN ORE PASSED DOWN SLIDES AND DIRECTLY INTO CHUTES, THUS REDUCING THE AMOUNT OF LABOR REQUIRED.

**MOIL** — A POINTED STEEL TO BE HIT WITH A HEAVY HAMMER AND USED TO CUT HITCHES OR TO REMOVE SMALL ROCK PROTRUSIONS.

**MONOXIDE** — A REFERENCE TO CARBON MONOXIDE, THE HIGHLY TOXIC FIRE GAS.

**MOTOR** — THE UNDERGROUND HAULAGE LOCOMOTIVE. THE TERM IS APPLIED TO BOTH TROLLEY AND BATTERY LOCOMOTIVES.

**MOTOR BELL** — EVERY MOTOR WAS FITTED WITH A WARNING BELL, WHICH WAS TO BE MANUALLY STRUCK WITH THE SMALL STEEL ROD ATTACHED BY A SHORT LENGTH OF CHAIN, TO ALERT OTHERS OF THE MOTORS APPROACH, PARTICULARLY WHEN ROUNDING CORNERS OR WHEN APPROACHING THE BOTTOM OF A MANWAY.

**MOTOR CREW** — THE CREW THAT OPERATES THE MOTOR CONSISTING OF A MOTORMAN AND MOTOR SWAMPIER.

**MOTOR JACK** — A HEAVY STEEL JACK CARRIED ON ALL TROLLEY MOTORS AND USED TO RERAIL THE MOTOR AND, ON OCCASION DERAILED LOADED CARS.

**MOTOR SANDERS** — JUST LIKE THEIR LARGER LOCOMOTIVE COUNTERPARTS, UNDERGROUND MOTORS HAD SANDERS BUILT IN TO SPRINKLE COURSE SAND ON THE RAILS AHEAD OF THE WHEELS TO AID IN TRACTION. WET RAILS IN AREAS WITH A SLIGHT UP GRADE ALWAYS NEEDED TO BE SANDED TO CLIMB. SEE ALSO SANDERS.

**MOTOR STEP** — A SMALL PLATFORM THAT ATTACHED TO THE CAB OF THE MOTOR WITH A SEAT OR TO THE LAST CAR OF THE TRAIN FOR THE MOTOR SWAMPER TO RIDE WHEN THE TRAIN WAS MOVING.

**MOTOR SWAMPER** — THE HELPER TO THE MOTORMAN WHO WAS LARGELY RESPONSIBLE FOR LOADING THE MINE CARS FROM CHUTES AND DUMPING CARS INTO RAISES OR INTO POCKETS AS WELL AS ALL CLEANUPS ASSOCIATED WITH BOTH ACTIONS, INCLUDING THE DIFFICULT TASK OF BREAKING OVERSIZE BOULDERS ON THE GRIZZLIES.

**MOTORMAN** — THE OPERATOR OF THE UNDERGROUND LOCOMOTIVE RESPONSIBLE FOR THE SAFE AND EFFICIENT OPERATION OF THE TRAIN AS WELL AS ASSURING THE CORRECT CHUTES WERE PULLED, CAR SAMPLES TAKEN AND MATERIAL TRANSPORTED TO THE APPROPRIATE LOCATION FOR DUMPING.

**MOUTH** — THE SURFACE OPENING OF A TUNNEL OR ADIT.

**MOVING GROUND** — A TERM USED TO DESCRIBE ROCK THAT IS UNSTABLE AND MOVING. IT IS ALMOST IDENTICAL TO THE TERM WORKING GROUND.

**MUCK** — 1). ROCK THAT HAS BEEN BROKEN BY BLASTING. 2). THE PROCESS OF MOVING ROCK BROKEN BY BLASTING IS TO MUCK.

**MUCK OUT** — 1). TO COMPLETELY REMOVE ALL OF THE BROKEN ROCK FROM A BLAST. 2). LESS OFTEN, TO CLEAN UP GENERAL SPILLAGE.

**MUCK PILE** — THE BROKEN ROCK PILE THAT IS THE RESULT OF A BLAST. THIS TERM WAS USED BOTH UNDERGROUND AND IN THE OPEN PIT IN THE SAME MANNER.

**MUCK SAMPLE** — A QUASI-REPRESENTATIVE SAMPLE OF ORE THAT IS TAKEN FROM A MUCK PILE, USUALLY BY THE SHIFTER, AND THEN ASSAYED TO DETERMINE THE GRADE OF THE PILE.

**MUCK SHEET** — TO FACILITATE HAND SHOVELING OR MUCKING, STEEL PLATES WERE PLACED FOR THE BLASTED ROCK TO FALL ON AFTER THE LIFTERS IN THE ROUND PUSHED THE BROKEN ROCK AWAY FROM THE FACE. IT WAS EVER SO MUCH FASTER TO MUCK FROM THE SMOOTH SURFACE OF THE STEEL SHEETS THAN A ROUGH, ROCK BOTTOM. SEE ALSO TURN SHEET.

**MUCK STICK** — A NAME OFTEN APPLIED TO A WOODEN HANDLED SHOVEL AS THEY WERE USED TO MUCK.

**MUCK TRUCK** — A HAUL TRUCK IN THE LAVENDER PIT.

**MUCKER** — THE CLASSIFICATION FOR THE LOWEST JOB IN THE UNDERGROUND MINES. THE MUCKER EVENTUALLY BECAME THE MINER'S HELPER OR, MORE CORRECTLY APPRENTICE, AS AFTER SOME YEARS HE WOULD BE PROMOTED TO MINER ONCE HE PROVED HIS ABILITIES. ALSO CALLER A SHOVELER.

**MUCKING** — THE OPERATION OF LOADING BROKEN ROCK BY HAND OR MACHINE, BE IT UNDERGROUND OR OPEN PIT.

**MUCKING MACHINE** — THE GENERIC TERM GIVEN TO THE PNEUMATIC, RAIL BASED OVERSHOT LOADERS. THESE WERE ALSO REFERRED TO AS “FINLAYS.”

**MUD DIGGER** — AS MOST OF THE EARLY ORES WERE SOFT, EVEN MUDLIKE AND THE MINERS WERE REFERRED TO AS “MUD DIGGERS,” TO THE VERY END, LONG AFTER THE SOFT, MUDDY ORES HAD BEEN EXHAUSTED.

**MUD PLASTER** — ALSO CALLED MUD-CAPPING. A METHOD FOR BLASTING LARGE ROCKS WITHOUT DRILLING, IN WHICH A SMALL AMOUNT OF UNWRAPPED EXPLOSIVE IS PLACED ON TOP OF THE ROCK AND COVERED BY A CAP OF MUD OR EARTH. WHILE A BIT MORE EFFECTIVE THAN A SIMPLE PLASTER, THIS WAS A DISCOURAGED PRACTICES, BUT FREQUENTLY USED, USUALLY OUT OF DESPERATION, TO BREAK HARD SULFIDE BOULDERS IN STOPES. SEE ALSO PLASTER.

**MUD PUMPERS** — IN CONCENTRATION PLANTS, MOST OF THE MATERIAL WAS HANDLED AS SLURRY FOLLOWING CRUSHING AND GRINDING AND THE SLURRY WAS USUALLY PUMPED, THUS THE NAME “MUD PUMPERS” FOR THOSE WHO WORKED IN THESE PLANTS.

**MULE BARN** — OBVIOUSLY, THIS WAS THE LOCATION WHERE THE MULES WERE STABLED WHEN NOT WORKING. EACH LEVEL WITHOUT DIRECT, LEVEL SURFACE ACCESS HAD A MULE BARN, AS THE CARE OF THESE MAGNIFICENT BEASTS WAS AN IMPORTANT MATTER. THE BARN WERE ALWAYS LOCATED IN DRY, WARM, YET WELL-VENTILATED AREAS. AT ALL TIMES, AMPLE WATER AND FOOD WERE PRESENT AND THE COMPANY EMPLOYED A FULL TIME VETERINARIAN TO CARE FOR THEM. THE BARN WERE KEPT VERY CLEAN, AS THE TWO, WHICH I VISITED MANY YEARS AFTER THE MULES HAD BEEN REMOVED, HELD NO SIGN OF THE ANIMALS EVER HAVING BEEN THERE EXCEPT FOR THE LEATHER TACK STILL HANGING ON THE WALLS AND THE FEED TROUGHS WITH BITS OF REMAINING HAY.

**MULE DRIVER** — THE MAN TASKED WITH RUNNING THE MULES TO PULL THE MINE CARS. THESE MEN SOON DEVELOPED LOVE-HATE RELATIONSHIPS WITH THEIR FAMOUSLY STUBBORN AND INCREDIBLY SMART CHARGES. LOCAL LORE HAS MANY INTERESTING AND OFTEN HUMOROUS STORIES OF THESE MEN AND THEIR MULES, BUT NONE OF ABUSE. MULES WERE EXPENSIVE TOOLS AND WERE TREATED AS SUCH, WITH NO ABUSE TOLERATED BY THE COMPANY. MULES WERE USED UNDERGROUND AT BISBEE FROM 1909 UNTIL 1930, STEADILY DECREASING IN NUMBER AS THE MORE EFFICIENT MOTOR HAULAGE GRADUALLY REPLACED THEM. ALSO CALLED A MULE SKINNER BY SOME.

**MULE SKINNER** — SEE MULE DRIVER.

**NACO** — THE NACO LIMESTONE ROCK UNIT.

**NACO WATER** — ALL POTABLE WATER IN THE MINES WAS REFERRED TO AS NACO WATER AS IT WAS WATER FROM THE WELL FIELD NEAR NACO, WHICH WAS PIPED UNDERGROUND FOR DRINKING PURPOSES.

**NAIL BAG** — AS NAILS CAME UNDERGROUND IN 100-POUND WOODEN KEGS, WHEN A MINER NEEDED NAILS, HE ALSO NEEDED SOMETHING IN WHICH TO CARRY THEM - SAFELY. NORMAL SACKS WERE DANGEROUS AS THE NAILS QUICKLY PENETRATED THE SACK SIMPLY BECAUSE OF THE CONFINING PRESSURE. SAFE NAIL BAGS WERE MADE IN THE ROPE SHOP OF THICK CANVAS AND HAD A WIDE WOODEN BOTTOM AND A STURDY ROPE HANDLE TO REDUCE THE POSSIBILITY OF NAILS COMING THROUGH THE SIDE AND CAUSING AN ACCIDENT.

**NATIVE** — THIS TERM WAS TYPICALLY USED TO MEAN “NATIVE COPPER,” A COMMON, NATURALLY OCCURRING FORM OF NEAR PURE COPPER, WHICH WAS WIDELY COLLECTED BY

THE MINERS AS MINERAL SPECIMENS. NATIVE COPPER WAS AN IMPORTANT ORE MINERAL AT BISBEE.

**NATURAL VENTILATION** — VENTILATION OF A MINE WITHOUT THE AID OF FANS. IT WAS A FUNCTION THE CHIMNEY EFFECT AND THE DIFFERENTIAL DENSITIES BETWEEN WARM AND COLD AIR. IN THE WARM SUMMERS, COOL MINE AIR WOULD FLOW OUT FROM THE LOWEST OPENING. DURING THE WINTERS, THE RELATIVELY WARM MINE AIR WOULD BE DISPLACED BY THE COOLER AND DENSER SURFACE AIR AND DISCHARGE FROM HIGH OPENINGS.

**NATURE OF GROUND** — DESCRIBING THE CHARACTERISTIC OF THE ROCK, SUCH AS SOFT - HARD; HEAVY — GOOD, BROKEN, ETC.

**NIGHT FOREMAN** — EVERY UNDERGROUND OPERATION HAD A FOREMAN IN CHARGE OF THE SHIFT BOSSES ON EACH OF THE TWO SHIFTS (DAY SHIFT, NIGHT SHIFT). THESE WERE NON-ROTATING POSITIONS AND THE SAME MAN WAS ALWAYS ON DUTY DURING THIS SHIFT. THE DAY FOREMAN WAS THE SENIOR OF THE TWO AND WAS, IN FACT, THE DIRECT SUPERVISOR OF THE NIGHT FOREMAN.

**NIGHT SHIFT** — THE SECOND SHIFT OF THE DAY. UNDERGROUND IT WAS FROM 4:00 PM UNTIL MIDNIGHT, ON THE SURFACE, 3:00 PM TO 11:00 PM. OFTEN REFERRED TO AS “SWING SHIFT.”

**NIGHTHAWK** — 1). THE NIGHTHAWK MINE. 2). IT COULD ALSO BE A REFERENCE TO THE NIGHTHAWK LEASING COMPANY, WHICH DEVELOPED AND OPERATED THE NIGHTHAWK MINE.

**NIGHTHAWK LEASING COMPANY** — THE COMPANY WHICH DEVELOPED AND MINED THE NIGHTHAWK MINING CLAIM UNDER A LEASE FROM PHELPS DODGE, FROM 1917 THROUGH 1932. SEVERAL GOOD OREBODIES WERE FOUND AND THE COMPANY WAS REASONABLE SUCCESS FOR A SHORT PERIOD.

**NIPPER** — ONE WHO LOOKED AFTER AND TOOK CARE OF SOMETHING E.G. THE TOOLNIPPER, TOOK CARE OF DISTRIBUTING THE NEEDED TOOLS TO THE WORKING PLACES AND COLLECTING THOSE IN NEED OF REPAIR OR SHARPENING.

**NO ROAD** — WHEN A MINE AREA WAS NO LONGER USED AND ABANDONED, MAINTENANCE OF THE AREA WAS STOPPED, AND IT WAS DEEMED UNSAFE TO ENTER, THEN A SIGN WITH “NO ROAD” WAS POSTED TO KEEP PEOPLE OUT.

**NOSE** — A ROCK PROTRUSION FROM A PIT WALL, WHICH EXTENDS FOR SEVERAL BENCHES. THESE WERE AVOIDED AS MUCH AS POSSIBLE, AS THEY WERE OFTEN UNSTABLE AND SUBJECT TO SLOPE FAILURE AND COLLAPSE.

**NUMBER SEVEN DUMP** — THE LARGE LEACH/WASTE FACILITY EAST OF THE LAVENDER PIT AND NORTH OF THE WARREN TOWN SITE. MOST OF THE WASTE AND ALL OF THE LEACH MATERIAL REMOVED FROM THE LAVENDER PIT WAS PLACED IN THIS FACILITY. THE NAME IS A HOLDOVER FROM THE MINING OF THE SACRAMENTO PIT, WHICH HAD A SEVERAL NUMBER-DESIGNATED WASTE STORAGE AREAS SURROUNDING THE PIT, INCLUDING THE NUMBER SEVEN DUMP THAT WAS USED IN THE LATTER YEARS OF MINING.

**OIL** — TO LUBRICATE SUCH AS PUTTING OIL IN THE IN-LINE OILER FOR PNEUMATIC DRILLS OR LUBRICATING A HOIST OR PUMP.

**OIL BOTTLE** — A STEEL, INLINE OIL CONTAINER THAT WAS HOOKED TO THE SAME AIR HOSE THAT DELIVERED COMPRESSED AIR TO THE DRILL AND WHICH ADDED A TINY AMOUNT OF OIL TO THE PASSING AIR STREAM TO LUBRICATE THE ROCK DRILL. SEE ALSO OILER, COCONUT.

**OILER** — 1). A PERSON WHOSE PRINCIPAL RESPONSIBILITY IS TO SEE TO THE PROPER LUBRICATION OF MACHINERY, SUCH AS A HOIST OR PUMP. 2). ALSO, ONE OF SEVERAL TYPES OF MECHANICAL DEVICES THAT DELIVER OIL TO MACHINES AND INTO AIR OR STEAM LINES IN CONTROLLABLE AMOUNTS.

**OLD WORKS** — MINE WORKINGS, WHICH ARE NO LONGER MAINTAINED OR IN USE.

**OLIVER** — THE OLIVER MINE.

**OPEN CUT** — ANY SURFACE OPENING DEVELOPED BY MINING FROM A STOPE, WHICH HAS DAY LIGHTED TO THE MINING OF ORES FROM THE SURFACE DOWN, TO AN OPEN PIT SUCH AS THE LAVENDER.

**OPEN HOLE** — A WARNING SIGN POSTED AHEAD OF AN UNCOVERED OR UNGUARDED HOLE AHEAD.

**OPEN PIT** — A MINE THAT IS ENTIRELY ON SURFACE. ALSO REFERRED TO AS OPEN-CUT OR OPENCAST MINE.

**OPPOSITE SHIFT** — THE UNDERGROUND WORKED TWO SHIFTS AND A CREW ON EACH SHIFT WAS ASSIGNED TO EVERY ACTIVE WORKING AREA. THUS, ONE CREW WOULD WORK NIGHT SHIFT IN THE SAME STOPE THAT A CREW HAD WORKED IN ON DAY SHIFT. EACH WAS THE “OPPOSITE SHIFT” TO THE OTHER. AS BONUS WAS CALCULATED ON TOTAL WORKPLACE PROGRESS, THE TWO SHIFTS HAD TO CONTRIBUTE EQUALLY AS THEY RECEIVED THE SAME LEVEL OF BONUS. WHENEVER THERE WAS A PROBLEM - LOOSE TIMBER, A LACK OF TOOLS OR MATERIALS, IT WAS, OF COURSE, THE FAULT OF THE “OPPOSITE SHIFT.”

**ORE** — THE NATURALLY OCCURRING MATERIAL FROM WHICH A MINERAL OR MINERALS OF ECONOMIC VALUE CAN BE EXTRACTED PROFITABLY OR TO SATISFY SOCIAL OR POLITICAL OBJECTIVES, SUCH AS THE MINING OF LOW-GRADE DURING WORLD WAR II. THE TERM IS GENERALLY BUT NOT ALWAYS USED TO REFER TO METALLIFEROUS MATERIAL, AND IS OFTEN MODIFIED BY THE NAMES OF THE VALUABLE CONSTITUENT; E.G., COPPER ORE.

**ORE BIN** — THE STORAGE BIN AT THE MINE SURFACE INTO WHICH THE HOISTED MINE CARS OF ORE OR SKIPS LOADED WITH ORE WOULD BE DUMPED. THE ORE BIN WAS ADJACENT TO RAILROAD TRACKS AND WOULD BE EMPTIED INTO RAIL CARS BY THE TOPLANDER FOR SHIPMENT TO THE SMELTER.

**ORE CONTROL** — IN THE SURFACE OPERATION IT WAS A TASK PERFORMED BY THE ENGINEERING DEPARTMENT WHEREBY THE BLASTED MUCK WAS CLASSIFIED AS ORE, LEACH OR WASTE BASED ON THE ASSAY RESULTS FROM DRILL HOLE CUTTINGS. THE MATERIAL WAS MARKED ACCORDINGLY IN THE FIELD BY THE ORE CONTROL ENGINEER AND COPIES OF PLANS FOR EACH BLAST, WITH THE ORE/WASTE/LEACH CONTACTS INDICATED, WERE GIVEN TO THE SHIFT BOSSES FOR REFERENCE. ALSO CALLED GRADE CONTROL.

**ORE DRESSING** — THE COMBINED PROCESSES NEEDED TO REMOVE THE VALUELESS GANGUE FROM ORES.

**ORE PASS** — A RAISE OR SERIES OF INTERCONNECTED RAISES USED TO TRANSFER ORE FROM ONE OR MORE LEVELS TO A POINT BELOW, WHERE IT IS LOADED INTO EITHER A MINE CAR FOR FURTHER TRANSPORT, OR A SKIP FOR HOISTING TO THE SURFACE.

**ORE POCKET** — EXCAVATION IN THE WALL OF A HOISTING SHAFT INTO WHICH ORE FROM STOPES IS DUMPED BY THE MOTOR CREW, FOR HOISTING BY SKIPS.

**ORE RESERVES** — THE CALCULATED TONNAGE AND GRADE OF MINERALIZATION, WHICH CAN BE EXTRACTED AND TREATED PROFITABLY. IT IS CLASSIFIED AS POSSIBLE, PROBABLE AND PROVEN ACCORDING TO THE LEVEL OF DRILLING BASED CONFIDENCE THAT CAN BE PLACED ON THE ESTIMATE. IT IS COMMON FOR A MINE TO HAVE SOME OF ITS RESERVES IN ALL THREE CATEGORIES.

**OREBODY** — A NATURAL CONCENTRATION OF METAL THAT CAN BE EXTRACTED AND SOLD AT A PROFIT.

**OUTCROP** — AN EXPOSURE OF ROCK OR MINERAL DEPOSIT, WHICH IS NOT COVERED BY SOIL AND CAN BE SEEN ON SURFACE. ORE OUTCROPS WERE EXCEEDINGLY RARE AT BISBEE, WITH THE SITE OF THE ORIGINAL DISCOVERY THE ONLY TRUE ORE OUTCROP AND MOST OF THIS WAS SOIL COVERED.

**OUTRIGGER** — A MOVABLE BEAM OR OTHER SUPPORT PLACED AT RIGHT ANGLES TO A PIECE OF EQUIPMENT TO PREVENT IT FROM TOPPLING OVER UNDER LOAD. THE VERY NARROW WHEELBASE OF THE TRACK BASED STEAM SHOVELS IN THE SACRAMENTO PIT REQUIRED THAT THEY HAVE OUTRIGGERS WITH JACK ARMS SET BEFORE LOADING.

**OVER BREAK** — THE UNINTENDED, EXCESS SPACE CREATED BY A BLAST. IN TIMBERED AREAS, IT CREATED A PROBLEM, AS NO OPEN SPACE COULD BE LEFT UNSUPPORTED, THUS, IT WAS NECESSARY TO ADD TIMBER AND BLOCKING TO SUPPORT THE OVER BROKEN AREA. OVER BREAK AT THE ORE - WASTE CONTACT COULD CAUSE EXCESS DILUTION BY MIXING WASTE WITH THE ORE AND WAS THEREFORE, UNDESIRABLE.

**OVERBURDEN** — LAYERS OF SOIL AND ROCK COVERING A MINERAL DEPOSIT. OVERBURDEN IS REMOVED AS WASTE DURING PRESTRIPPING, PRIOR TO OPEN PIT MINING.

**OVERHEAD SUMP** — A SUMP FOR WATER COLLECTION THAT IS CUT OUT OF THE ROCK ABOVE THE INTAKE LEVEL OF THE PUMPS. THESE WERE COMMON AT BISBEE AS THE HUGE PUMPS REQUIRED TO LIFT THE LARGE FLOWS OF WATER TO THE SURFACE HAD LITTLE SUCTION CAPACITY AND WERE THUS FED FROM ABOVE. THIS ALSO ELIMINATED THE NEED TO PRIME THESE LARGE PUMPS IF THE PUMP CHAMBERS WERE EMPTIED FOR MAINTENANCE OR BY LEAKAGE.

**OVERSIZE** — 1). BOULDERS TOO LARGE TO BE HANDLED BY THE POWER SHOVEL IN THE PIT AND WHICH MUST BE DRILLED AND BLASTED. 2). UNDERGROUND, IT WAS THE BOULDERS TOO LARGE TO PASS THROUGH GRIZZLIES. THESE WERE USUALLY BROKEN BY HAND WITH A DOUBLE JACK OR, LESS FREQUENTLY, BLASTED.

**OVERWIND** — HOISTING THE CAGE OR SKIP TOO HIGH IN THE HEADFRAME, PAST THE SAFE POINT. IF THE CAGE OR SKIP WAS HOISTED INTO THE SHEAVE WHEEL, GREAT DAMAGE WOULD RESULT TO THE CONVEYANCE, SHEAVE, HEADFRAME, CABLE AND EVEN THE HOIST. SPECIAL SWITCHES WERE PLACED ON THE HEADFRAME TO STOP THE HOIST IN THE EVENT OF AN

OVERWIND CONDITION, BUT IT WAS NOT TOTALLY EFFECTIVE. A FAST MOVING CAGE OR SKIP COULD EASILY STILL BE PULLED INTO THE SHEAVE.

**OXIDATION** — A CHEMICAL REACTION CAUSED BY EXPOSURE TO OXYGEN WHICH RESULTS IN A CHANGE IN THE CHEMICAL COMPOSITION OF A MINERAL, TYPICALLY BY THE REMOVAL OF THE CONTAINED SULFUR.

**OXIDATION CAVES** — CAVE LIKE OPENINGS, OFTEN LARGE AND BEAUTIFULLY DECORATED, WHICH FORMED AS A DIRECT RESULT OF THE OXIDATION OF SULFIDE BODIES IN THE LIMESTONE. A SUBSTANTIAL REDUCTION IN VOLUME TAKES PLACE DURING COMPLETE OXIDATION WITH THE REMOVAL OF THE SULFUR FROM THE MINERALS. THIS, COUPLED WITH THE ACTION OF THE LIBERATED ACIDS ON THE LIMESTONE, FREQUENTLY LEFT LARGE HOLES OVER THE OXIDE ORES. OVER TIME, THESE CAVES WERE DECORATED BY MINERAL DEPOSITION, MOSTLY CALCITE AND ARAGONITE. BISBEE WAS JUSTIFIABLY FAMOUS FOR THE BEAUTY OF THESE CHAMBERS AS MANY WERE HIT DURING MINING.

**OXIDE ORES** — ORES THAT HAVE BEEN CHEMICALLY CHANGED FROM EXPOSURE TO THE NEAR SURFACE ENVIRONMENT AND THE INFLUENCE OF OXYGEN. THE ORIGINAL MINERALS WERE SULFIDES, AND THE OXIDATION PROCESS HAS REMOVED THE SULFUR LEAVING BEHIND THE METALS IN ONE OR MORE COMBINATIONS. TRUE OXIDE ORES ARE THOSE WHERE THE METAL IS COMBINED WITH OXYGEN SUCH AS THE COPPER OXIDE MINERALS - CUPRITE AND TENORITE AND THE IRON OXIDES — GOETHITE AND HEMATITE. CARBONATES ARE WHERE THE METALS ARE COMPLEXED WITH THE CARBONATE RADICAL (CO<sub>3</sub>). COPPER EXAMPLES ARE AZURITE AND MALACHITE, IRON CARBONATE IS SIDERITE, THE LEAD CARBONATE IS CERUSSITE AND ZINC CARBONATE IS SMITHSONITE. IN ALL CASES, REGARDLESS OF THE TRUE COMPOSITION, THEY WERE COLLECTIVELY REFERRED TO AS “OXIDE ORES.”

**OXIDES** — A TERM GENERICALLY APPLIED TO ANY OF THE ORES THAT HAVE UNDERGONE OXIDATION, INCLUDED CARBONATES AS WELL AS TRUE OXIDE MINERALS.

**P. D.** — PHELPS DODGE.

**P. D. MERC.** — THE COMPANY STORE OR PHELPS DODGE MERCANTILE COMPANY WHICH OPERATED SEVERAL RETAIL STORES IN THE BISBEE AREA AS WELL IN ALL OF THE LOCATIONS WHERE PHELPS DODGE OPERATED MINES OR SMELTERS. IT ALSO HAD A WHOLESALE GROCERY BUSINESS, WHICH SERVED MUCH OF COCHISE COUNTY. THE P. D. MERC. WAS A GOOD STORE, WITH QUALITY PRODUCTS AT COMPETITIVE PRICES AND NO REQUIREMENT ON THE PART OF THE COMPANY TO TRADE THERE, UNLIKE MANY COMPANY STORES ELSEWHERE.

**PANEL** — A COMPLETE, 33 FOOT LONG SECTION OF STANDARD GAGE, RAILROAD TRACK WITH TIES ATTACHED WHICH CAN BE QUICKLY MOVED, AS A UNIT, AND PLACED OR REMOVED BY A CRANE. THESE WERE USED IN THE SACRAMENTO PIT AS ALL HAULAGE WAS BY RAIL.

**PANEL YARD** — AN AREA WHERE PANELS OF TRACK ARE ASSEMBLED AND REPAIRED FOR USE IN THE PIT.

**PARD** — A CONTRACTION OF THE WORD PARTNER, BUT QUITE COMMONLY USED UNDERGROUND TO IDENTIFY THE COWORKER WHO SHARED A STOPE OR OTHER WORKING. SEE ALSO PARTNER.

**PARTING QUARTZITE** — THIS WAS THE RELATIVELY THIN QUARTZITE BED IN THE LOWER MARTIN LIMESTONE, WHICH WAS AN IMPORTANT MARKER BED IN THE UNDERGROUND MINES, AS IT WAS ERRONEOUSLY BELIEVED EARLY ON THAT NO ORE WAS TO BE FOUND BELOW

THIS HORIZON. THIS UNIT WAS ALSO SIMPLY REFERRED TO AS “THE QUARTZITE,” SUBTLY DISTINGUISHING IT FROM THE LOWER BOLAS QUARTZITE.

**PARTNER** — THE MAN YOU WORKED UNDERGROUND WITH, SIDE BY SIDE, EVERY DAY, SOMETIMES FOR YEARS, IN STOPES, RAISES, CROSSCUTS ETC, USUALLY JUST THE TWO TOGETHER WITH ABSOLUTE TRUST AND CONFIDENCE IN THE OTHERS CAPABILITY TO DO HIS JOB AS YOUR LIFE DEPENDED ON THIS . IT WAS COMMONPLACE TO NEVER CALL HIM BY HIS GIVEN NAME, BUT JUST PARD OR PARTNER.

**PASTY** — A TASTY MEAT PIE, TRADITIONALLY FILLED WITH DICED MEAT, SLICED POTATO AND ONION, COMMONLY TAKEN UNDERGROUND FOR LUNCH. IT WAS A PARTICULAR FAVORITE AMONG THE COUSIN JACK (CORNISH) MINERS WHO CALLED IT “A LETTER FROM HOME.” OTHER, LESS FORTUNATE MINERS, OFTEN ATTEMPTED TO TRADE THEIR SANDWICHES AND OTHER GOODIES FOR THESE DELECTABLE TREATS.

**PAY PERIOD** — THE TWO WEEK TIME PERIOD DURING WHICH PAY WAS CALCULATED, INCLUDING ANY BONUS, BASED ON THE TIME WORKED AND, IN THE CASE OF BONUS, THE ADVANCE OR MEASURED PRODUCTION.

**PAYROLL NUMBER** — SOMETIMES REFERRED TO AS EMPLOYEE NUMBER, THIS WAS THE NUMBER BY WHICH THE MAN WAS KNOWN. THE TIMEKEEPER AND THE PAYMASTER MAY NOT KNOW A MAN’S NAME, BUT WHEN THEY SAW HIM, THEY KNEW HIS NUMBER. THIS NUMBER WAS STAMPED ON HIS BRASS, IT WAS USED BY HIM AND HIS FAMILY TO CHARGE THINGS AT THE COMPANY STORE AS WELL AS TO RECEIVE TREATMENT AT THE COMPANY HOSPITAL. YES, IT WAS A NUMBER THAT IDENTIFIED THE EMPLOYEE, BUT FEW IF ANY FELT THEY WERE DEFINED BY THIS NUMBER, AS SO MANY INDUSTRIAL WORKERS DID. THE EMPLOYEES ALMOST ALWAYS FELT A PART OF THE COMPANY AND THE NUMBER WAS JUST SOMETHING THE ACCOUNTANTS IN HEAD OFFICE USED TO KEEP TRACK OF THINGS.

**PEACOCK COPPER** — A NAME GIVEN BY MINERS TO THE RICH COPPER MINERAL — BORNITE, IN ALLUSION TO ITS TYPICAL IRIDESCENT COLORS, FOLLOWING A SHORT TIME AFTER EXPOSURE TO THE AIR.

**PENETRATION RATE** — THE SPEED WITH WHICH A DRILL OR DRILL BIT WILL CUT ROCK, AS MEASURED IN INCHES PER MINUTE OR FEET PER HOUR.

**PIE CAN** — A NAME COMMONLY GIVEN TO A MINER’S LUNCH PAIL AS THEY OFTEN CONTAINED A MEAT PIE (PASTY).

**PIG TAIL** — A SHORT LENGTH OF 1/2 INCH CABLE THAT HAS EACH END FITTED WITH A HELICAL SHAPED PIECE OF STEEL THAT WAS TO SERVE AS A WAY OF HOOKING BACK ONTO THE CABLE. TIMBER TRUCKS WITH LONG LOADS WERE HAULED BY THE MOTOR CREW USING ONE OR MORE PIGTAILS TO ATTACH THE TRUCK TO THE MOTOR OR TO OTHER TRUCKS.

**PILLAR** — A MASS OF ROCK, IDEALLY WASTE OR LOW-GRADE, LEFT IN PLACE TO GIVE SUPPORT TO THE SURROUNDING ROCK. ORE PILLARS WERE FREQUENTLY MINED AT SOME LATE STAGE, WHEN THE SUPPORT WAS NO LONGER NEEDED AND THE SURROUNDING AREA COULD BE ALLOWED TO COLLAPSE.

**PINCH BAR** — A SCALING BAR.

**PIPE AND TRACK REPAIRMAN** — MINE WORKER WHO REPAIRS, LENGTHENS, AND MAINTAINS THE SMALL BORE PIPELINES FOR AIR AND WATER AS WELL AS PERFORMS NEEDED

REPAIRS TO THE TRACK INCLUDING THE INSTALLATION OF SWITCHES IN MINES. ALSO SIMPLY CALLED THE "PIPE AND TRACK MAN."

**PIPE AND TRACK CAR** — THE PIPE AND TRACK REPAIRMAN HAD A SPECIALLY CONSTRUCTED MINE CAR HE WOULD TRAM OR HAVE THE MOTOR CREW HAUL AND WHICH WAS FILLED WITH HIS TOOLS AS WELL AS THE COMMONLY NEEDED REPLACEMENT PARTS SUCH AS PIPE FITTINGS. IT WAS ONE OF THE FEW CARS KEPT LOCKED AS MANY OF THE TOOLS AND SUPPLIES WOULD HAVE BEEN VERY USEFUL TO THE LIGHT-FINGERED MINERS AT HOME.

**PIPE COLUMN** — A PIPELINE HUNG IN A SHAFT TO BRING WATER, COMPRESSED AIR OR SAND FILL SLURRY INTO THE MINE.

**PIPE COMPARTMENT** — ONE COMPARTMENT IN MOST SHAFTS WAS DEDICATE TO BRINGING IN THE NECESSARY SERVICES THROUGH PIPES, SUCH AS WATER AND COMPRESSED AIR AS WELL AS OFTEN CONTAINING THE PUMP COLUMN, THUS IT WAS FREQUENTLY REFERRED TO AS SUCH. ELECTRICAL CABLES WERE ALSO IN THIS SHAFT COMPARTMENT AS WELL. SEE ALSO SERVICE COMPARTMENT.

**PIPE SHOP** — ONE OF THE MANY SUPPORT SHOPS WHOSE CREWS WERE RESPONSIBLE FOR THE INSTALLATION AND MAINTENANCE OF LARGE BORE PIPE WHEREVER NEEDED. THEY WERE ALSO RESPONSIBLE FOR COMPRESSED AIR SYSTEMS, FIRE WATER SYSTEMS AS WELL AS ALL WATER TRANSPORT AND STORAGE SYSTEMS, INCLUDING POTABLE WATER. THE UNDERGROUND BULL GANG WAS AFFILIATED WITH THE PIPE SHOP AND TOOK CARE OF THESE ASPECTS UNDERGROUND.

**PIT** — 1). A TERM USED TO REFER TO THE LAVENDER PIT. 2). ANY OPEN EXCAVATION.

**PIT BULL GANG** — IF THE JOB WAS HARD, HEAVY AND DIRTY IN THE OPEN PIT, THE BULL GANG DID IT, THOUGH OFTEN IN ASSISTANCE TO OTHER CREWS. EXAMPLES ARE SUCH AS HELPING WITH LONG SHOVEL AND DRILL MOVES, MAJOR SHOVEL MAINTENANCE AND GENERAL MAINTENANCE.

**PITMAN** — IN THE SAC PIT, A LARGE CREW WORKED ALONGSIDE THE SHOVEL SETTING JACK ARMS (OUTRIGGERS), TACK CLAMPS AND THE LIKE. THESE WERE CALLED PIT MEN. IN THE LAVENDER PIT, A SINGLE PERSON WAS DESIGNATED AS THE PITMAN WITH THE RESPONSIBILITY OF SPOTTING THE TRUCKS, KEEPING THE POWER CABLE PULLED UP AND WATCHING THE DIPPER TEETH, TO ASSURE THAT NONE ARE MISSING. PITMEN WERE NO LONGER USED BY THE MID-1960s.

**PISS DITCH** — THE WATER DITCH ALONG CROSSCUTS IN WET AREAS WAS SO CALLED, AS THIS WAS THE PLACE MOST OF THOSE WORKING IN THE AREA CHOSE TO RELIEVE THEMSELVES.

**PLANT** — 1). A BUILDING OR GROUP OF BUILDINGS IN WHICH A PROCESS OR FUNCTION IS CARRIED OUT; AT A MINE SITE IT WILL COLLECTIVELY INCLUDE WAREHOUSES, HOISTING EQUIPMENT, COMPRESSORS, MAINTENANCE SHOPS, AND OFFICES. 2). THE MILL OR CONCENTRATOR.

**PLASTER** — PLACING A SMALL AMOUNT OF UNWRAPPED DYNAMITE, PERHAPS HALF OF A STICK, ON A BOULDER'S SURFACE TO BREAK IT WITH THE BLAST. THIS WAS USUALLY INEFFECTIVE AND DISCOURAGED BY THE COMPANY, AS THE FORCE OF THE UNCONTAINED EXPLOSIVE LARGELY DISSIPATED TO THE SURROUNDING AIR. THIS BEING SAID, AFTER EXTENDED PERIODS OF TRYING TO BREAK HARD SULFIDE BOULDERS ON GRIZZLIES WITH A

DOUBLE JACK, ANYTHING SEEMED WORTH A TRY AND THE AUTHOR PLACED MANY A PLASTER ON OBSTINATE BOULDERS. SEE ALSO MUD PLASTER, MUD-CAPPING.

**PLAYED OUT** — SAID OF A MINE OR MINE AREA FROM WHICH ALL OF THE ECONOMIC ORE HAS BEEN MINED.

**PLUG** — 1). THIS IS A TERM APPLIED TO A FORBIDDEN PRACTICES IN THE OPERATION OF A MOTOR WHERE “PLUGGING” WAS USING THE MOTOR CONTROLLER AS A BREAK BY PUTTING IT IN A POSITION TO GO THE OPPOSITE DIRECTION FROM THE MOVEMENT. WHILE IT WORKED, AND WAS OCCASIONALLY NECESSARY, IT CAUSED THE WHEELS TO SPIN AND WOULD CAUSE WEAR SPOTS ON THE TRACKS. 2). A SHORT BLASTHOLE WITH A SMALL AMOUNT OF EXPLOSIVES USED TO BREAK A BOULDER OR TO REMOVE A ROCK PROTRUSION. 3). THE ACT OF DRILLING THE HOLE AND BLASTING THE BOULDER OR ROCK WAS TO PLUG.

**PLUGGER** — A HAND HELD PNEUMATIC DRILL, GENERALLY USED FOR DRILLING DOWNWARD OR HORIZONTALLY.

**POCKET** — AN EXCAVATION IN THE SIDE OF A SHAFT IN WHICH BROKEN ORE OR WASTE IS STORE UNTIL LOADED INTO SKIPS FROM THE POCKET AND HOISTED TO THE SURFACE.

**PONY SET** — A SET OF TIMBER THAT IS SHORTER THAN A STANDARD SET.

**POP** — A SMALL BLAST SUCH AS USED FOR BREAKING BOULDERS, SMALL ROCK MASSES OR A LIGHT BLAST TO LOOSEN UP GROUND FOR SETTING TIMBER OR PERHAPS EVEN FOR MINING, IF THE GROUND IS SOFT AND NEEDED JUST A LIGHT SHAKING TO ALLOW FOR REMOVAL.

**PORPHYRY** — 1). ANY IGNEOUS ROCK IN WHICH RELATIVELY LARGE CRYSTALS CALLED PHENOCRYSTS ARE SET IN A FINE GRAINED GROUNDMASS. MOST OF THE SACRAMENTO STOCK WAS COMPOSED OF PORPHYRITIC ROCKS, WHICH HOSTED MUCH OF THE ORE MINED BY THE TWO PITS. 2). AN EARLY COLLECTIVE TERM USED TO IDENTIFY ANY OF THE UNITS OF THE SACRAMENTO STOCK COMPLEX ENCOUNTERED IN THE UNDERGROUND MINES.

**PORPHYRY COPPER** — A DEPOSIT OF DISSEMINATED COPPER MINERALS IN OR AROUND A LARGE BODY OF PORPHYRITIC INTRUSIVE ROCK. THE DEPOSIT PRINCIPALLY MINED BY BOTH THE SACRAMENTO AND LAVENDER PIT MINES WAS A PORPHYRY COPPER DEPOSIT.

**PORTAL** — THE SURFACE ENTRANCE TO A TUNNEL OR ADIT. THE BEGINNING POINT FOR A TUNNEL OR ADIT.

**PORTAL TO PORTAL** — A REFERENCE OF THE TIME SPENT UNDERGROUND, MEANING THE TIME FROM WHICH ONE PASSED THROUGH THE PORTAL GOING INTO THE MINE, UNTIL HE PASSED THROUGH THE PORTAL TO EXIT THE MINE. THIS WAS LIMITED TO EIGHT HOURS, BY ARIZONA LAW, EXCEPT IN THE CASE OF DIRE EMERGENCIES. SEE ALSO COLLAR TO COLLAR.

**POST** — A PIECE OF HEAVY TIMBER USED FOR VERTICAL SUPPORT OR AS THE VERTICAL COMPONENTS OF A SET OF TIMBER, WHICH TYPICALLY HAD TWO POSTS PER SET.

**POST-MINING** — HAVING FORMED AFTER MINING OPENED UP AND AREA. POST-MINING MINERALS, SUCH AS SULFATE CRUST ON HIGH SULFIDE MINE WALLS, WERE COMMON AT BISBEE.

**POST-ORE** — HAVING OCCURRED OR BEEN DEPOSITED OR EMLACED AFTER THE ORE WAS FORMED. POST-ORE MINERALS WERE EXTREMELY COMMON IN THE SULFIDE ZONES AT BISBEE, AS THE SULFIDES OXIDIZED UPON EXPOSURE TO THE OXYGEN RICH ATMOSPHERE. THE OXIDATION PRODUCTS WERE LARGELY IRON OR COPPER/IRON SULFATE MINERS, WHICH FORMED CRUST ALONG SULFIDE —RICH CROSSCUT WALLS.

**POWDER** — A GENERAL TERM FOR EXPLOSIVES INCLUDING DYNAMITE OR A BLASTING AGENT, BUT EXCLUDING CAPS.

**POWDER BAG** — SEE POWDER SACK.

**POWDER BOX** — DYNAMITE WAS SHIPPED IN WOODEN BOXES CONTAINING 50 POUNDS, OR, LESS OFTEN, 10 OR 25 POUNDS. ONCE EMPTY THESE BOXES FOUND USES FOR ANY NUMBER OF APPLICATIONS BOTH UNDERGROUND AND AT HOME. NAILED TO A LAGGING, THEY MADE EXCELLENT SHELVES; THEIR OBVIOUS USE FOR SERVING AS STORAGE BOXES WAS WIDELY EMPLOYED. AT HOME, THEY WERE USED IN SHEDS FOR MUCH THE SAME AND IN SOME CASES, AS FURNITURE IN CHILDREN'S ROOMS, MY BEDSIDE TABLE, AS A YOUNG BOY WAS MADE OF TWO POWDER BOXES GLUED TOGETHER AND PAINTED. MORE THAN ONE PERSON TOOK THEM APART AND USED THE SIDES AS SIDING FOR A SHED OR GARAGE, NAILED TO 2" X 4"'S. BECAUSE THE WOOD WAS THIN, IT WAS ALSO EMPLOYED BY THE MINING COMPANIES TO MAKE SPITTER BOARDS. FEW SUCH BOXES WENT TO THE TRASH, AS THERE WAS ALWAYS A USE FOR THEM, ALWAYS.

**POWDER CAR** — A SPECIAL CAR CONSTRUCTED FOR THE TRANSPORTATION OF DYNAMITE. THE SIZE WAS SUCH THAT IT ACCOMMODATED UP TO 18, 50-POUND BOXES OF DYNAMITE. THESE CARS WERE CONSTRUCTED OF WOOD AND LINED WITH RUBBER TO PREVENT SPARKS. THEY WERE RED IN COLOR TO DENOTE THE CONTENTS. THESE CARS WERE LOADED AT THE SURFACE, LOWERED AS SOON AS POSSIBLE, ONLY WHEN NO ONE WAS IN THE SHAFT AND TO THE WAITING POWDER MONKEY WHO IMMEDIATELY TRAMMED THE CAR, BY HAND, TO THE POWDER MAGAZINE, WELL AWAY FROM THE SHAFT. NO MOTOR HAULAGE OF A POWDER CAR WAS PERMITTED BECAUSE OF THE DANGER FROM THE CONSTANTLY SPARKING TROLLEY WIRE AND THE RISK OF STRAY ELECTRIC CURRENT PASSING THROUGH THE CAR.

**POWDER CREW** — IN THE LAVENDER PIT, THE CREW THAT WAS RESPONSIBLE FOR LOADING AND BLASTING THE LARGE DIAMETER BLASTHOLES AS WELL AS THE SMALLER SECONDARY DRILL HOLES.

**POWDER HEADACHE** — THE NITROGLYCERIN USED TO MAKE DYNAMITE WILL CAUSE AN EXTRAORDINARILY INTENSE HEADACHE, IF ABSORBED THROUGH THE SKIN FROM HANDLING THE OR FROM BREATHING THE SMOKE OF A BLAST. THESE HEADACHES WERE A PROBLEM AND SMOKE IN HIGH CONCENTRATIONS POTENTIALLY LETHAL. THE MINERS SOON LEARNED HOW TO AVOID A POWDER HEADACHE. IT WAS A NOT TOO UNCOMMON A PRANK TO PUT A TINY BIT OF DYNAMITE IN THE HATBAND OF A FELLOW WORKER TO CAUSE A MILD POWDER HEADACHE. RETRIBUTION WAS ALWAYS QUICK TO FOLLOW, IF THE PRANKSTER WAS KNOWN.

**POWDER MAGAZINE** — STORAGE PLACE FOR EXPLOSIVES. USUALLY IN A DRY, DEAD-END CROSSCUT, WELL AWAY FROM THE SHAFT AND WITHIN A REASONABLE DISTANCE OF THE WORKING AREAS. ALL OF THE NECESSARY BLASTING SUPPLIES WERE KEPT HERE AS WELL, SUCH AS LOADING STICKS, SPITTERS, SKEWERS AND SPITTER BOARDS. THE POWDER MAGAZINES FOR THE PITS WERE SURFACE FACILITIES IN SECURE AND SHIELDED LOCALITIES AND CONSTRUCTED OF MASONRY MATERIALS AND LINED WITH WOOD.

**POWDER MONKEY** — THE PERSON WHO MAINTAINS THE POWDER MAGAZINE AND ITS CONTENTS, INCLUDING DYNAMITE, AND FUSES AS WELL AS OTHER BLASTING SUPPLIES IN THE POWDER MAGAZINE, AS NEEDED BY THE MINERS. THIS WAS ALMOST ALWAYS AN OLDER,

EXPERIENCED AND RESPONSIBLE MINER WHO COULD NOT KEEP UP WITH THE VERY RIGOROUS PACE OF MINING, BUT WHO WAS NOT READY FOR RETIREMENT. IT WAS NOT AN EASY JOB, JUST LESS PHYSICALLY DEMANDING. TYPICALLY, MORE THAN ONE MAGAZINE WAS UNDER THE CARE OF A POWDER MONKEY HE ALSO HAD TO HAND TRAM ALL OF THE EXPLOSIVES FROM THE SHAFT TO THE MAGAZINE AS MOTOR HAULAGE WAS FORBIDDEN FOR SAFETY REASONS. SEE ALSO POWDER NIPPER.

**POWDER NIPPER** — A TERM OFTEN USED INSTEAD OF POWDER MONKEY TO DESCRIBE THE SAME FUNCTION.

**POWDER SACK** — SOMETIMES CALLED POWDER BAG. A HEAVY, TREATED CANVAS SACK WITH A WIDE SHOULDER STRAP MADE SPECIFICALLY FOR THE TRANSPORT OF EXPLOSIVES. DYNAMITE WAS PLACED IN ONE SACK, FUSE, PRIMERS, SPITTER AND SKEWER IN A SECOND. THESE SACKS WERE MADE LOCALLY IN THE ROPE SHOP AND FOUND WIDE USE IN OTHER APPLICATIONS, BUT WERE FORBIDDEN TO USE IN THE TRANSPORT OF NAILS.

**POWDER SLIP** — A REQUISITION FOR POWDER, GIVEN TO A MINER BY THE SHIFT BOSS AND PRESENTED TO THE POWDER MONKEY TO HAVE THE POWDER ISSUED FOR USE BY THE MINER AT HIS WORK PLACE AND DURING THE SHIFT.

**POWDER SMOKE** — THE SMOKE PRODUCED BY BLASTING. UNDERGROUND, IT WAS A VERY REAL PROBLEM AS AT HIGH CONCENTRATIONS, IT WAS POTENTIALLY TOXIC. EVEN RELATIVELY LOW LEVELS OF POWDER SMOKE COULD CAUSE THE SEVERE POWDER HEADACHES. THIS IS WHY ALMOST ALL BLASTING TOOK PLACE ONLY AT SHIFT'S END, AS SMOKE FROM ONE WORKING PLACE WOULD PASS TO ANOTHER, VIA THE MINE VENTILATION SYSTEM. IN ADDITION, THIS IS WHY THE SEPARATION BETWEEN DAYSHIFT AND NIGHTSHIFT WAS A FULL HOUR, SO AS IT ALLOWED TIME FOR THE ATMOSPHERE TO CLEAR OF THIS SMOKE.

**POWDER STICK** — ANOTHER NAME FOR LOADING STICK, THE WOODEN STICK USED TO PUSH DYNAMITE INTO THE BLASTHOLE AND THEN TAMP IT LIGHTLY.

**POWDER TRUCK** — THE SPECIALLY CONSTRUCTED TRUCK USED IN THE LAVENDER PIT TO TRANSPORT SACKS OF BLASTING AGENT, PRIMACORD AND OTHER BLASTING SUPPLIES ONLY.

**POWER PLANT** — A PLANT USED TO GENERATE POWER, STEAM OR ELECTRICAL. THE POWER WAS ORIGINALLY STEAM, GENERATED BY COAL THEN OIL. EACH MINE HAD A STEAM POWER PLANT. THE STEAM WAS PIPED TO THE NEARBY SHAFT TO RUN THE HOIST. LATER AIR COMPRESSORS WERE STEAM POWERED AND, IN SOME CASES, STEAM WAS PIPED DOWN A SHAFT TO POWER PUMPS. BY THE 1910S, THESE STEAM PLANTS WERE GENERATING ELECTRICITY AS WELL, BUT STEAM WAS STILL THE MAIN POWER SOURCE. IN TIME, THE STEAM WAS USED JUST TO GENERATE ELECTRICITY. LATER, CENTRAL POWER PLANTS WERE CONSTRUCTED TO GENERATE ELECTRICITY AND PROVIDE COMPRESSED AIR WITH ONE AT THE SACRAMENTO MINE FOR THE COPPER QUEEN AND ONE AT THE JUNCTION MINE FOR THE C. & A OPERATIONS.

**PRECIPITATE** — THE HIGH COPPER, MUDLIKE MATERIAL RECOVERED IN A PRECIPITATION PLANT THROUGH THE CONTACT OF HIGH COPPER SOLUTIONS WITH SCRAP IRON. THIS MATERIAL WAS COLLECTED AND SHIPPED DIRECTLY TO THE SMELTER

**PRECIPITATION PLANT** — A FACILITY WHERE COPPER BEARING SOLUTIONS FROM THE UNDERGROUND OR THOSE COLLECTED FROM THE LEACH DUMPS ARE PASSED OVER SCRAP IRON TO RECOVER THE CONTAINED COPPER. THIS OCCURRED THROUGH A REPLACEMENT OF THE IRON BY COPPER. THE PRODUCT IS CALLED PRECIPITATE, WHICH WAS HIGH IN COPPER

(+50%) AND SENT TO THE SMELTER FOR RECOVERY. THESE PLANTS WERE BOTH UNDERGROUND AND ON THE SURFACE AND OFTEN CALLED "PERCIP PLANTS."

**PRECIOUS METAL** — THOSE METALS OF HIGH VALUE AND SOLD BY THE TROY OUNCE SUCH AS SILVER AND GOLD.

**PRECIOUS METAL CREDITS** — THE ACTUAL RECEIVED VALUE OF THE GOLD AND SILVER AS CONTAINED IN THE PROCESSED ORES, LESS SMELTING LOSSES AND REFINING COST. PRECIOUS METAL CREDITS WERE CALCULATED INTO THE TOTAL COST OF MINING AND PROCESSING AS CREDITS AGAINST PROCESSING COSTS. IN SOME INSTANCES, HIGH GOLD/SILVER VALUES JUSTIFIED THE MINING OF LOWER GRADE COPPER ORES BECAUSE OF THE ADDITIONAL REVENUE, WHICH WOULD BE GENERATED FROM THE CONTAINED PRECIOUS METALS.

**PRE-EMPLOYMENT PHYSICAL** — THE PHYSICAL EXAMINATION THAT ALL NEW EMPLOYEES WERE REQUIRED TO UNDERGO PRIOR TO BEING EMPLOYED. THIS WAS NEEDED TO PROVE THE ABILITY OF THE MAN TO PERFORM THE DIFFICULT AND STRENUOUS WORK. UNIONS, PARTICULARLY, THE I.W.W., FELT THE PHYSICAL EXAM WAS A FORM OF BLACKBALLING UNION SYMPATHETIC MEN. I NEVER SAW ANY REASON TO BELIEVE THIS WAS THE CASE, HOWEVER.

**PREGNANT SOLUTIONS** — SOLUTIONS WHICH HAVE PASSED THROUGH THE LEACH MATERIAL OR COLLECTED UNDERGROUND AND ARE HIGH IN CONTAINED COPPER AND WHICH WILL BE SENT TO THE PRECIPITATION PLANT FOR COPPER RECOVERY.

**PRESTRIPPING** — THE MINING OF WASTE TO UNCOVER ORE TO MAKE IT ACCESSIBLE FOR MINING. TYPICALLY, THIS IS DONE PRIOR TO ANY ORE BEING MINED OR THE CONCENTRATOR BEING COMPLETED. IN THE SACRAMENTO PIT, SOME FIVE YEARS WERE SPENT PRESTRIPPING THE OREBODY WHILE THE LAVENDER PIT OREBODY REQUIRED THREE YEARS OF PRESTRIPPING.

**PRILL** — A NAME GIVEN THE GRANULAR AMMONIUM NITRATE BLASTING AGENT.

**PRIMACORD** — A FUSE COMPOSED OF AN EXPLOSIVE CORE WITHIN A TEXTILE OR PLASTIC COVERING. IT DETONATES EVERY EXPLOSIVE THAT IS IN DIRECT CONTACT WITH IT. PRIMACORD WAS USED TO INITIATE THE BLASTS IN THE LAVENDER PIT.

**PRIMARY BLAST** — IN THE OPEN PIT, THE MAIN BLAST USED TO BREAK THE IN SITU ROCK. THE PRIMARY BLAST AT BISBEE WERE LARGE, SPECTACULAR EVENTS, BREAKING TENS OF THOUSANDS OF TONS AT A TIME. THESE WERE SHOT DAILY AT 3:15 PM, OFTEN WITH MANY WATCHING FROM THE PIT LOOKOUT ALONG HIGHWAY 80.

**PRIMARY CRUSHER** — IN ORE DRESSING, THE FIRST STAGE IN WHICH CRUSHERS TAKE RUN-OF-MINE ORE AND REDUCE IT TO A SIZE SMALL ENOUGH TO BE TAKEN BY THE NEXT CRUSHER IN THE SERIES. ORDINARILY, A GYRATORY CRUSHER WAS USED SUCH AS AT THE LAVENDER PIT, WHILE A LARGE JAW CRUSHER SERVED THE SAME PURPOSE AT THE SAC CONCENTRATOR.

**PRIMER** — A CONTRIVANCE, SUCH AS A CAP, TUBE, OR WAFER, CONTAINING PERCUSSION POWDER OR OTHER COMPOUND FOR IGNITING AN EXPLOSIVE CHARGE; IGNITED BY FRICTION, PERCUSSION, OR ELECTRICITY. UNDERGROUND, CAPS WERE THE PRIMERS USED WHILE IN THE LAVENDER PIT, TNT WAFERS WERE USED ALONG WITH PRIMACORD TO EXPLODE THE MUCH LESS SENSITIVE ANFO, WHICH FILLED MUCH OF THE BLASTHOLE.

**PRINCE ALBERT TIN** — OFTEN SIMPLY REFERRED TO AS A P. A. TIN. THESE WERE THE POCKET FLASK-SHAPED TIN IN WHICH PRINCE ALBERT TOBACCO WAS SOLD. THESE USEFUL TINS FOUND A NUMBER OF OTHER APPLICATIONS IN THE MINES, ONCE EMPTY AND WERE SELDOM SIMPLY DISCARDED. THE MOST COMMON USE WAS A CONTAINER FOR THE ADDITIONAL CARBIDE, WHICH WAS TO BE NEEDED DURING THE SHIFT. AS MINERS WERE RESPONSIBLE FOR PURCHASING A MEANS TO CARRY THIS CARBIDE, THESE TINS WERE A CHEAP ALTERNATIVE. THESE MADE GREAT WAY TO HAVE A FEW 50 PENNY NAILS IN THE POCKET WITHOUT THE DANGER OF BEING PUNCTURED. ANOTHER COMMON, BUT ILL-ADVISED APPLICATION FOR A P A TIN WAS TO HOLD BLASTING CAPS, UNTIL NEEDED. THIS USES WAS DANGEROUS, AS THE TIN WAS COMMONLY IN A POCKET AND THE SENSITIVE CAPS BOUNCED AROUND LOOSELY.

**PROSPECT** — 1). A RAISE DRIVEN IN THE SEARCH FOR ORE IN THE DAYS BEFORE DIAMOND DRILLING BECAME COMMON, WAS CALLED A “PROSPECT.” 2). ALSO, TO SEARCH FOR ORE ON THE SURFACE. 3). A SHALLOW PIT OR OPEN CUT ON THE SURFACE, USUALLY EXCAVATED AT THE TIME OF LOCATION OF THE MINING CLAIM.

**PROSPECTIVE** — AN AREA OR REGION WHERE THERE IS POTENTIAL FOR ORE TO BE FOUND IS SAID TO BE PROSPECTIVE.

**PROSPECTUS** — A DOCUMENT FILED WITH THE APPROPRIATE SECURITIES COMMISSION DETAILING THE ACTIVITIES AND FINANCIAL CONDITION OF A COMPANY SEEKING FUNDS FROM THE PUBLIC THROUGH THE ISSUANCE OF SHARES. BEFORE REGULATIONS CAME INTO EFFECT, THESE DOCUMENTS WERE OFTEN INACCURATE OR MISLEADING IF NOT FANCIFUL OR DOWNRIGHT FRAUDULENT, IN AN EFFORT TO SEPARATE AN INVESTOR FROM HIS OR HER MONEY. MORE THAN A FEW PROSPECTUSES’ FOR MINING COMPANIES/PROPERTIES AT BISBEE WERE VERY CLEVERLY WRITTEN AND WHILE LONG ON HOPE AND PROMISE, THEY WERE SHORT ON FACTS AND REALITY.

**PULL A CHUTE** — THE ACT OF OPENING THE CHUTE DOOR TO FILL MINE CARS WAS CALLED PULLING THE CHUTE. THIS WAS NOT ALWAYS A SIMPLE MATTER AS THE ORE WAS SELDOM FREE FLOWING AND ALMOST ALWAYS NEEDED TO BE BARRED OR A BLOW PIPE USE TO FILL THE MINE CARS.

**PULL A ROUND** — A ROUND IS PULLED IF THE BLAST IS SUCCESSFUL AND THE DESIRED LENGTH BROKEN.

**PULL THE RODS** — THE SMALL DIAMOND DRILLS USED AT BISBEE ALL HAD STANDARD CORE BARRELS. THIS REQUIRED THAT THE COMPLETE STRING OF RODS HAD TO BE PULLED WITH EVERY FIVE TO TEN FEET OF ADVANCE TO REMOVE THE CORE BARREL AT THE END AND THEN, RECOVER THE CORE. THIS REQUIRED UNSCREWING THE INDIVIDUAL FIVE FOOT SECTIONS OF ROD EVERY TIME THEY WERE PULLED, AS THERE WAS TYPICALLY LITTLE SPACE FOR LONGER RODS. THE RODS WERE THEN RECONNECTED, ONE AT A TIME AND PUT BACK IN THE HOLE TO DRILL AGAIN, A VERY LABOR AND TIME INTENSIVE TASK.

**PULL UP CABLE** — AS AN ELECTRIC SHOVEL WOULD PROGRESS ALONG A WORKING FACE, IT WOULD USE UP THE SLACK IN THE TRAILING POWER CABLE. IT WAS FREQUENTLY NECESSARY TO PULL UP CABLE TO GIVE THE SHOVEL SLACK AND TO BE SURE THAT THE POWER CABLE DID NOT BECOME TANGLED OR CAUGHT ON SOMETHING THAT WOULD DAMAGE THE HIGH VOLTAGE CABLE. THIS TASK WAS USUALLY PERFORMED BY HAND USING THE SPECIALLY MADE CABLE TONGS TO PULL THE HEAVY CABLE, A DIFFICULT TASK.

**PUMP COLUMN** — THE LARGE BORE, HEAVY WALLED PIPE, USUALLY LOCATED IN THE PIPE COMPARTMENT OF A SHAFT, WHICH CARRIED THE DISCHARGE OF THE MINE PUMPS TO THE SURFACE OR ANOTHER LEVEL FOR FURTHER PUMPING. REGULAR MINE WATER WAS PUMPED

THROUGH STANDARD STEEL PIPE, WHILE ACID MINE WATERS WERE REMOVED THROUGH WOODEN PIPE, THEN VIA STAINLESS PIPE.

**PUMP OILER** — THE INDIVIDUAL RESPONSIBLE FOR LUBRICATION OF THE PUMPS IN THE PUMP STATIONS AS WELL AS THE CLEANING AND PAINTING OF THE MANY PUMPS. THERE WAS ONE PER SHIFT AT BOTH THE 2200 LEVEL AND 2700 LEVEL JUNCTION PUMP STATIONS AND AT THE 2966 LEVEL CAMPBELL PUMP STATION. THE PERSON AT THE 2200 MANUALLY LUBRICATED THE PISTON RODS WITH A BRUSH AND GREASE ON EVERY OPERATING PUMP EVERY HOUR. HE ALSO MAINTAINED THE COMPRESSED AIR RESERVE FULL FOR FEED INTO THE PUMP COLUMN TO PREVENT HAMMERING BY THE POSITIVE DISPLACEMENT PUMPS. IN ADDITION, THE MAN AT THE JUNCTION CHECKED ON THE ACID WATER PUMPS ON THE 1800 TWICE PER SHIFT. THE CAMPBELL OILER CHECKED THE PUMPS ON THE 2700 LEVEL STATION, THOSE IN 12 XC ON THE 2700 AND WALKED TO THE 3100 DENN PUMP STATION EACH SHIFT AS WELL. THE OILER WAS REPLACED BY AUTOMATION IN 1962.

**PUMP STATION** — A CHAMBER TYPICALLY NEAR THE SHAFT AT DEPTH, WHERE A PUMP IS INSTALLED.

**PUMP SUMP** — A CHAMBER CUT TO SERVE AS A RESERVOIR FOR MINE WATER TO BE PUMPED. SUMPS WERE ALWAYS PRESENT IN PUMP STATIONS TO COLLECT AND PROVIDE SURGE CAPACITY FOR THE WATER TO BE PUMPED. TYPICALLY, THESE WERE HIGHER THAN THE PUMPS, OVERHEAD SUMPS, TO PRECLUDE THE NEED FOR PRIMING.

**PUMPMAN** — HE WAS RESPONSIBLE FOR THE OPERATION OF THE PUMP STATION WHERE ASSIGNED. THIS INCLUDED MONITORING INCOMING WATER FLOW, WATER PH TO ADD LIME IF NEEDED, PERFORM MINOR MAINTENANCE, STARTING AND STOPPING THE PUMPS AS NECESSARY TO MANAGE INCOMING FLOW. ALL STARTS AND STOPS ON THE 2200 LEVEL JUNCTION STATION WERE DONE ONLY AFTER NOTIFYING THE POWERHOUSE OF THE INTENDED CHANGE AS THESE HUGE MOTORS COULD IMPACT THE WHOLE SYSTEM IF STARTED WHEN OTHER DEMAND WAS HIGH.

**PUNCH** — USING A STEEL BAR TO MAKE THE MATERIAL IN A HUNG CHUTE MOVE BY POKING THE TROUBLESOME MUD OR ROCK AND MOVING THE BAR AROUND. THIS WAS HARD WORK, PARTICULARLY IN CLAYLIKE MATERIALS.

**PUNCH BAR** — A SHORT, POINTED HEAVY STEEL BAR USED TO POKE THE ORE IN CHUTES TO MAKE IT MOVE BY BREAKING UP BOULDER JAMS OR JAR LOOSE THE STICKY CLAYS.

**PUP MOTOR** — A VERY SMALL TROLLEY MOTOR. GENERALLY, THESE WERE THE FIRST UNITS BROUGHT UNDERGROUND, THE 2 1/2 TON MOTORS INTRODUCED IN 1908 AND STILL IN LIMITED USE IN 1975.

**PYRITE** — A HARD, HEAVY, SHINY, YELLOW MINERAL,  $FeS_2$  OR IRON DISULFIDE, GENERALLY IN CUBIC CRYSTALS. ALSO CALLED IRON PYRITES OR FOOL'S GOLD. PYRITE IS THE MOST COMMON SULFIDE MINERAL FOUND AT BISBEE. OFTEN CALLED "PYRITES" OR "IRON PYRITE" BY THE MINERS.

**PYRITE SAND** — IN MORE THAN A FEW INSTANCES, UNCONSOLIDATED, GRANULAR PYRITE WAS HIT. THIS MATERIAL WAS SAND LIKE AND WOULD FLOW THROUGH ANY OPEN SPACE. ALL LAGGING HAD TO BE INSTALLED SKIN TO SKIN AND ANY KNOTHOLES COVERED BY NAILING A WEDGE OVER IT. DRIVING HEADINGS THROUGH THIS MATERIAL WAS DIFFICULT AND WAS ONLY POSSIBLY BY USING SPILING. ALSO CALLED SUGAR SULFIDE.

**QUARTZITE** — 1). A REFERENCE TO THE BOLSA QUARTZITE ROCK UNIT BOTH ON THE SURFACE AND UNDERGROUND. 2). IN THE UNDERGROUND MINES, THIS COULD ALSO BE A REFERENCE TO THE RELATIVELY THIN QUARTZITE BED IN THE LOWER MARTIN LIMESTONE WHICH WAS AN IMPORTANT MARKER BED AS IT WAS ERRONEOUSLY BELIEVED EARLY ON THAT NO ORE WAS TO BE FOUND BELOW THIS HORIZON. THIS UNIT WAS ALSO CALLED THE PARTING QUARTZITE.

**QUEEN INCLINE** — THE LOCAL NAME BY WHICH THE INCLINED SHAFT OF THE COPPER QUEEN MINE WAS KNOWN.

**QUEEN TUNNEL** — THE NAME GIVEN TO THE ADIT DRIVEN FROM THE OLD SMELTER SITE, NEAR THE CZAR SHAFT, AND THE SOUTHWEST SHAFT SIMULTANEOUSLY, TO HAUL LEAD ORES TO THE SURFACE FOR LOADING AND SHIPPING. THE CONNECTION BETWEEN THE TWO PORTIONS WAS COMPLETED IN 1915. IT IS A PART OF THE 3<sup>RD</sup> LEVEL SOUTHWEST MINE AND ULTIMATELY CONNECTED TO THE SUNRISE, CUPRITE AND UNCLE SAM SHAFTS. TODAY, A PORTION IS USED FOR THE QUEEN MINE TOURS.

**RADIO BELL** — A CAGE MOUNTED SIGNAL METHOD, WHICH USED A RADIO TRANSMITTER TO SEND THE SIGNAL TO THE HOIST ENGINEER. IT WAS OPERATED BY THE CAGER FROM INSIDE THE CAGE BY PULLING A ROPE HOOKED TO A BOTTLE SWITCH. THIS SAME DEVICE WOULD AUTOMATICALLY SEND A LONG, UNBROKEN SIGNAL TO THE HOIST ENGINEER IF THE ROPE BECAME SLACK, ADVISING HIM TO STOP UNREELING CABLE BECAUSE OF THIS DANGEROUS CONDITION.

**RADON** — A COLORLESS, HEAVY, RADIOACTIVE, GASEOUS ELEMENT, WHICH IS INERT. IT IS THE HEAVIEST KNOWN GAS. FORMED BY THE DISINTEGRATION OF URANIUM, IT WAS MONITORED FOR BY AIR SAMPLING, AS TOTAL ANNUAL EXPOSURE TO THE GAS WAS LIMITED BY REGULATION DUE TO HEALTH CONCERNS. BECAUSE URANIUM WAS WIDELY DISTRIBUTED IN VERY MINOR AMOUNTS IN THE ORES AT BISBEE, RADON WAS OCCASIONALLY FOUND IN RELATIVELY HIGH CONCENTRATIONS, PARTICULARLY IN UNVENTILATED AREAS WITH STAGNATE AIR IN OXIDE AREAS.

**RAIL** — THE SMALL SIZE RAILROAD RAIL USED IN THE MINES. RAIL IS SIZED BY ITS WEIGHT PER YARD (3 FEET). UNDERGROUND, THE SMALLEST EVER USED WAS EIGHT POUND, WHICH WAS TOO NARROW AND GROOVED THE MINE CAR WHEELS, THEN 12-POUND, WHICH WAS FINE FOR HAND TRAMMING OR MULE HAULAGE, BUT TOO LIGHT FOR MOTORS. IN THE END, MOST RAIL USED WAS 25-POUND OR IN RARE CASES BECAUSE OF HEAVY CARS, 40-POUND. THE SACRAMENTO PIT EMPLOYED 90-POUND RAIL FOR ALL OF ITS USES. THE RAIL USED FOR WASTE TRANSPORT FROM THE TRUCK/TRAIN TRANSFER POINT IN THE LAVENDER PIT OPERATIONS WAS ALSO THE 90-POUND TYPE.

**RAIL CLAMPS** — THE RAILROAD TYPE STEAM SHOVELS HAD CLAMPS TO SECURE THEM TO RAIL TO HELP STABILIZE THEM WHEN DIGGING. THESE MANUAL CLAMPS WERE SET BY THE PIT CREW.

**RAIL PUNCH** — A HEAVY CLAMP WITH A VERY COARSE THREADED SCREW WHICH, WHEN TIGHTENED BY HAND WILL PUNCH A HOLE IN THE WEB OF A MINE RAIL OF SUFFICIENT DIAMETER TO ALLOW A TRACK BOLT TO PASS.

**RAISE** — A VERTICAL OR INCLINED OPENING IN A MINE DRIVEN UPWARD FROM A LEVEL OR STOPE TO CONNECT WITH THE LEVEL ABOVE FOR ACCESS, VENTILATION, AND MINING ABOVE THE LEVEL OR THE TRANSFER OF ORE OR WASTE. THESE WERE ALSO USED TO EXPLORE THE GROUND FOR A LIMITED DISTANCE ABOVE A LEVEL OR STOPE.

**RAISING** — TO EXCAVATE AN OPENING UPWARD SUCH AS DRIVING A RAISE.

**RAMP** — 1). A SECONDARY OR TERTIARY INCLINED OPENING IN AN UNDERGROUND MINE, DRIVEN TO CONNECT LEVELS, USUALLY DRIVEN IN A DOWNWARD DIRECTION, AND USED FOR HAULAGE. UNDERGROUND RAMPS WERE FEW AT BISBEE WITH THE ONLY EXAMPLE KNOWN TO THE AUTHOR IN THE SACRAMENT MINE WHERE AN INCLINED CONNECTION WAS MADE WITH A LEVEL ORIGINATING AT THE JUNCTION MINE. 2). IN THE SURFACE MINE, AN INCLINED ROADWAY BETWEEN BENCHES, OFTEN TRANSVERSE SEVERAL BENCHES.

**RAW CROSSCUT** — A SECTION OF A CROSSCUT IN ROCK THAT DOES NOT NEED SOME FORM OF SUPPORT TO REMAIN OPEN.

**RAW GROUND** — GROUND WHICH IS UNSUPPORTED BY TIMBER OR ROCK BOLTS.

**RAW RAISE** — AS RAISES WERE, BY NECESSITY, AT LEAST PARTIALLY TIMBERED FOR REASONS OF ACCESS, A RAW RAISE IS ONE INTENTIONALLY STRIPPED OF TIMBER TO ALLOW FOR UNIMPEDED PASSAGE OF ROCK OR FOR VENTILATION REASONS.

**READ THE GROUND** — THIS COMMONLY USED PHRASE HAD TWO, DISTINCT MEANINGS. THE MORE IMPORTANT REFERENCED THE ABILITY TO LOOK AT AN AREA AND DETERMINE HOW SAFE IT MAY BE IN TERMS OF POTENTIAL COLLAPSE AND HOW TO BEST SUPPORT THE GROUND WITH TIMBER. SECONDLY, IT WAS THE UNCANNY, ALMOST OCCULT-LIKE ABILITY TO FOLLOW THE ERRATIC PATH OF THE ORE WITHIN THE BARREN LIMESTONE. BOTH TALENTS WERE HIGHLY REGARDED, WITH GOOD REASON. WHILE SOME FELT THAT THE INTRODUCTION OF GEOLOGIST INTO THE MINES REPLACED THE SECOND TYPE, I DISAGREE AND I WAS A GEOLOGIST IN THE MINES. THE FIRST TYPE OF MINER WAS NEVER REPLACED BY SOMEONE WITH JUST A COLLEGE DEGREE.

**REAGENT** — ANY OF SEVERAL ADDITIVES USED IN THE FROTH FLOTATION PROCESS, GENERALLY TO AFFECT THE SURFACE CHARACTERISTICS OF THE GROUND ORE PARTICLES CAUSING THEM TO ADHERE TO BUBBLE SURFACES AND FLOAT OR TO NOT ADHERE AND SINK. OTHER REAGENTS INCLUDE PH REGULATORS, SLIME DISPERSANTS, RESURFACING AGENTS, WETTING AGENTS, CONDITIONING AGENTS, COLLECTORS, AND FROTHERS.

**RECOVERY** — THE AMOUNT OF METAL RECOVERED FROM AN ORE IN A MINERAL PROCESS PLANT AND EXPRESSED AS A PERCENTAGE.

**REDUCTION WORKS** — ANY OF THE SMELTERS, WHICH SERVED BISBEE, WERE KNOWN AS THE REDUCTION WORKS. THE OFFICIAL NAME FOR THE COPPER QUEEN SMELTER AT DOUGLAS WAS "THE DOUGLAS REDUCTION WORKS."

**REJECT** — SAMPLES COLLECTED FROM THE VARIOUS PHASES OF MINE OPERATIONS WERE GENERALLY FROM TWO TO 50 POUNDS IN WEIGHT. THE WHOLE SAMPLE WOULD BE DRIED, CRUSHED AND SPLIT INTO TWO PARTS, WITH ONE PART USED FOR ASSAY DETERMINATION AND THE OTHER PART, THE REJECT, RETURNED TO THE ORE STREAM FOR METAL RECOVERY.

**REPLACEMENT ORE** — ORE FORMED BY A PROCESS DURING WHICH CERTAIN MINERALS HAVE PASSED INTO SOLUTION AND HAVE BEEN CARRIED AWAY, WHILE OTHER, OFTEN VALUABLE MINERALS FROM THE SOLUTION HAVE BEEN DEPOSITED IN THE PLACE OF THOSE REMOVED. THE MANY LIMESTONE-HOSTED OREBODIES MINED AT BISBEE WERE REPLACEMENT DEPOSITS.

**RELIEVERS** — IN A SEQUENCED BLASTING ROUND, THE HOLES FIRED AFTER THE CUT HOLES AND BEFORE THE BACK AND SKIMMER HOLES TO “RELIEVE” THE BURDEN TO BE BROKEN BY THESE OTHER HOLES WHEN FIRED.

**REPORT** — THE SOUND OF A BLASTHOLE EXPLODING. AS ALL UNDERGROUND BLASTING WAS BY FIRE FUSE WITH ONE HOLE EXPLODING AT A TIME, MINERS WERE REQUIRED TO COUNT THE EXPLOSIONS OR “REPORTS” TO ASSURE THAT THE SAME NUMBER OF HOLES WENT OFF THAT WERE LOADED AND SPIT. ANY LESS, INDICATED EITHER A HANG FIRE OR MISSED HOLE, BOTH POTENTIALLY DANGEROUS CONDITIONS WHICH HAD TO BE APPROPRIATELY HANDLED.

**REPORT OFF** — TO NOTIFY THE MINE TIMEKEEPER THAT ONE WILL NOT REPORT TO WORK. THIS WAS DONE EITHER BY PHONE OR THROUGH ANOTHER PERSON. FAILURE TO REPORT OFF AND NOT COME TO WORK (AWOL) WAS A SERIOUS OFFENCE AND THREE TIMES IN A YEAR COULD, AND USUALLY WOULD, RESULT IN DISMISSAL. ABSENTEEISM WAS TREATED AS A SERIOUS OFFENCE AND FEW EXCUSES WERE ACCEPTED, EVEN WITH A CALL IN. MY FIRST SHIFT BOSS MADE THIS VERY CLEAR BY SAYING HE ACCEPTED JUST TWO EXCUSES FROM HIS MEN — RIGOR MORTIS OR PREGNANCY AND IF I WAS SUFFERING FROM EITHER, HE WOULD EXCUSE MY ABSENCE.

**RERAIL** — TO PUT A MINE CAR OR MOTOR BACK ON THE RAILS. A NUMBER OF TECHNIQUES AND PROCEDURES WERE USED, INCLUDING A RERAILING FROG AND THE MOTOR JACK, BOTH CARRIED ON THE MOTOR FOR THIS VERY USE.

**RERAILING FROG** — EACH MOTOR UNDERGROUND CARRIED A WEDGE-SHAPED, CAST STEEL ITEM WITH A RAISED EDGE USED TO HELP RERAIL MOTORS OR LOADED CARS. AS THE DERAILED MOTOR’S WHEELS CLIMBED ONTO THE FROG, THEY WERE GUIDED TO THE RAIL AND UPWARD, ABOVE THE RAIL TO ALLOW THE FLANGE TO CLEAR THE RAIL.

**RESERVE** — THAT PART OF A MINERAL RESOURCE WHICH IS WELL IDENTIFIED AS TO GRADE, LOCATION AND COST TO MINE AND WHICH CAN BE MINED AND PROCESSED PROFITABLY.

**RETURN WATER** — WATER RECOVERED FROM THE TAILINGS POND FOLLOWING TAILINGS DISPOSAL AND RETURNED TO THE CONCENTRATOR FOR REUSE.

**RIB** — THE WALLS OF ANY UNDERGROUND OPENING.

**RIG** — USUALLY REFERS TO A MOBILE DRILL SUCH AS USED IN EXPLORATION.

**RIGGING** — THE PLACEMENT OF CABLING OR CHAINS IN PREPARATION FOR LIFTING OF A HEAVY OR UNWIELDY OBJECT. GOOD RIGGING IS AN ART AND WAS USUALLY PERFORMED BY THE BULL GANG.

**RING** — A COMPLETE SET OF CRIBBING OR OTHER TIMBER, COVERING ALL SIDES, IN VERTICAL OR STEEPLY INCLINED OPENINGS SUCH AS RAISES OR SHAFTS.

**RING OFF** — WHEN A CAGER WAS READY TO SEND THE CAGE OR SKIP TO THE SURFACE OR SOME OTHER POINT WITHOUT BEING ABOARD, HE WOULD PULL THE SHAFT BELL ROPE WITH THE BELL SIGNALS OF WHERE HE WANTED THE CAGE OR SKIP TO GO AND OFF IT WOULD GO. THIS WAS RINGING OFF.

**RIP** — BREAKING GROUND BY USING A RIPPER ON THE BACK OF A BULLDOZER.

**RIPPER** — A LONG, TOOTH-LIKE SHANK PLACED AT THE REAR OF A BULLDOZER, WHICH IS FORCED INTO THE GROUND FOR THE PURPOSE OF BREAKING THE GROUND LOOSE AS THE DOZER MOVES FORWARD. IN HARD GROUND, A SINGLE SHANK WOULD BE USED, WHILE IN SOFTER MATERIAL, SUCH AS DUMPS, TWO OR THREE SHANKS COULD BE EMPLOYED.

**ROCK** — THE TERM IS USED TO REFER TO BROKEN MUCK, THE UNBROKEN ORE IN PLACE AS WELL AS THE ROCK MASS IN WHICH THE ORE IS HOSTED SUCH AS COUNTRY ROCK.

**ROCK BOLT** — 1). A STEEL BAR THAT IS INSERTED INTO PRE-DRILLED HOLES IN ROCK AND SECURED FOR THE PURPOSE OF GROUND CONTROL. ROCK BOLTS ARE CLASSIFIED ACCORDING TO THE MEANS BY WHICH THEY ARE SECURED OR ANCHORED IN ROCK. AT BISBEE, TWO GENERAL TYPES WERE USED: EXPANSION SHELL AND WEDGE. 2). THE ACT OF INSTALLING ROCK BOLTS.

**ROCK DRILL** — ANY OF THE PNEUMATIC DRILLS USED TO DRILL BLASTHOLES.

**ROCK DRILL OIL** — OIL MADE SPECIFICALLY FOR THE LUBRICATION OF THE MOVING PARTS OF ROCK DRILLS. IT IS CONSTANTLY INTRODUCED INTO THE COMPRESSED AIR STREAM IN MINOR AMOUNTS FROM AN INLINE, STEEL OILER CONNECTED TO THE AIR HOSE THAT DELIVERS AIR TO THE DRILL. BEFORE EVER TURNING THE DRILL ON, THE MINER MADE CERTAIN THE OIL BOTTLE WAS FULL AS THE LAST THING HE NEEDED WAS A ROCK DRILL THAT WOULD NOT FUNCTION.

**ROCK IN THE BOX** — THE PRINCIPAL FUNCTION OF MOST UNDERGROUND WAS TO PUT THE “ROCK IN THE BOX” MEANING THE CHUTE, CAR OR SKIP. “LET’S PUT THE ROCK IN THE BOX,” MEANT - LET US GET TO WORK.

**ROCKER DUMP** — A STYLE OF MINE CAR THAT IS DUMPED BY ROCKING IT TO GAIN MOMENTUM, AND THEN DUMPED BY TIPPING IN THE DIRECTION OPPOSITE THE WORKER.

**ROLL-YOUR-OWN** — HAND MADE CIGARETTES OF TOBACCO FROM A CAN OR POUCH (PRINCE ALBERT WAS A FAVORITE, THE EMPTY TINS WERE USEFUL FOR OTHER APPLICATIONS) ROLLED IN CIGARETTE PAPER. THESE WERE COMMON IN THE MINES FROM THE OUTSET. IN THE MID 1960S, THESE WERE THE ONLY FORM OF CIGARETTES ALLOWED BECAUSE OF FIRE CONCERNS. COMMERCIALY MADE (TAYLOR MADE) CIGARETTES WOULD CONTINUE TO BURN, WHEN DISCARDED OR LET UNATTENDED, ROLL-YOUR-OWN WERE HARD TO KEEP LIT, EVEN WHEN PUFFING AND WENT OUT QUICKLY WHEN DISCARDED.

**ROPE** — ALL LARGE STEEL CABLE WAS CALLED ROPE. THIS INCLUDED THE HOIST CABLE, FLAT OR ROUND, THUS THE ROPE SHOP WAS RESPONSIBLE FOR CARE AND MAINTENANCE OF THE HOIST CABLE.

**ROPE SHOP** — THIS SHOP WAS THE HOME TO THE VERY SMALL BUT IMPORTANT GROUP THAT WAS RESPONSIBLE FOR CARE AND MAINTENANCE OF THE HOIST CABLES AT ALL OF THE MINES, INCLUDING LUBRICATION AND CHANGING WHEN INDICATED. AS THIS WORK WAS SPORADIC, THE ROPE SHOP HAD MANY OTHER TASKS SUCH AS THE MAKING THE MANY THINGS OF CANVAS FOR THE MINES SUCH AS POWDER SACKS AND NAIL BAGS, POUCHES FOR ENGINEERS AND REPAIRING LAMP BELTS. ALL CABLE SLINGS, CABLE DOGS AND PIG TAILS WERE ASSEMBLED HERE AND THEN SENT TO THE BLACKSMITH SHOP FOR FINAL CRIMPING OF THE FERRULES (PIPE SLEEVES) USED TO HOLD THE EYES IN THE CABLE PRODUCTS. THEY DID ALL THINGS CABLE WITH THE EXCEPTION OF SLUSHER CABLES. SHOVEL BOOM AND HOIST CABLES WERE MADE TO SIZE HERE FROM USED HOIST CABLE AS WELL, BUT INSTALLED BY THE PIT SHOVEL REPAIR GANG.

**ROTARY DRILL** — A TYPE OF DRILL, WHICH MAKES HOLES BY ROTATING A RIGID, TUBULAR, STRING OF DRILL RODS TO WHICH IS ATTACHED A TRICONE BIT. THESE ARE COMMONLY EMPLOYED FOR DRILLING LARGE-DIAMETER BLASTHOLES IN OPEN PIT MINES AND WERE USED IN THE LAVENDER PIT.

**ROTATION HANDLE** — THE HORIZONTAL HANDLE ON THE NON-ROTATING STOPERS, BY WHICH THE MINER GAVE A DEGREE OF ROTATION TO THE DRILL BY ROTATING THE WHOLE MACHINE BACK AND FORTH, ABOUT 90° WITH THIS HANDLE.

**ROUND** — 1). A PLANNED PATTERN OF DRILL HOLES OR SERIES OF SHOTS INTENDED TO BE FIRED EITHER SIMULTANEOUSLY OR WITH DELAY PERIODS BETWEEN SHOTS. 2). ALSO, THE MUCK PILE OBTAINED WHEN THE ROUND IS BLASTED.

**ROUND TIMBER** — MINE TIMBER THAT IS ESSENTIALLY DEBARKED TREE TRUNKS AND, THUS ROUND IN CROSS SECTION. VERY LITTLE ROUND TIMBER WAS USED AT BISBEE, AS IT WAS VERY DIFFICULT TO FRAME FOR THE INTERLOCKING TIMBER SUPPORT SYSTEMS SO SUCCESSFULLY EMPLOYED.

**RUBY COPPER** — A NAME MINERS GAVE THE COPPER OXIDE MINERAL, CUPRITE, BECAUSE OF ITS DEEP RED COLOR.

**RUCKER TOP SLICE SYSTEM** — A VARIATION OF TOP SLICING USED TO MINE THE VERY LARGE DIVIDEND OREBODY ON THE RUCKER CLAIM. ALL OTHER MINING METHODS HAD FAILED TO SAFELY MINE THIS SOFT, CLAYEY OREBODY, DESPITE MORE THAN 25 YEARS OF TRYING. THE MINING SCHEME VARIED FOR CLASSIC TOP SLICING IN HOW THE CUTS WERE TAKEN AND THE USE OF INCLINED RAISES LEADING TO SCRAMS TO HANDLE THE STICKY ORES.

**RUN** — 1). THE PORTION OF THE MINE UNDER THE RESPONSIBILITY OF A SHIFT BOSS OR INSPECTED BY A FIRE BUG, OR MANAGED BY A MINING ENGINEER. IT WOULD TYPICALLY COVER SEVERAL LEVELS AND NUMEROUS WORKING AREAS. THE MINES WERE DIVIDED INTO SEVERAL RUNS AS THE WORK AREAS WERE OFTEN SCATTERED. 2). THIS TERM WAS ALSO USED TO DESCRIBE HOW WELL OR BADLY A PARTICULAR CHUTE MAY BE WORKING. IF IT WILL RUN, THE ROCK WILL FLOW FREELY, IF IT DOES NOT RUN, THE MUCK IS STICKY OR COMPOSED OF COURSE BOULDERS THAT MUST BE BARRED OR A BLOW PIPE USED TO MAKE IT RUN. 3). IN REFERENCE TO THE ORE GRADE, SUCH AS “THE FACE WILL RUN 3%.” THIS MEANS THE ORE GRADE OF THE FACE IS 3%. 4). TO ASSAY SUCH AS TO RUN THE SAMPLE.

**RUN-OF-MINE** — A TERM USED LOOSELY TO DESCRIBE ORE OF AVERAGE GRADE AND AVERAGE ROCK SIZE AS REMOVED FROM THE MINE.

**RUNNING GROUND** — UNCONSOLIDATED MATERIAL, WHICH WOULD FLOW LIKE DRY SAND INTO ANY OPENING. IT COULD ALSO BE VERY WET, SEMI-FLUID UNCONSOLIDATED MATERIAL, WHICH WOULD FLOW FLUID-LIKE. MINING THROUGH THIS TYPE OF MATERIAL WAS DIFFICULT, AS CLOSELY SPACED SPILING HAD TO BE DRIVEN ON TOP AND THE SIDES OF THE HEADING. ALL HOLES BETWEEN THE SPILING HAD TO BE COMPLETELY COVERED OR CHINKED WITH CLOTH. IT WAS EXTREMELY HAZARDOUS TO ALLOW THE MATERIAL TO RUN, AS AN UNSUPPORTED OPEN SPACE WOULD FORM OVER THE HEADING AND AT SOME POINT, IT WAS SURE TO COLLAPSE, BREAKING THE BACK TIMBER.

**RUSTLE** — TO LOCATE NEEDED TOOLS AND SUPPLIES AND BRING THEM TO THE WORKING FACE WHERE THEY WERE NEEDED. IN LARGE STOPING AREAS, IT WAS COMMON TO HAVE A MAN WHOSE SOLE RESPONSIBILITY WAS TO RUSTLE TOOLS AND TIMBER.

**RUSTLING** — THIS WAS THE PROCESS OF TRYING TO GET A JOB IN THE MINES. ONCE AN EMPLOYMENT APPLICATION WAS FILLED OUT, THE MAN WAS EXPECTED TO BE OUTSIDE OF THE EMPLOYMENT OFFICE EVERY MORNING AT 7:00 AM WHEN THE EMPLOYMENT AGENT WOULD APPEAR. HE WOULD SAY “NO ONE IS NEEDED TODAY” WHICH WAS EVER SO COMMON AND THE HOPEFUL WOULD LEAVE UNTIL THE NEXT DAY, OR HE WOULD CALL THE NAMES OF THOSE HE WANTED. IF A NAME WAS CALLED AND THE MAN WAS NOT PRESENT, ANOTHER NAME WAS CALLED UNTIL THE EMPLOYMENT AGENT HAD THE NUMBER OF MEN HE NEEDED. THIS IN ITSELF DID NOT MEAN A JOB; A PHYSICAL WAS TO BE TAKEN. AT THE EMPLOYMENT OFFICE, WEIGHT WAS CHECKED (115 POUNDS MINIMUM) AND EYESIGHT, WHICH HAD TO BE 20/30 OR BETTER WITHOUT GLASSES, AS GLASSES WERE NOT GENERALLY ALLOWED UNDERGROUND. I RECALL THE DAY I WAS HIRED AFTER ONLY A FEW WEEKS OF RUSTLING AND TRYING TO PUT ON WEIGHT. THE GUY NEXT TO ME IN THIS LONG, LONG LINE WAS ALSO CALLED. HE WAS AN EXPERIENCED MINER AND OVER THE WEEKS, WE HAD DEVELOPED A FRIENDSHIP, BUT HE HAD POOR EYE SIGHT AND WAS REJECTED. THE EMPLOYMENT AGENT SAID TO ME “THAT FELLA, COULD NOT SEE THE GROUND TO THROW HIS HAT AT.”

**S.W.** — THE SOUTHWEST MINE OR THE SOUTHWEST SHAFT.

**SAC** — A LOCAL SLANG TERM USED TO REFER TO THE SACRAMENTO SHAFT OR MINE. USUALLY USED AS “THE SAC.”

**SAC HILL** — 1). A REFERENCE TO SACRAMENT HILL. 2). A TERM USED TO REFER TO THE OPEN PIT OPERATIONS ON SACRAMENTO HILL OR THE SACRAMENTO PIT.

**SAC PIT** — AS WITH THE SACRAMENTO SHAFT, A SLANG TERM WAS USED FOR THE SACRAMENTO PIT WAS TYPICALLY REFERRED TO AS THE “SAC PIT.” SEE ALSO SAC HILL.

**SACRAMENTO STOCK** — THE MULTI-PHASE INTRUSIVE COMPLEX THAT FORMED SACRAMENTO HILL AND WHICH WAS THE HOST OF THE ORES MINED BY BOTH THE SACRAMENTO AND LAVENDER OPEN PIT MINES. IT WAS COMPOSED OF TWO DISTINCT INTRUSIVE PHASES AS WELL AS A LARGE INTRUSIVE BRECCIA.

**SADDLE** — A MOVEABLE AND ADJUSTABLE CLAMP TO HOLD A CARRIAGE IN WHICH THE PNEUMATIC DRILL WAS SET. THE SADDLE IS CLAMPED TO THE HORIZONTAL BAR, IN A BAR AND COLUMN DRILL SETUP.

**SAFETY CHAIN** — A CHAIN USED TO SECURE ONE ITEM TO ANOTHER AS A SAFETY MEASURE. SAFETY CHAINS WERE USED ON AIR HOSE CONNECTION TO MACHINERY TO PREVENT A LOOSE HOSE FROM WHIPPING ABOUT; ALSO ON DRILLS TO THE CARRIAGE WHEN TAKEN OUT OF THE SADDLE. TWIN, HEAVY SAFETY CHAINS WERE CLAMPED TO THE HOIST CABLE AND HOOKED TO THE CAGE IN THE EVENT THE SOCKET OR KING PIN BREAKS TO PREVENT A FALL OF THE CAGE. SEE ALSO WHIP CHECK.

**SAFETY COLLAR** — A CLAMP ON THE DRILL COLUMN SET UNDER THE BAR OR ARM TO KEEP IT IN PLACE WHILE SETTING UP AND DRILLING.

**SAFETY DOGS** — ALSO CALLED DOGS, THESE WERE HEAVY, CAM SHAPED STEEL MASSES WITH GEAR LIKE TEETH AND MOUNTED ON A SPRING LOADED SHAFT ON THE CAGE WHICH, IF THE ROPE BECAME SLACK, WOULD ROTATE AND THE TEETH WOULD DIG INTO THE SHAFT GUIDES AND STOP THE CAGE SLOWLY AND COMPLETELY. SLACK ROPE WOULD OCCUR IF THE ROPE BROKE OR IF THE CAGE BECAME WEDGED IN THE SHAFT.

**SAFETY FUSE** — A CORD-LIKE SUBSTANCE USED IN THE IGNITION OF EXPLOSIVES. BLACK POWDER IS ENTRAINED IN THE CORD AND, WHEN LIT, BURNS ALONG THE CORD AT A SET RATE

OF FEET PER MINUTE. SUCH A FUSE CAN BE SAFELY USED TO IGNITE A CAP, WHICH IS THE PRIMER FOR AN EXPLOSIVE. SEE ALSO FIRE FUSE AND FUSE.

**SAFETY MAN** — PERSON WHO CHECKS MINES TO DETERMINE THE SAFETY CONDITION OF WORKING AREAS, THE EQUIPMENT, VENTILATION, AND ELECTRICAL INSTALLATIONS AS WELL AS ASSURING THAT SAFE PRACTICES WERE BEING EMPLOYED IN THE WORK BEING PERFORMED.

**SAFETY MEETINGS** — EVERY DEPARTMENT HELD MONTHLY, HALF-HOUR SAFETY MEETINGS, WHICH WERE OBLIGATORY TO ATTEND. PERTINENT SUBJECTS WERE DISCUSSED AND RECENT ACCIDENTS REVIEWED WITH THE HOPE OF PREVENTING A REOCCURRENCE. THESE WERE GOOD AND EFFECTIVE MEETINGS, IN MY VIEW.

**SAFETY SCREENING** — HEAVY WIRE SCREENING SECURED TO THE SLUSHER STAND, IN FRONT OF THE SLUSHER AND BETWEEN THE RAKE TO PROTECT THE OPERATOR FROM A BROKEN CABLE SNAPPING BACK. ALSO CALLED A BACKLASH SCREEN.

**SAGGING GROUND** — AN AREA WHERE DOWNWARD PRESSURE FROM THE ROCK HAS DEFORMED, BROKEN OR DISPLACED THE CAPS GIVING A SAGGING APPEARANCE.

**SAGINAW** — 1). THE SAGINAW SHAFT, AN UNSUCCESSFUL MINE WHICH ULTIMATELY WAS USED SOLELY FOR VENTILATION. 2). THE SUBURB OF LOWELL CREATED, WHEN HOUSES WERE MOVED FROM THE AREA OF THE LAVENDER PIT TO ALLOW FOR MINING.

**SALARIED EMPLOYEE** — THE MANAGEMENT, CLERICAL AND TECHNICAL STAFF WERE CLASSIFIED AS SALARIED EMPLOYEES BECAUSE OF THEIR MANAGERIAL FUNCTIONS. ALL OTHERS WERE CLASSIFIED AS DAY'S PAY EMPLOYEES.

**SAMPLE CAR** — ALL SAMPLES FROM THROUGHOUT THE MINE WERE BROUGHT TO THE SHAFT STATION BY THE MOTOR CREWS. AFTER THE SHIFT HAD BEEN HOISTED, THE CAGER PUT A SPECIAL CAR ON THE CAGE AND WENT TO COLLECT THE SAMPLES FROM ALL OF THE ACTIVE LEVELS. THE CAR WAS THEN TAKEN TO THE SURFACE WHERE A DRIVER COLLECTED THE SAMPLES FROM THE SAMPLE CAR FOR TRANSPORT TO THE SAMPLE MILL.

**SAMPLE MILL** — ALL SAMPLES WERE TAKEN TO THE SAMPLE MILL FOR DRYING THEN CRUSHING AND PULVERIZATION, FOR EASY CHEMICAL DIGESTION DURING ASSAY. THIS FACILITY WORKED ONLY NIGHTS AND GRAVEYARDS AS THE SAMPLES HAD TO BE READY FOR THE ASSAY OFFICE BY 6:00 AM EVERY MORNING.

**SAMPLE** — 1). REPRESENTATIVE FRACTION OF A BODY OF MATERIAL; REMOVED BY APPROVED METHODS AND TESTED OR ANALYZED TO DETERMINE THE NATURE, COMPOSITION, PERCENTAGE OF SPECIFIED CONSTITUENTS. 2). TO TAKE A SAMPLE, SUCH AS TO SAMPLE A FACE.

**SAMPLE HAMMER** — THE SMALL PICK, WITH ONE BLUNT, FLAT, END, USED BY GEOLOGIST, MINING ENGINEERS AND SHIFT BOSSES TO CHIP SAMPLES FROM THE WORKING FACE OR THE RIBS. ALSO CALLED A PROSPECT PICK.

**SAMPLE RETURNS** — THE ASSAY RESULTS FROM THE SAMPLES SUBMITTED FOR ASSAY.

**SAMPLE SACK** — A CANVAS SACK MADE SPECIFICALLY FOR SAMPLING. TWO SIZES WERE COMMONLY USED. ONE WITH A CAPACITY OF TWO POUNDS OF MATERIAL USED FOR GRAB OR CHIP SAMPLES AND A LARGER, 25 POUND SIZE USED FOR TAKING BULK SAMPLES OF SEVERAL TRAINS OR A SHIFT OF ORE FROM A STOPE.

**SAMPLE SHEET** — THE DAILY SHEET FROM THE ASSAY OFFICE WITH ALL OF THE SAMPLE RETURNS FROM THE PREVIOUS DAY'S SAMPLES. THIS SHEET WAS WIDELY DISTRIBUTED SO THAT ALL OF THE SUPERVISORY AND TECHNICAL STAFF WOULD BE AWARE OF THE ASSAYS FROM ALL OF THE WORKING PLACES, NOT ONLY THE SAMPLES THEY MAY HAVE SUBMITTED. AN UNUSUALLY HIGH-GRADE SAMPLE ON THE SHEET WOULD GUARANTEE EITHER A CALL OR VISIT BY THE MINE SUPERINTENDENT TO FIND OUT THE DETAILS.

**SAMPLE SPLITTER** — A DEVICE FOR SEPARATING DRY INCOHERENT MATERIAL (SUCH AS PULVERIZED MATERIAL) INTO EQUAL, TRULY REPRESENTATIVE SAMPLES OF WORKABLE SIZE FOR LABORATORY STUDY.

**SAMPLE TAG** — THE PAPER TAG INSERTED IN THE SAMPLE BAG AT THE TIME OF COLLECTION INDICATING THE DATE, SAMPLER'S NAME, WORKING PLACE AND THE ELEMENTS TO BE ASSAYED.

**SAMPLER** — ON THE SURFACE, A PERSON ASSIGNED TO TAKE SAMPLES FROM THE PROSPECT CHURN DRILL CUTTINGS AT APPROPRIATE INTERVALS AND IN APPROPRIATE QUANTITIES TO BE REPRESENTATIVE OF THE INTERVAL BEING DRILLED AT THAT MOMENT IN TIME.

**SAND FILL** — HYDRAULIC BACKFILLING OR GOBBING OF UNDERGROUND WORKINGS USING DE-SLIMED, DE-PYRITIZED MILL TAILINGS. SAND FILL GOBBING BEGAN IN BISBEE IN THE EARLY 1960S AND WAS USED IN ALL BUT THE MOST BROKEN OF GROUND.

**SAND LINE** — THE STEEL PIPE LINE USED TO BRING THE TREATED MILL TAILINGS USED FOR GOBBING INTO THE MINE AS WELL AS THE MANY DISTRIBUTION LINES ON EACH ACTIVE LEVEL.

**SAND PLANT** — A FACILITY THAT IS DESIGNED TO SEPARATE THE SLIMES AND PYRITE FROM CONCENTRATOR TAILINGS AND RECOVER THE COURSE FRACTION FOR USE IN SAND FILL GOBBING. PYRITE WAS REMOVED AT BISBEE'S SAND PLANT TO REDUCE THE CHANCE OF A SULFIDE MINE FIRE IN THE GOB.

**SAND THE RAILS** — THE SPRINKLING OF SAND ON THE MINE RAILS TO INCREASE THE TRACTION BETWEEN THE MOTOR'S WHEELS AND THE RAIL. THIS WAS USUALLY NECESSARY WITH STEEP GRADES AND WET RAILS.

**SAND TRUCK**— A SINGLE SAND PLANT WAS BUILT AT THE CAMPBELL TO PROVIDE SAND FILL GOB FOR ALL THE MINES. A 25-TON CAPACITY, MACK HAUL TRUCK, USED EARLY ON IN THE LAVENDER PIT, WAS CONVERTED TO TRANSPORT SAND TO THE OTHER MINES. THE TRUCK WAS FITTED WITH A COMPRESSOR TO PUSH AIR THROUGH THE LOAD AND KEEP THE SAND FROM SETTLING IN THE TRUCK BEFORE IT WAS DELIVERED TO THE RECEIVING PLANT AT THE COLE MINE.

**SANDERS** — SMALL CONTAINERS ON FRONT AND BACK SIDE EDGES OF THE WHEELS ON MOTORS, INTO WHICH DRY SAND IS KEPT TO SPRINKLE ON THE RAILS BY THE MOVEMENT OF A LEVER IN THE OPERATOR'S CAB, WHEN TRACTION IS NEEDED.

**SANITARY NIPPER** — THE INDIVIDUAL TASKED WITH THE HUMBLE, BUT IMPORTANT JOB OF MAINTAINING THE UNDERGROUND TOILET CARS.

**SAW FILING SHOP** — THIS SMALL SHOP WAS AFFILIATED WITH THE CARPENTER SHOP. SAWS AS WELL AS AXES WERE SHARPENED HERE, BY SKILLED HANDS AND WITH TRAINED EYES TO MAKE SURE THE SET ON THE SAW TEETH WAS JUST RIGHT. ALSO, THE MANY HAND TOOLS USED UNDERGROUND EVENTUALLY RETURNED TO THE SURFACE FOR REPAIR AND MOST

WITH WOODEN HANDLES NEEDED EITHER REPLACED OR SANDED TO REMOVE SPLINTERS. NUMEROUS PICKS, DOUBLE JACKS AND SMALL HAMMERS FLOWED THROUGH THIS SHOP ON THEIR WAY TO THE BLACKSMITHS SHOP FOR SHARPENING AND DRESSING, THEN BACK UNDERGROUND.

**SCAB** — 1). TO NAIL A LAGGING ONTO A POST TO SUPPORT A SECOND PIECE OF TIMBER SUCH AS A FALSE CAP. 2). TO ATTACH ANY TWO THINGS TOGETHER WITH PIECES OF WOOD SUCH AS TWO LADDERS CONNECTED TOGETHER BY NAILING BOARDS ON THE SIDES OF EACH AT THE POINT THEY JOIN. 3). A TERM COMMONLY USED BY STRIKING WORKERS TO NEGATIVELY DESCRIBE ANYONE WHO WOULD NOT SUPPORT THEIR STRIKE.

**SCALING** — REMOVAL OF LOOSE ROCK FROM THE ROOF OR WALLS. THIS WORK IS DANGEROUS AND A LONG BAR (CALLED A SCALING BAR) IS OFTEN USED. SEE ALSO BARRING DOWN.

**SCALING BAR** — A LONG, HEXAGONAL STEEL BAR WITH A SLIGHT BEND IN THE TAPERED END AND USED FOR REMOVING LOOSE ROCK FROM THE BACK OR RIBS (SCALING OR BARRING DOWN). BY THE MID-1960S, THESE BARS WERE MADE OF ALUMINUM WITH A TAPERED STEEL POINT, WHICH GREATLY REDUCED THE WEIGHT OF THIS VITAL TOOL. ALSO CALLED A PINCH BAR.

**SCHIST** — A REFERENCE TO THE PINAL SCHIST, THE PRECAMBRIAN BASEMENT ROCK UNIT AT BISBEE.

**SCONCE** — A CAST IRON CANDLE HOLDER TO BE NAILED TO OR SET ON TIMBER WHERE THE CANDLE CAN BURN WITHOUT SETTING THE TIMBER ON FIRE. THESE WERE A COPPER QUEEN CONSOLIDATED MINING COMPANY EXCLUSIVE ITEM, DEVELOPED IN AN EFFORT TO REDUCE THE NUMBER OF MINE FIRES CAUSED BY CANDLE SNUFFS LEFT BURNING AND UNATTENDED.

**SCORIFICATION** — THE SEPARATION OF GOLD OR SILVER BY HEATING IT TO A HIGH TEMPERATURE WITH A LARGE AMOUNT OF GRANULATED LEAD ALONG WITH A LITTLE BORAX, IN A SCORIFIER. THE GOLD OR SILVER DISSOLVES IN THE MOLTEN LEAD, WHICH SINKS TO THE BOTTOM OF THE VESSEL, WHILE THE IMPURITIES FORM A SLAG WITH THE LEAD OXIDE THAT IS PRODUCED.

**SCOTT TRUCK** — ALSO OFTEN CALLED THE SCOTT CAR, IT WAS SPECIAL TYPE OF TIMBER TRUCK, WHICH ALLOWED THE FRAMED TIMBER TO BE CHAINED SECURELY TO THE TRUCK AT THE FRAMING SHOP, AND THEN TRANSPORTED TO THE APPROPRIATE MINE, STILL CHAINED TO THE SCOTT TRUCK. THE WHOLE TRUCK, WITH TIMBER WAS THEN LOADED, VERTICALLY, ONTO THE CAGE. SMALL WHEELS ON THE END OF THE SCOTT TRUCK ALLOW FOR IT TO ROLL FORWARD ONTO THE STATION AS THE CAGE WAS SLOWLY LOWERED, STILL FULLY LOADED WITH TIMBER. THIS WAS AN EFFORT TO REDUCE THE HANDLING OF INDIVIDUAL PIECES OF TIMBER WHEN LOWERED DOWN THE SHAFT BY BOTH THE TOP CAGER AND THEN BY THE BOTTOM CAGER AS WELL AS THE MOTOR CREW.

**SCRAM** — UNDERGROUND DRIVE ABOVE THE HAULAGE LEVEL, ALONG WHICH ORE OR WASTE IS MOVED BY SLUSHERS TO A DISCHARGE CHUTE FOR DIRECT LOADING INTO MINE CARS BY A SLUSHER. ONE SUCH FACILITY WAS ON THE 1400 LEVEL COLE WHERE WASTE WAS LOADED INTO GRANBY TYPE CARS BY A SLUSHER, FOR HAULAGE TO THE DALLAS. IN THE DIVIDEND SLICE OF THE CZAR MINE, THESE WERE ALSO CALLED POCKETS.

**SCRAPER** — A COMMONLY USED EARLY TERM FOR SLUSHERS.

**SCREW-OFF BIT** — A DETACHABLE DRILL BIT FOR PNEUMATIC DRILLS, WHICH COULD BE SCREWED OFF OF THE DRILL STEEL WHEN DULL. THE EARLY PNEUMATIC DRILLS USED INTEGRAL STEEL, DRILL STEEL, WHICH HAD THE BIT FORMED ON ONE END OF THE STEEL. RESHARPENING WAS A CONSTANT PROCESS, AS THE TEMPERED STEEL BIT END WOULD DULL QUICKLY, OFTEN IN DRILLING ONLY A PART OF A SINGLE ROUND. SEVERAL SETS OF DRILL STEEL COULD EASILY BE USED PER SHIFT AND ALL HAD TO BE SENT TO THE BLACKSMITH SHOP FOR SHARPENING AND RE-TEMPERING. COLLECTIVELY, THIS AMOUNTED TO A HUGE AMOUNT OF DRILL STEEL TO BE GATHERED FROM A LARGE MINE. A GREAT ADVANCE WAS THE DETACHABLE BIT AS ONLY THE USED BITS NEEDED TO BE HANDLED. THE FIRST DETACHABLE BITS WERE COURSE THREAD SCREW-OFF TYPES.

**SECONDARY BLASTING** — IRRESPECTIVE OF THE METHOD OF PRIMARY BLASTING EMPLOYED, IT WAS ALWAYS NECESSARY TO REBLAST A SMALL PROPORTION OF THE ROCK ON THE OPEN PIT FLOOR. LARGE BOULDERS FOR EXAMPLE, SO AS TO REDUCE THEM TO A SIZE SUITABLE FOR HANDLING BY THE SHOVELS AND THEN BY CRUSHERS. ALSO, HARD TOES IN THE DIGGING PITS HAD TO BE REBLASTED. ALL WERE DRILLED BY SMALL, MOBILE OR HAND HELD DRILLS AND LOADED WITH EXPLOSIVES TO BE SHOT AT THE END OF THE SHIFT WITH THE OTHER PIT BLAST.

**SECONDARY CRUSHER** — CRUSHING AND PULVERIZING MACHINES NEXT IN LINE AFTER THE PRIMARY CRUSHING TO FURTHER REDUCE THE PARTICLE SIZE OF THE ORE. FEED FOR THE SECONDARY CRUSHERS CAME FROM THE COURSE ORE STOCK PILE. THE DISCHARGE WENT TO THE FINE ORE STORAGE BINS TO FEED THE BALL MILLS.

**SECONDARY ENRICHMENT** — A MINERAL DEPOSITION PROCESS IN WHICH NEAR-SURFACE OXIDATION PRODUCES ACIDIC SOLUTIONS THAT LEACH METALS, CARRY THEM DOWNWARD, AND REPRECIPITATE THEM ON OTHER SULFIDE MINERALS, THUS ENRICHING SULFIDE MINERALS ALREADY PRESENT. THIS WAS THE PROCESS THAT MADE THE OTHERWISE LOW-GRADE PORPHYRY MINERALIZATION IN THE TWO PITS ECONOMIC, IT HAD BEEN SUPERGENE ENRICHED. ALSO CALLED SUPERGENE ENRICHMENT.

**SECONDARY MINERALS** — A MINERAL FORMED LATER THAN THE ROCK ENCLOSING IT, USUALLY AT THE EXPENSE OF AN EARLIER-FORMED PRIMARY MINERAL, AS A RESULT OF WEATHERING (OXIDATION), METAMORPHISM, OR EXSOLUTION. SECONDARY MINERALS WERE FORMED THROUGH OXIDATION WERE ABUNDANT AND WIDELY DISTRIBUTED AT BISBEE AND RESULTED IN HIGHER COPPER GRADES IN SOME AREAS SUCH AS BOTH THE LAVENDER AND SACRAMENTO PIT ORES.

**SECTIONAL SET** — TIMBER SETS MADE FROM SEVERAL SECTIONS WHICH WHEN FITTED TOGETHER WILL SUPPORT A WIDE SPACE. SEE ALSO SEGMENTED SETS.

**SEGMENTED SETS** — TIMBER SETS WHICH ARE COMPOSED OF SEVERAL PIECES THAT ARE SET AT DIFFERENT ANGLES TO BE JOINED TOGETHER AND TO ARCH OVER A BROAD OPENING SUCH AS A SHAFT STATION. SEE ALSO SECTIONAL SETS.

**SELECTIVE MINING** — THE OBJECT OF SELECTIVE MINING IS TO OBTAIN A RELATIVELY HIGH-GRADE OR CLEAN MINE PRODUCT; THIS USUALLY ENTAILS THE USE OF A MUCH MORE EXPENSIVE STOPING SYSTEM AND HIGH EXPLORATION AND DEVELOPMENT COSTS IN SEARCHING FOR AND DEVELOPING THE SEPARATE DEPOSITS, STRINGERS OR BANDS OF ORE.

**SELF RESCUER** — A SMALL RESPIRATOR-LIKE DEVICE CARRIED BY ALL UNDERGROUND EMPLOYEES UNDERGROUND AT BISBEE FROM THE MID-1960S. IT WAS PLACED ON THE LAMP BELT TO PROVIDE THE WORKER WITH IMMEDIATE PROTECTION AGAINST CARBON MONOXIDE

AND SMOKE IN CASE OF A MINE FIRE OR EXPLOSION. IT CONTAINS A GRANULATED CHEMICAL, WHICH CONVERTS THE TOXIC CARBON MONOXIDE TO HARMLESS CARBON DIOXIDE. THE DEVICE IS USED FOR ESCAPE PURPOSES ONLY BECAUSE IT DOES NOT SUSTAIN LIFE IN ATMOSPHERES CONTAINING DEFICIENT OXYGEN. THE LENGTH OF TIME A SELF-RESCUER CAN BE USED IS GOVERNED MAINLY BY THE HUMIDITY IN THE MINE AIR; E.G., IN MOIST AIR IT WILL LAST FOR A MINIMUM PERIOD OF 30 MIN, AND IN MODERATELY DRY ATMOSPHERES, FOR A PERIOD OF ONE HOUR OR MORE.

**SERVICE COMPARTMENT** — ONE COMPARTMENT IN MOST SHAFTS WAS DEDICATED TO BRINGING IN THE NECESSARY SERVICES SUCH AS WATER, COMPRESSED AIR, AND ELECTRICAL POWER AS WELL AS OFTEN CONTAINING THE PUMP COLUMN. SEE ALSO PIPE COMPARTMENT.

**SERVICE HOIST** — A TYPICALLY SMALL HOIST USED FOR ACCESS TO THE SERVICE COMPARTMENT FOR THE INSTALLATION AND MAINTENANCE OF THE VARIOUS PIPE COLUMNS AND POWER CABLES. SEE ALSO DINKY HOIST.

**SET HANGERS** — SHORT LENGTHS OF CABLE FITTED WITH FORGED SPIKES AT EACH END, WHICH ARE AT RIGHT ANGLES TO THE CABLE AXIS. THEY ARE USED TO HANG SETS OR OTHER TIMBER. BY DRIVING THE SPIKED END INTO THE TIMBER TO BE SUPPORTED AND A FIXED PIECE OF TIMBER, THE CABLE WILL SUPPORT THE WEIGHT OF THE SET. SEE ALSO CABLE DOGS.

**SET(S)** — THE TIMBERS COMPOSING ANY FRAMING, WHETHER USED IN A SHAFT, STOPE, DRIFT, CROSSCUT, OR RAISE. THUS, THE FOUR PIECES FORMING A SINGLE COURSE IN THE CURBING OF A SHAFT, OR THE THREE OR FOUR PIECES FORMING THE LEGS AND COLLAR, AND SOMETIMES THE SILL, OF AN ENTRY FRAMING ARE TOGETHER CALLED A SET, OR TIMBER SET. A DRIFT SET CONSIST OF THE TWO POSTS, THE CAP, TWO COLLAR BRACES, TWO SPREADERS AS WELL AS BACK AND SIDE LAGGING.

**SETUP** — IN DRILLING, LOCATION OF MACHINE, IN MINING, TO GATHER THE NECESSARY TOOLS AND COMPLETE ALL WORK PREPARATORY TO DRILLING.

**SHAFT** — A VERTICAL OR STEEPLY INCLINED EXCAVATION OF LIMITED AREA COMPARED WITH ITS DEPTH; MADE FOR FINDING OR MINING ORE, RAISING ORE, WASTE, HOISTING AND LOWERING WORKERS AND MATERIAL, OR VENTILATING UNDERGROUND WORKINGS. THE TERM IS OFTEN SPECIFICALLY APPLIED TO A VERTICAL SHAFT, AS DISTINGUISHED FROM AN INCLINE OR INCLINED SHAFT. A SHAFT IS PROVIDED WITH A HOISTING ENGINE AT THE TOP FOR HANDLING WORKERS, ROCK, AND SUPPLIES; OR IT MAY BE USED ONLY IN CONNECTION WITH PUMPING OR VENTILATING OPERATIONS.

**SHAFT BELL** — THE BELL ROPE JUST INSIDE OF THE SHAFT, WHICH IS ONLY USED TO SIGNAL THE HOIST ENGINEER TO MOVE THE CAGE OR SKIP. IT WAS ONLY TO BE USED BY THE CAGER OR OTHER QUALIFIED AND CERTIFIED PERSONNEL SUCH AS CERTAIN MAINTENANCE PERSONS PERFORMING THEIR TASK ON THE CAGE, HOIST CABLE OR HOIST.

**SHAFT BOARD** — SPECIAL BOARDS WERE USED FOR WORKING OVER THE SHAFT. THESE WERE SIX FEET LONG, 12 INCHES WIDE, TWO INCHES THICK, BUT REINFORCED WITH STEEL RODS RUNNING THE LENGTH AND STEEL CAPS ON EACH TO WHICH THE REINFORCING RODS WERE ATTACHED. THIS DESIGN GAVE A LIGHT WEIGHT BOARD, WHICH WOULD NOT FAIL WHEN TWO MEN STOOD ON IT. NORMAL SAFETY PROCEDURES REQUIRED EITHER A THREE INCH THICK BOARD OR A DOUBLE THICKNESS OF TWO INCH FOR WORK OVER OPEN HOLE; THIS DESIGN COMPENSATED FOR THE THINNER BOARD, AND WAS EASIER AS WELL AS SAFER TO PLACE OVER THE SHAFT.

**SHAFT CIRCLE** — AN AREA SURROUNDING THE SHAFT FROM WHICH NO ORE COULD BE STOPPED REGARDLESS OF THE CIRCUMSTANCES, TO PROTECT THE SHAFT FROM MOVEMENT. SEE ALSO SHAFT PILLAR.

**SHAFT DIVIDER** — THE TIMBER OR CONCRETE WALL SEPARATING THE COMPARTMENTS IN A SHAFT.

**SHAFT DIVERSION DOOR** — TO PREVENT SPILLAGE FROM THE LOADING OF SKIPS FALLING INTO THE SHAFT SUMP, EACH SKIP COMPARTMENT AT ALL OF THE MINES THAT USED SKIPS HAD HEAVY, INCLINED, DIVERSION DOORS BELOW THE LAST SHAFT POCKET WHICH CAPTURED ALL SPILLAGE AND CHANNELED IT TO AN EASILY ACCESSIBLE SPOT BEHIND THE SHAFT FOR EASY CLEANUP. THESE MASSIVE, HINGED DOORS WERE LOWERED FROM THE SHAFT WALL BEFORE SKIP LOADING BEGAN AND RAISED WHEN SKIPS WERE NO LONGER BEING LOADED. THE HOISTMAN PLACE A SMALL SIGN IN HIS LINE OF SIGHT TO REMIND HIM NOT TO TRY TO LOWER THE CAGE BELOW THIS POINT. ALSO CALLED SPILL DOORS.

**SHAFT GATE** — A GATE OR BAR TO PREVENT SOMEONE OR SOMETHING FROM FALLING INTO THE SHAFT.

**SHAFT GUIDES** — HEAVY WOODEN OR STEEL RUNNERS PRECISELY SET AND JOINED ON THE SHAFT COMPARTMENT WALLS. THESE FIT IN CHANNELS (SHOES) ON EITHER SIDE OF THE CAGE AND KEPT IT CENTERED IN THE SHAFT AS WELL AS LIMITING ANY HORIZONTAL MOVEMENT TO A FEW FRACTIONS OF AN INCH. THE WOODEN GUIDES WERE MADE OF WELL CURED HARD MAHOGANY. THEY WERE CHECKED FOR ALIGNMENT AND GREASED BY HAND ON A REGULAR BASIS.

**SHAFT HANGERS** — STEEL RODS WITH A “J” HOOK ON ONE END AND THREADED ON THE OTHER OF A COMBINED LENGTH EQUAL TO THE DISTANCE BETWEEN SHAFT SETS PLUS THE THICKNESS OF TWO OF THE WALL PLATES. HOLES ARE DRILLED IN THE WALL PLATE ABOVE AND THE FIRST ROD PUT THROUGH AND A WASHER PLACED OVER THE ROD AND THE NUT HAND-TIGHTENED. WHEN THE CORNER POST AND END PLATES ARE IN POSITION, THE SECOND ROD IS HOOKED INTO THE J HOOK AND PASSED THROUGH THE HOLE IN THE LOWER WALL PLATE, THEN TIGHTENED UNTIL ALL THE TIMBER IS SECURE.

**SHAFT HOUSE** — ALL OF THE EARLY MINE HEADFRAMES WERE TOTALLY ENCLOSED INSIDE OF LARGE BUILDINGS THAT ALSO CONTAINED THE HOIST. THE LARGE BUILDING WAS CALLED THE SHAFT HOUSE. THIS FORM OF CONSTRUCTION CAME WITH MINING ENGINEERS FROM THE VERY COLD ENVIRONMENTS OF NORTHERN MICHIGAN AND CORNWALL, ENGLAND. NO SHAFT HOUSES WERE CONSTRUCTED AFTER 1900. ALSO CALLED ENCLOSED HEADFRAME.

**SHAFT PILLAR** — THE BLOCK OF GROUND CONTAINING THE SHAFT, WHICH WAS OFF LIMITS TO MINING EXCEPT FOR ACCESS DEVELOPMENT. SEE ALSO SHAFT CIRCLE.

**SHAFT PAY** — AS WORKING OVER OPEN SHAFTS WAS MORE HAZARDOUS, ANYONE WHO ENGAGED IN SUCH WORK WAS PAID A PREMIUM ON HIS STANDARD WAGE.

**SHAFT POCKET** — LOADING POCKETS OF ONE OR MORE COMPARTMENTS FOR ORE AND FOR WASTE BUILT SOMEWHAT BELOW THE SHAFT STATIONS. THEY ARE CUT INTO THE WALLS ON ONE OR BOTH SIDES OF A VERTICAL SHAFT.

**SHANK** — *1).* TO BREAK A DRILL STEEL AT THE POINT WHERE THE STEEL FITS INTO THE DRILL. THIS WAS A COMMON OCCURRENCE AS IT WAS A WEAK POINT IN ALL STEELS BECAUSE THERE WAS A COLLAR AT THIS PART OF THE STEEL, WHICH WAS FREQUENTLY REFORMED

DURING MAINTENANCE, WHICH CAUSED IT TO BECOME BRITTLE. 2). IT IS ALSO THAT PART OF THE DRILL STEEL THAT FITS IN THE DRILL AND OFTEN HAD A FORMED COLLAR.

**SHATTUCK** — THE SHATTUCK MINE.

**SHATTUCK CAVE** — THIS WAS THE LARGEST AND PERHAPS THE MOST NOTED OF THE MANY OXIDATION CAVES HIT DURING MINING AT BISBEE. THIS CAVE WAS FIRST DISCOVERED IN 1913 WHEN AN EXPLORATION DRIFT ON THE 300 LEVEL HIT THE BOTTOM OF THE CAVE. FOR A WHILE, VISITORS WERE PERMITTED TO ENTER THE CAVE, BUT NOT ALLOWED TO REMOVE SPECIMENS. HOWEVER, IN A FEW YEARS, IT BECAME NECESSARY TO CLOSE THE CAVE BECAUSE OF NEARBY MINING AT WHICH TIME A GOOD MANY SPECIMENS WERE REMOVED AND GIVEN TO MUSEUMS.

**SHATTUCK DENN** — 1).THE SHATTUCK DENN MINING COMPANY WHICH WAS FORMED IN 1925 THROUGH THE MERGER OF THE SHATTUCK AND ARIZONA COPPER COMPANY AND THE DENN AND ARIZONA COPPER COMPANY. 2). OFTEN, THE DENN MINE WAS REFERRED TO AS THE SHATTUCK DENN.

**SHEAVE BLOCK** — 1). GENERALLY, A SINGLE WHEEL, PULLEY BLOCK IN A METAL FRAME USED IN SLUSHER MUCKING. ALSO CALLED A SKOOKUM BLOCK OR SLUSHER BLOCK. 2). A SHEAVE BLOCK MAY ALSO REFER THE GUARDED PULLEY, SET AT THE TOP OF A RAISE THROUGH WHICH A SMALL DIAMETER CABLE IS PASSED FOR THE PURPOSE OF HOISTING TIMBER OR SUPPLIES TO THE WORK AREA.

**SHEAVE LINER** — SHEAVE WHEELS WERE LINED WITH REPLACEABLE STEEL PLATES TO KEEP THE SHEAVE FROM WEARING.

**SHEAVE WHEEL** — THE LARGE, GROOVED WHEEL ON THE TOP OF THE HEADFRAME OVER WHICH THE HOIST ROPE PASSES. SOMETIMES CALLED BULL WHEEL.

**SHIFT** — 1). A DESIGNATED PERIOD OF WORK, USUALLY LASTING EIGHT HOURS. 2). A COLLECTIVE TERM FOR THE GANG OF WORKERS EMPLOYED FOR THE PERIOD, SUCH AS THE DAY SHIFT OR THE NIGHT SHIFT. 3). ALSO THE WORK PERIOD AS TO PUT IN A SHIFT.

**SHIFT BOSS** — THE SUPERVISOR DIRECTLY RESPONSIBLE FOR THE EMPLOYEES ON A SHIFT AND WORKING ON HIS RUN (AREA OF RESPONSIBILITY). THE UNDERGROUND MINES HAD BECOME SO LARGE THAT THEY WERE DIVIDED INTO MANAGEABLE AREAS OR RUNS FOR WHICH THE SHIFT BOSS WAS RESPONSIBLE. IN FACT, THE UNDERGROUND SHIFT BOSS WAS MORE OF A COORDINATOR THAN A BOSS IN THAT HIS RESPONSIBILITIES WERE PRIMARILY TO SEE THAT EACH WORK PLACE HAD ALL OF THE SUPPLIES AND SERVICES IT NEEDED TO DO ITS WORK PROPERLY.

**SHIFT CHANGE** — THE TIME AT WHICH THE WORK SHIFTS CHANGE AND ONE CREW REPLACES ANOTHER. BLASTING ALWAYS TOOK PLACE AT "SHIFT CHANGE" AS NO ONE WAS IN THE WORK AREAS. ALSO, MINOR REPAIR WORK ON EQUIPMENT WAS PERFORMED DURING "SHIFT CHANGE" TO MINIMIZE ANY LOST TIME.

**SHIFT DIFFERENTIAL** — A MINOR ADDITION TO THE HOUR RATE PAID EMPLOYEES WHO WORKED NIGHT SHIFT OR GRAVEYARD, WITH THE GRAVEYARD SHIFT RECEIVING A BIT MORE THAN NIGHT SHIFT.

**SHIFT ROTATION** — THE CHANGE FROM ONE SHIFT TO ANOTHER AS A FUNCTION OF THE NORMAL ROTATION. IN BOTH THE SURFACE AND UNDERGROUND, SHIFT ROTATION TOOK PLACE EVERY TWO WEEKS. THE UNDERGROUND WORKFORCE WOULD ROTATE FROM DAYSHIFT TO

NIGHT SHIFT AND VICE VERSA. IN THE PIT AND CONCENTRATOR, THE ROTATION WAS FROM DAYSHIFT TO GRAVEYARD AND FROM GRAVEYARD TO NIGHTSHIFT AND NIGHTSHIFT TO DAYSHIFT. THE CHANGE TOOK PLACE AT THE END OF SHIFT EVERY OTHER SATURDAY.

**SHIFTER** — A SHIFT BOSS.

**SHOE LINER** — STEEL LINER PLATES BOLTED INSIDE OF THE CAGE SHOES TO ASSUME THE WEAR FROM THE CONSTANT CONTACT AND MOVEMENT AGAINST THE SHAFT GUIDES.

**SHOOT** — TO SET OFF A BLAST.

**SHORT CHANGE** — IN THOSE AREAS WHERE 24 HOUR, SEVEN DAYS A WEEK COVERAGE WAS NEEDED AND THE OPERATION WORKED THREE SHIFTS, SUCH AS THE OPEN PIT AND CONCENTRATOR WHICH WORKED A 26 DAY ON AND A TWO DAY OFF ARRANGEMENT, THE ROTATION FROM NIGHT SHIFT TO DAY SHIFT WAS A SHORT CHANGE AS ONLY EIGHT HOURS WAS BETWEEN THE TWO SHIFTS. LEAVING NIGHT SHIFT AT 11:00 PM, SHOWERING AND CHANGING CLOTHS, DRIVE HOME AND BE BACK AT WORK, AND READY AT 7:00 AM THE NEXT MORNING MEANT A MAXIMUM OF SIX HOURS SLEEP. FOR THE UNDERGROUND MINERS, A SHORT CHANGE WAS COMING OFF NIGHT SHIFT AT MIDNIGHT SATURDAY AND REPORTING TO DAYSHIFT MONDAY MORNING AT 7:00 AM.

**SHOT** — 1). A BLAST 2). TO HAVE BEEN BLASTED.

**SHOVEL REPAIR CREW** — THE WORK CREW THAT SPECIALIZED IN REPAIRING THE ELECTRIC SHOVELS IN THE LAVENDER PIT.

**SHOVEL** — 1). UNDERGROUND, A HAND SHOVEL. 2). THE ACT OF SHOVELING. 3). IN THE OPEN PIT, THE ELECTRIC OR STEAM SHOVELS USED AS LOADING MACHINES.

**SHOVEL PIT** — AN OPEN PIT MINE WHERE EITHER STEAM OR ELECTRIC POWER SHOVELS ARE USED FOR LOADING BROKEN ROCK INTO TRUCKS OR TRAINS.

**SHOVEL TEETH** — THE REPLACEABLE DIGGING POINTS ON THE SHOVEL BUCKET.

**SHOVEL MOVE** — MOVING A LARGE ELECTRIC SHOVEL WAS A TASK. MOST OF ALL, THE VERY HEAVY, HIGH VOLTAGE CABLES HAD TO BE STRATEGICALLY PLACED, END ON END FROM THE SWITCH HOUSE CLOSEST TO THE STARTING POINT AND THEN FROM EVERY SWITCH HOUSE ON THE WAY. THE POWER HAD TO BE KILLED EVERY TIME A CABLE WAS ADDED OR DROPPED, AND RE-ENERGIZED ONCE THE CABLES WERE SECURELY CONNECTED. THIS ALL HAD TO BE DONE WITH MINIMAL DISRUPTION TO MINING, NOT A EASY TASK AS THE CABLE WHICH CROSSED ROAD WAYS OR HAULAGE RAMPS HAD TO BE BRIDGED TO ALLOW TRAFFIC TO PASS. ALL DROPPED CABLES HAD TO BE COILED ON A CABLE DRUM MOUNTED ON A CABLE TRUCK AND PLACED IN STORAGE.

**SHOVELER** — THE MAN WHO WAS RESPONSIBLE FOR MUCKING IN CROSSCUTS OR STOPES. LATER, THEY WERE CALLED MUCKERS.

**SHUT DOWN** — POST 1950, THE TWO-WEEK PERIOD IN JULY WHEN, PD WOULD CLOSE THE MINES AND REQUIRE NON-ESSENTIAL PERSONNEL TO TAKE VACATION. THIS PERIOD WAS USED FOR PLANNED MAINTENANCE IN A NUMBER OF AREAS TO REDUCE THE AMOUNT OF DOWNTIME LATER ON. BY WAY OF EXAMPLE, THE CHANGING PORTIONS THE COMPRESSED AIR LINES IN A SHAFT OR REPAIRING LAUNDERS IN THE CONCENTRATOR OR MAJOR ELECTRIC SHOVEL REBUILDS WERE SUCH REPAIRS.

**SIDE BOARD** — 1). A VERTICAL EXTENSION PLACED ON HAUL TRUCK DUMP BODIES TO INCREASE THE VOLUME. 2). A PIECE OF LAGGING FITTED WITH STEEL CLIPS AND PLACED ON THE SIDE OF A MINE CAR DURING LOADING. THE SIDE BOARD WAS POSITIONED ON THE MINE CAR SIDE, OPPOSITE THE CHUTE, WHEN BEING LOADED TO PROTECT THE MAN FROM ROCKS PASSING OVER THE TOP OF THE MUCK IN A NEAR FULL CAR. IT WAS USED DURING THE DAYS BEFORE LOADING PLATFORMS, WHEN THE PERSON LOADING THE CAR WAS STANDING BUT A FOOT ABOVE THE CAR, A POTENTIALLY DANGEROUS PLACE WITHOUT A SIDE BOARD. ALSO, SEE LOADING BOARD.

**SIDE BOOM HANGERS** — SHELF-LIKE HANGERS WITH A LIP MADE OF STEEL PLATE THAT FIT ON THE SIDE OF THE POST AND WERE HELD IN PLACE BY A HEAVY STEEL ROD BEHIND THE POST AND THE HEIGHT CONTROLLED BY NAILING A WEDGE ON THE POST. THE BOOMS WERE THEN PLACED IN THE SIDE HANGERS AND TIMBERING CARRIED OUT AS USUAL FOR ANY BOOM SETUP.

**SIDE LAGGING** — THE LAGGING PLACED ALONG THE RIB OF A WORKING TO CONTAIN LOOSE MATERIAL.

**SIDE RODS** — THE LONG BOLTS THAT PASS THROUGH COIL SPRINGS AND HOLD THE DRILL CHUCK IN TIGHT CONTACT WITH THE DRILL BODY.

**SIGNAL CHART** — THE CHART WITH THE SIGNAL CODE FOR HOISTING, WHICH IS POSTED ON EVERY MINE LEVEL, THE SURFACE AND IN THE HOIST HOUSE AS REQUIRED BY STATUTE. SEE ALSO, BELL CHART.

**SILICA** — 1). SILICON DIOXIDE. QUARTZ IS A COMMON EXAMPLE. THE TERM IS ALSO APPLIED TO HIGH SILICA CONTENT ROCK USED AS A FLUX DURING SMELTING. 2). A TERM USED TO DESCRIBE ANY HARD, HIGH QUARTZ ROCK.

**SILICA BRECCIA** — AS THE NAME SUGGESTS, THESE WERE HIGHLY SILICEOUS UNITS, COMPOSED OF VERY ANGULAR FRAGMENTS OF LIMESTONE, WHICH HAD BEEN COMPLETELY REPLACED BY SILICA IN A MATRIX OF CRYPTOCRYSTALLINE QUARTZ AND SPECULAR HEMATITE. THESE UNITS WERE TO THE SOUTHWEST, SHATTUCK AND HIGGINS ORE ZONES AND WERE INVARIABLY PIPELIKE AND CONNECTIONS WITH PORPHYRY AT DEPTH WERE COMMON. AN ESTIMATE THAT 90 PERCENT OF THE ORE MINED IN THESE AREAS WAS IN PHYSICAL CONTACT WITH SILICA BRECCIAS. THE ORIGIN OF THESE BRECCIAS REMAINS UNCLEAR.

**SILICOSIS** — A DISEASE OF THE LUNGS, PNEUMOCONIOSIS, CAUSED BY INHALING SILICA ROCK DUST FROM AIR DRILLS. SOMETIMES CALLED “MINERS CONSUMPTION”. SEE ALSO DUSTED.

**SILL** — THE SILL LEVEL IS THE SAME AS THE MINE LEVEL. IT STARTS AT THE TRACK AND EXTENDS FOR TEN FEET VERTICALLY WHEN IT BECOMES THE FIRST FLOOR. THE BOTTOM OF A RAISE IS TYPICALLY THE SILL LEVEL AS IT IS COINCIDENTAL WITH THE LEVEL.

**SILL TIMBER** — THE TIMBER SET ON THE SILL LEVEL UPON WHICH SUBSEQUENT TIMBER SETS WERE BUILT.

**SILVER SPRAY** — THE ORIGINAL NAME OF THE SPRAY MINE, WHICH BECAME SHORTENED THROUGH COMMON USAGE RATHER THAN BY DESIGN.

**SINGLE JACK** — A LIGHTWEIGHT HAMMER, USUALLY OF 3½ TO FOUR POUNDS. FORMALLY USED FOR SINGLE HANDED DRILLING, SEE WHICH.

**SINGLE HANDED DRILLING** — IN SINGLE HANDED DRILLING, THE STRIKING AND ROTATION OF THE STEEL IS PERFORMED BY ONE PERSON USING A SINGLE JACK HAMMER. THE HAMMER IS HELD IN ONE HAND AND THE CHISEL-SHAPED DRILL STEEL IS HELD IN THE OTHER. AFTER EVERY BLOW FROM THE HAMMER, THE STEEL IS ROTATED SLIGHTLY TO KEEP IT FROM STICKING AND TO MAKE THE HOLE ROUND. IN SINGLE HANDED WORK THE HOLE DEPTH IS USUALLY THREE TO FOUR FEET WITH A DRILLING RATE OF 1.6 FEET PER HOUR (WHEN DONE BY A SKILLED MINER OF THE TIME).

**SINKER** — A HEAVY JACKHAMMER DRILL USED TO DRILL DOWN HOLES AND USED MOSTLY IN SHAFT SINKING.

**SINKING** — THE PROCESS BY WHICH A SHAFT OR WINZE IS DRIVEN DOWNWARD.

**SINKING BUCKET** — A LARGE STEEL BUCKET OF UP TO SEVERAL TONS CAPACITY, INTO WHICH THE BROKEN MUCK FROM SINKING A SHAFT OR WINZE IS SHOVELED OR OTHERWISE, LOADED FOR HOISTING.

**SIX POST** — A METHOD OF TIMBERING A TWO COMPARTMENT RAISE THROUGH RELATIVELY COMPETENT GROUND USING SIX VERTICAL POST WITH SIDE LAGGING TO SUPPORT THE GROUND AS WELL AS TO DIVIDE THE RAISE INTO TWO COMPARTMENTS. THIS WAS A PREFERRED TECHNIQUE FOR MOST RAISES, AS IT WAS FASTER AND USED MUCH LESS TIMBER THAN A CRIBBED RAISE. ALSO, THE TIMBER FRAMING AND SPACING WERE IDEAL TO START A SQUARESET STOPE, THUS SAVING EVEN MORE TIME.

**SKEWER** — A PIECE OF WOODEN DOWELING SHARPENED ON ONE END AND USED TO MAKE A HOLE IN DYNAMITE TO RECEIVE THE BLASTING CAP.

**SKIMMERS** — THE BLASTHOLES IN AN UNDERGROUND STOPE OR CROSSCUT ROUND WHICH WERE JUST ABOVE THE LIFTERS AND THE NEXT TO LAST TO FIRE. WHEN THEY WENT OFF, THEY SKIMMED THE BROKEN MUCK ON TOP OF THE REMAINING HOLES AND CAST IT BACKWARDS, ONTO THE MUCK SHEET.

**SKIN TO SKIN** — SAID OF TIMBER SETS PLACED SO THAT THE POST AND CAPS ARE INSTALLED SO CLOSE THAT THEY ARE IN CONTACT, WITH NO SPACE BETWEEN THE POSTS. THIS WAS NECESSARY ONLY IN THE HEAVIEST OF GROUND CONDITIONS. IN VERY LOOSE, RUNNING GROUND, BACK AND SIDE LAGGING WERE INSTALLED SKIN TO SKIN AS WELL.

**SKIP** — A GUIDED STEEL BUCKET, USUALLY RECTANGULAR, WITH A CAPACITY UP TO 5 TONS, WHICH IS USED IN VERTICAL OR INCLINED SHAFTS FOR HOISTING ORE OR WASTE. THE SKIP IS MOUNTED WITHIN A CARRYING FRAMEWORK, HAVING AN APERTURE AT THE UPPER END TO PERMIT LOADING, AND A SELF-DUMPING FEATURE TO DISCHARGE THE ORE OR WASTE ROCK INTO A BIN ON THE SURFACE.

**SKIP HOISTING** — THE HOISTING OF ORE FROM THE MINE BY USING SKIPS, AS OPPOSED TO CAGE HOISTING, WHERE THE ORE WAS HOISTED IN MINE CARS ON THE CAGES.

**SKIP TENDER** — THE PERSON WORKING IN THE SHAFT POCKET THAT WAS RESPONSIBLE FOR LOADING THE SKIPS AND, THEN, SIGNALING THE HOIST ENGINEER BY RINGING 1-2 ON THE

SHAFT BELL TO HOIST THE LOADED SKIP TO THE SURFACE. HE THEN LOADS THE POCKET CARTRIDGE, PREPARATORY FOR LOADING THE NEXT SKIP.

**SKOOKUM BLOCK** — A COMMON NAME FOR ANY PULLEY BLOCK THROUGH WHICH THE SLUSHER CABLE WAS PASSED FOR MUCKING OPERATIONS. THE NAME WAS DERIVED FROM THE TRADEMARK OF ONE OF THE EARLIER BLOCKS USED FOR SLUSHER OPERATION. SEE ALSO SLUSHER BLOCK AND SHEAVE BLOCK.

**SLAB** — 1). GENERALLY USED TO DESCRIBE A LARGE FLAT ROCK, OFTEN A LOOSE ROCK IN THE BACK. 2). ALSO, THE ACT OF SLABBING.

**SLABBED** — 1). HAVING BEEN HIT BY A LARGE ROCK FALLING FROM THE BACK OR RIB, INVARIABLY A SERIOUS, IF NOT FATAL ACCIDENT. SEE ALSO FALL OF GROUND. 2). ALSO, ROCK BROKEN BY THE ACT OF SLABBING.

**SLABBING** — BLASTING HOLES DRILLED MORE OR LESS PARALLEL TO AN OPENING, SUCH AS REMOVING A THIN PORTION OF A RIB OR BACK, BY DRILLING AND BLASTING TO WIDEN OR RAISE THE HEIGHT OF AN OPENING. IN AN INCLINED CUT AND FILL STOPE, ALL ROCK IS DRILLED AND BLASTED PARALLEL TO AN OPEN SPACE AND IS SAID TO BE SLABBED WHEN BLASTED.

**SLACK ROPE** — A CONDITION THAT EXISTS WHEN THE HOISTING ROPE IS NOT UNDER TENSION FROM THE LOAD OF THE CAGE OR SKIP. THIS CAN OCCUR IF THE CAGE OR SKIP BECOMES ACCIDENTLY LODGED IN THE SHAFT WHEN BEING LOWERED. IT IS A DIFFICULT SITUATION, AS THE ROPE MUST BE CAREFULLY TAKEN UP TO AVOID KINKING WHICH WOULD RUIN THE ROPE. THIS MUST BE GUIDED BY HAND, AS THE ROPE IS WOUND ON THE DRUM. ALL CAGES WERE EQUIPPED WITH RADIO TRANSMITTERS, WHICH NOTIFIED THE HOIST ENGINEER IF THE ROPE BECAME SLACK SO HE COULD STOP IMMEDIATELY.

**SLAG** — 1). THE TOP LAYER OF THE MULTILAYER MELT FORMED DURING SMELTING OPERATIONS. IN SMELTING, IT CONTAINS THE GANGUE MINERALS AND THE FLUX AND IN MOST REFINING OPERATIONS, THE OXIDIZED IMPURITIES. 2). ALSO REFERS TO THE COOLED AND HARDENED MATERIAL AFTER DUMPING IN THE SLAG DUMP. A GOOD DEAL OF SLAG WAS USED AS RAILROAD BALLAST AS IT WAS RELATIVELY HEAVY AND DURABLE.

**SLAKING** — THE CRUMBLING AND GRADUAL DISINTEGRATION OF ROCK UPON EXPOSURE TO AIR OR MOISTURE. THIS WAS COMMONLY DUE TO THE OXIDATION OF MINOR, DISSEMINATED PYRITE.

**SLICKER** — A WATERPROOF, RAINCOAT-LIKE JACKET WORN IN VERY WET WORK ENVIRONMENTS SUCH AS SHAFTS. IT WAS COMMON FOR CAGERS IN UPCAST SHAFTS TO WEAR SLICKERS AS CONDENSED WATER FROM THE MOISTURE-LADEN AIR WAS ALWAYS DRIPPING FROM EVERYWHERE INCLUDING THE CAGES.

**SLIDE** — 1). A TERM USED IN THE LAVENDER PIT TO REFER TO SLOPE FAILURES. 2). IN RAISES, A STEEPLY INCLINED BULKHEAD SET IN THE MANWAY COMPARTMENT TO DIRECT BLASTED MUCK INTO THE CHUTE COMPARTMENT. 3). IN STOPES, INCLINED LAGGING PLACED ON THE STOPE FLOOR AND DIRECTED TOWARD THE CHUTE, UPON WHICH BROKEN MUCK WAS SHOVELED TO REDUCE IN-STOPE ORE TRANSPORT BY WHEELBARROW OF CAR.

**SLIDE RAILS** — NORMAL RAILS LAID ON THEIR SIDE, AND INSIDE THE NORMAL TRACK, THEN EXTENDED TO THE MUCK PILE AND USED TO RUN A MUCKING MACHINE ON WHILE MUCKING A FACE. THE RAILS ARE SIMPLY SLID AHEAD AS THE MUCKING TAKES PLACE. SLIDE

RAILS WERE USED UNTIL SUFFICIENT ADVANCE HAD BEEN MADE TO INSTALL A FULL LENGTH OF TRACK.

**SLIDING WAGE SCALE** — A WAGE SCALE FOR ALL NON-MANAGEMENT WORKERS THAT WAS TIED TO THE PRICE OF COPPER. THIS PROGRAM WAS ESTABLISHED IN 1915 WITH 16 CENTS PER POUND COPPER AS THE BASE. AS THE COPPER PRICE WENT UP, WAGES WERE INCREASED BY 25 CENTS PER DAY FOR EVERY 2 CENTS PER POUND THE PRICE INCREASED. CONVERSELY, WHEN THE PRICE DROPPED, WAGES WERE REDUCED CORRESPONDINGLY. WHILE BOTH LOVED (DURING GOOD TIMES) AND HATED (DURING BAD TIMES), THIS SYSTEM WAS USED UNTIL 1944, WHEN THE WORKFORCE WAS UNIONIZED.

**SLING** — A SHORT LOOP OR LENGTH OF CABLE WITH SMALL LOOPS AT EITHER END.

**SLIP** — A SMALL FAULT OR OTHER NATURALLY OCCURRING BREAK IN THE GROUND. THESE WERE CONSIDERED DANGEROUS AS THEY OFTEN HAD CLAYLIKE FAULT GOUGE ALONG THE HANGING WALL AND COULD FALL WITH NO WARNING.

**SLOPE** — THE ANGLE OF THE BENCH FACE FROM CREST TO TOE, TYPICALLY 70° OR THE OVERALL SLOPE OF THE PIT WALLS FROM THE UPPER MOST BENCH CREST TO THE LOWERMOST BENCH CREST. THIS WAS A FUNCTION OF ROCK QUALITY AND, WHILE IN THE LAVENDER PIT IT AVERAGED 45°, SOME AREAS WERE STEEPER WHERE THE ROCK WAS COMPETENT AND OTHERS FLATTER SUCH AS BELOW THE JUNCTION MINE YARD, WHERE THE ROCK WAS LESS COMPETENT.

**SLOPE FAILURES** — PIT SLOPES FAIL IF THE OVERALL ANGLE IS STEEPER THAN THE ROCK CAN SUPPORT. SEVERAL SLOPE FAILURES OCCURRED IN THE LAVENDER PIT. ONE UNDER THE JUNCTION MINE YARD, A SECOND UNDER HIGHWAY 80 JUST BEFORE ENTERING LOWELL AND THE MOST SPECTACULAR IN THE HOLBROOK EXTENSION IN 1973 WHEN AN ESTIMATED 1 1/2 MILLION TONS OF ROCK BROKE LOOSE AND SLID SUDDENLY INTO THE PIT. THE FAILURE WAS EXPECTED, AS SURFACE CRACKS ALONG THE PIT RIM HAD BEEN MONITORED FOR SOME TIME AND FAILURE PREDICTED TO WITHIN TEN MINUTES OF ACTUAL OCCURRENCE. A LARGE CROWD WAS ON HAND TO WITNESS THE SPECTACULAR EVENT FROM SAFE VANTAGE POINTS AND MANY PHOTOS WERE TAKEN OF THE SLIDE IN MOVEMENT.

**SLUSHER** — A TWIN DRUM HOIST USED TO DRAG A RAKE TO BROKEN MUCK OR TO PULL A BUCKET FULL OF BROKEN ROCK TO A POINT. DURING OPERATION, ONE DRUM WILL BE ENGAGED WHILE THE OTHER FREEWHEELS. THUS, BY ENGAGING ONE DRUM TO PULL, THE FULL RAKE IS PULLED TOWARD THE SLUSHER OPERATOR. WHEN THE OTHER DRUM IS ENGAGED, IT PULLS THE EMPTY RAKE OR BUCKET AWAY FROM IT TO GET ANOTHER LOAD OF BROKEN ROCK.

**SLUSHER BLOCK** — THE PULLEY THROUGH WHICH THE CABLES OF THE SLUSHER PASSED. THE SLUSHER BLOCK WAS SECURELY ATTACHED TO THE FACE BY AN EYEBOLT, TIMBER OR A CHAIN BEHIND THE MUCK TO BE MOVED. THESE WERE OFTEN REFERRED TO AS SKOOKUM BLOCKS OR SHEAVE BLOCKS AS WELL.

**SLUSHER BUCKET** — THE APPARATUSES CONNECTED TO THE TWO SLUSHER CABLE AND USED TO DRAG BROKEN ROCK TO THE DESIRED POINT. SEE ALSO, SLUSHER RAKE.

**SLUSHER RAKE** — THE SCRAPER-LIKE DEVICE USED TO DRAG BROKEN ROCK WHEN PULLED BY THE SLUSHER CABLE. SEE ALSO, SLUSHER BUCKET.

**SLUSHER REPAIR CREW** — A GROUP OF REPAIRMEN SPECIALIZING IN THE MAINTENANCE AND REPAIR OF SLUSHERS, BOTH PNEUMATIC AND ELECTRIC. THEY OFTEN ASSISTED IN NEW SLUSHER SETUPS IF NEEDED. THE MEN TYPICALLY WORKED ALONE, GOING

FROM STOPE TO STOPE ON A REGULAR BASIS FOR MAINTENANCE OR FOR REPAIR, AS NEEDED. THEY WERE KNOWN FOR THE HEAVY TOOL BAGS THEY CARRIED OVER EACH SHOULDER, JUST TO HAVE WHAT THEY REQUIRED TO DO THEIR JOB.

**SNATCH BLOCK** — A PULLEY BLOCK THAT CAN BE EASILY FASTENED TO LINES OR OBJECTS BY MEANS OF A HOOK, OR SHACKLE FOR QUICK, TEMPORARY PLACEMENT, AND USED FOR HOISTING TIMBERS OR OTHER LIGHTWEIGHT SUPPLIES.

**SNIFFER TUBE** — A REFERENCE TO THE AIR SAMPLERS USED TO TEST FOR VARIOUS GASES BY DRAWING A PREDETERMINED AMOUNT OF AIR THROUGH A GLASS TUBE FILLED WITH GRANULAR MATER, WHICH CHANGED COLOR DEPENDENT ON THE CONCENTRATION OF THE GAS BEING TESTED FOR. SEE ALSO DRÄGER.

**SOLDIER MINER** — BECAUSE OF THE ACUTE MANPOWER SHORTAGE IN THE STRATEGICALLY IMPORTANT METAL MINES DURING WORLD WAR II, THE WAR BOARD ASSIGNED FURLOUGHED SOLDIERS, WITH PREVIOUS MINING EXPERIENCE, TO WORK AS MINERS IN METAL MINES NATIONWIDE. MORE THAN 900 WERE ASSIGNED TO BISBEE OVER THE COURSE OF THE WAR. IN GENERAL, THE PROGRAM WAS A FAILURE, AT LEAST IN THE EYES OF THE MINING COMPANIES, AS THE ASSIGNED MEN OFTEN WERE INEXPERIENCED OR LESS THAN EAGER TO DO THE HEAVY AND HARD WORK REQUIRED. A FEW STAYED ON AFTER THE WAR AND WERE STILL WORKING WHEN THE MINES CLOSED FOR GOOD IN 1975. NEEDLESS TO SAY, THESE WERE AMONG THE BETTER ONES.

**SOLUTION ENLARGEMENT** — GROUND WATER COMMONLY ENLARGED PRE-EXISTING STRUCTURES, SUCH AS FAULTS IN THE LIMESTONES BY DISSOLVING THE WALL ROCK. THE PROCESS WAS THE SAME AS TYPICAL LIMESTONE CAVE FORMATION, BUT ON A SMALLER SCALE AND OFTEN LOCALIZED. SEE ALSO WATERCOURSE.

**SOOTY CHALCOCITE** — A COMMON VARIETY OF SUPERGENE CHALCOCITE DEPOSITED AS SOOT-LIKE MATERIAL, TYPICALLY AS A COATING ON PYRITE.

**SOUTHWEST** — THE SOUTHWEST MINE.

**SOUTHWEST OREBODY** — THE VERY LARGE AND RICH OREBODY DISCOVERED ALMOST SIMULTANEOUSLY BY THE COPPER QUEEN AND ATLANTA MINING COMPANIES IN LATE 1884. THIS DISCOVERY SAVED BISBEE FROM BECOMING YET ANOTHER GHOST TOWN WITH A PLAYED OUT MINE. IT ALSO LED TO A MERGER BETWEEN THE TWO COMPANIES, FORMING THE COPPER QUEEN CONSOLIDATED MINING COMPANY, WHICH MADE THE FORMALLY MERCHANT COMPANY, PHELPS DODGE A COPPER PRODUCER. THE OREBODY WAS SO NAMED BECAUSE IT WAS TO THE SOUTHWEST OF BOTH THE COPPER QUEEN AND ATLANTA SHAFTS.

**SOUTHWEST SHAFT** — ANY ONE OF THE SEVERAL INTERIOR SHAFTS, WHICH SERVICED THE SOUTHWEST MINE. THE LAST SOUTHWEST SHAFT HAD THE HOIST ON THE 6<sup>TH</sup> LEVEL AND BOTTOMED ON THE 200 LEVEL CZAR. IT REMAINED IN SERVICE UNTIL REPLACED BY A COMBINATION OF THE QUEEN TUNNEL AND SUNRISE SHAFT IN 1915. THE QUEEN MINE TOURS VISITS THE LAST OF THE SOUTHWEST SHAFTS AS A PART OF THE UNDERGROUND MINE TOUR.

**SOUTHWEST TUNNEL** — THE 5<sup>TH</sup> LEVEL OF THE SOUTHWEST MINE, WHICH IS ACTUALLY AN ADIT. THE PORTAL IN HENDRICKS GULCH WAS FRAMED IN CONCRETE WITH THE WORDS "SOUTHWEST 1915" INSCRIBED ABOVE THE ENTRANCE.

**SPAD** — A SPAD IS A FLAT SPIKE HAMMERED INTO A WOODEN PLUG ANCHORED IN A HOLE DRILLED INTO THE MINE CEILING FROM WHICH IS THREADED A PLUMB LINE. A NUMBERED METAL TAG IS HELD IN PLACE BY THE SPAD AND THE NUMBER RECORDED BY THE SURVEY

CREW AS TO LOCATION AND THE TRACK ELEVATION AT THE POINT. THE SPAD IS, THEN, AN UNDERGROUND SURVEY STATION SIMILAR TO THE USE OF STAKES IN MARKING SURVEY POINTS ON THE SURFACE. A LINE SPAD, OR SIGHT SPAD, IS A STATION THAT ALLOWS A MINER TO VISUALLY ALIGN THE CROSSCUT DIRECTION FROM THE MAIN SPAD.

**SPECIMEN** — THE TERM WAS USED TO DENOTE A MINERAL SPECIMEN.

**SPECIMEN HOUND** — THE TITLE GIVEN A MINER OR OTHER UNDERGROUND WORKER WHO WENT TO EXTRAORDINARY LENGTHS TO COLLECT MINERAL SPECIMENS, WHILE AT WORK, THOUGH SOME WERE COLLECTORS IT WAS USUALLY TO SELL THE SPECIMENS LATER. IN DOING SO, HE OFTEN NEGLECTING HIS RESPONSIBILITIES, IF NOT HIS SAFETY BY TAKING CHANCES SUCH AS VISITING ABANDONED WORKINGS. THE TERM WAS NOT NECESSARILY TOTALLY NEGATIVE, AS MOST MINERS WOULD OPPORTUNISTICALLY COLLECT ANYTHING OF INTEREST THEY MIGHT FIND.

**SPECIMEN STOPE** — A STOPE THAT PRODUCED DESIRABLE MINERALS SPECIMENS IN QUANTITY.

**SPHALERITE** — THE MOST IMPORTANT ORE OF ZINC MINED AT BISBEE. IT IS A ZINC SULFIDE.

**SPIKE** — 1). A FLANGED, SHARPENED PIECE OF STEEL WITH A SQUARE CROSS SECTION, WHICH IS USED TO SECURE RAIL TO WOODEN TIES. 2). ALSO A VERY THICK NAIL WITH A CONE SHAPED HEAD USED TO SECURE STEEL LINING IN CHUTES. 3). TO SPIKE, IS TO DRIVE IN A SPIKE OR LARGE NAIL WITH A HAMMER.

**SPIKE MAUL** — THE HEAVY HAMMER SPECIALLY DESIGNED FOR DRIVING RAILROAD SPIKES. THESE WERE USED ON THE SURFACE, BUT NEVER UNDERGROUND AS THE SPIKES WERE MUCH SMALLER AND THE UNDERGROUND OPENING WERE NOT SUFFICIENTLY HIGH TO ALLOW FOR THEIR USE. SMALLER TRACK HAMMERS WERE EMPLOYED FOR DRIVING SPIKES INSTEAD.

**SPIKE PULLER** — A STEEL BAR OF ABOUT THREE FEET IN LENGTH WITH ONE END BENT AT 90° THEN TAPERED AND GROOVED SO AS TO FIT AROUND A TRACK SPIKE FOR PULLING THE SPIKE FROM THE WOODEN TRACK TIE. SEE ALSO CHIVA.

**SPILE** — 1). A TEMPORARY LAGGING OR OTHER TIMBER DRIVEN AHEAD, BY USING A DOUBLE JACK, IN LOOSE GROUND TO HOLD IT BACK AND ALLOW FOR MUCKING UNDER OR TO THE SIDE OF IT TO ADVANCE THE HEADING. SPILING WAS ONLY UNDERTAKEN IN THE MOST DIFFICULT OF CONDITIONS WHERE THE MUCK WOULD RUN IF NOT HELD BY THE SPILE. A SPILE TIMBER WAS 4" X 6" X 8' WITH ONE END BEVELED TO FACILITATE THE DRIVING FORWARD. THE FLAT END OF THE SPILE WAS ALWAYS PLACED ON THE TOP OR OUTSIDE SO THAT WHEN A BOULDER WAS HIT, THE SPILE WAS DIRECTED AWAY FROM THE OPENING. 2). THE ACT OF SPILING - TO SPILE.

**SPIT** — LIGHTING THE FUSE FOR A BLAST WITH A SPITTER. TO SPIT IS TO LIGHT A FUSE.

**SPITTER** — THESE WERE TECHNICALLY CALLED "HOT WIRE IGNITERS" AND WERE SPARKLERLIKE, BUT HOTTER AND WHEN THE SPLIT END OF A FIRE FUSE WAS TOUCHED WITH A SPITTER, IT WOULD IGNITE INSTANTLY. SPITTERS WERE KEPT IN A SPECIAL CAN IN THE POWDER MAGAZINE WHERE A LIGHT BULB KEPT THEM HOT AND DRY. EACH BLAST REQUIRED TWO SPITTERS; BOTH WERE LIGHTED BY A MATCH AT THE SAME TIME. ONE WAS USED TO IGNITE THE FUSE WHILE THE SECOND SERVED AS A TIMING DEVICE, WHICH BURNED FOR ONE AND ONE HALF MINUTES AND WHEN THE TIMING SPITTER WENT OUT, THE MINERS HAD TO LEAVE THE BLAST AREA REGARDLESS OF WHETHER OR NOT ALL THE FUSE WERE LIT AS THE FIRST HOLE WOULD GO OFF IN BUT A FEW MORE MINUTES. A SIMPLE, BUT EFFECTIVE SAFETY PROCEDURE.

BEFORE THE ADVENT OF HOT WIRE IGNITERS, SPITTERS WERE TWO FOOT LENGTHS OF FIRE FUSE, NOTCHED TO THE POWDER CORE EVERY INCH. WHEN THE BURNING POWDER REACHED A NOTCH, THE FLAME WOULD SPIT OUT SUFFICIENTLY TO IGNITE THE BLASTING FUSE.

**SPITTER BOARD** — THE SPITTER BOARD WAS A PATENTED, BISBEE INNOVATION. THEY WERE WIDELY USED IN STOPES AND RAISES AND, LESS OFTEN IN CROSSCUTS, THE FIRE FUSES WERE PLACED IN GROUPS IN THIN, 4 X 6 INCH SLOTTED BOARDS TO IGNITE WITH A SPITTER, THUS THE NAME. IT WAS QUICKER AND SURER TO HAVE SEVERAL GROUPINGS OF FUSES TO LIGHT THAN HAVE ALL OF THEM HANGING INDEPENDENTLY AND LIGHT THEM INDIVIDUALLY. TIME WAS ALWAYS A FACTOR ONCE THE FIRST FUSE WAS LIT AND IT WAS EASY TO MISS ONE, WHICH MADE FOR BOTH A BAD BLAST AND A SAFETY CONCERN WITH A MISSED HOLE. AFTER THE FUSES WERE ALL IGNITED, THE SPITTER BOARDS WERE EASILY BROKEN BY HAND TO ALLOW THE FUSES TO FALL AND AVOID ANY KINKS THAT COULD CAUSE THE FUSE TO GO OUT AND THE HOLE TO MISFIRE.

**SPITTER CAN** — EVEN THOUGH SPITTERS WERE LIGHTLY COATED BY A TAR-LIKE SUBSTANCE, THEY COULD BE ADVERSELY AFFECTED BY LONG EXPOSURE TO HIGH HUMIDITY, SOMETHING COMMON TO THE MINE ATMOSPHERE AT BISBEE. TO PROTECT SPITTERS FROM DEGRADATION DUE TO HUMIDITY, THEY WERE STORED IN SPECIAL GALVANIZED STEEL CYLINDRICAL CONTAINER FITTED WITH A TIGHT LID, MADE IN THE MINE TIN SHOP. IN THE CENTER OF THE CONTAINER WAS A HEAVY WIRE MESH CYLINDER, SURROUNDING A 100-WATT INCANDESCENT LIGHT BULB, THE HEAT FROM WHICH WAS SUFFICIENT TO KEEP THE SPITTERS FROM ADSORBING MOISTURE.

**SPITTER CORD** — USED IN RAISE BLASTING, THIS WAS A MATERIAL MANUFACTURED BY THERMALITE, WHICH WAS LIKE SMALL DIAMETER (1/8 INCH) FIRE FUSE, EXCEPT IT BURNED ON THE OUTSIDE AS WELL AND HAD THIN STEEL WIRES TO GIVE IT STRENGTH. THE ENDS OF THE SAFETY FUSE TO BE USED HAD CRIMPED BLASTING CAP-LIKE CARTRIDGES, CONNECTOR SHELLS, ON ONE END AND THE PRIMER ON THE OTHER. THE CONNECTOR SHELLS CONTAINED AN IGNITION COMPOUND, WHICH WAS IGNITED BY THE SPITTERCORD THAT WAS PLACED IN A SLOT IN THE SHELL. THIS IN TURN, IGNITED THE FIRE FUSE.

**SPLIT** — AFTER DRYING AND CRUSHING, SAMPLES ARE DIVIDED (SPLIT) INTO EQUAL PARTS. EACH PART IS REFERRED TO AS A SPLIT, WITH ONE SAVED FOR ASSAY, WHILE THE OTHER IS REJECTED.

**SPLIT A SWITCH** — WHEN A MOTORMAN APPROACHES A SWITCH, WHICH MERGES TWO TRACKS INTO A SINGLE TRACK, HE WAS TO THROW THE SWITCH IN FAVOR OF HIS ROUTE OF TRAVEL, IF IT WAS NOT ALREADY SO SET. HOWEVER, THE MOTORMAN OFTEN SIMPLY DROVE THE MOTOR THROUGH THE SWITCH, WHICH EASILY OPENED UNDER THE PRESSURE OF THE PASSING MOTOR AND CARS. THE DANGER WAS, THAT THE SWITCH DID NOT ALWAYS CLOSE COMPLETELY, LEAVING A SPLIT SWITCH, WHICH WAS A GUARANTEED DERAILMENT FOR THE NEXT TRAIN TO PASS THAT WAY, THUS THE PROHIBITION OF THE PRACTICE. ALSO CALLED FLYING A SWITCH.

**SPLIT LAGGING** — STANDARD, 12 INCH WIDE LAGGING WAS OFTEN SPLIT LENGTHWISE AND PLACED BEHIND SQUARESET OR DRIFT POST AND SPACED ABOUT SIX INCHES BETWEEN BOARDS TO CONFINE COARSE GOB. LESS TIMBER WAS NEEDED BY DOING THIS AS THERE WAS NO REAL WEIGHT SUPPORTED AND THE SPACING BETWEEN BOARDS WOULD BE THE SAME IF WHOLE LAGGING WERE USED, THUS THERE WAS A SAVINGS OF ABOUT A THIRD OF THE LAGGING.

**SPOON** — THIS WAS THE NAME GIVEN THE ROD LIKE DEVICE WITH AN ELONGATED SPOON-LIKE END, WHICH WAS USED TO CLEAN OUT UNEXPLODED DYNAMITE FROM MISFIRED HOLES. THESE WERE USUALLY MADE FROM FOUR-FOOT LENGTHS OF COPPER TROLLEY WIRE, AS IT WAS SUFFICIENTLY RIGID AND A NON-SPARKING MATERIAL. IRON WAS USED EARLY ON, BUT

REPLACED BY BRASS THEN COPPER TO IMPROVE SAFETY. THESE WERE SOMETIMES REFERRED TO AS SCRAPERS.

**SPOTTER** — A PERSON ON THE GROUND WHO AIDS IN THE CORRECT PLACEMENT OF A HAUL TRUCK OR TRAIN CAR, IN THE CASE OF THE SACRAMENTO PIT, EITHER TO BEGIN LOADING OR TO DUMP IN THE APPROPRIATE PLACE. SEE ALSO TRUCK SPOTTER.

**SPRAG** — 1). A SHORT WOODEN PROP SET IN A SLANTING POSITION FOR SUPPORT, OFTEN USED IN A TEMPORARY MANNER WHEN REPAIRING DRIFT SETS. 2). TO SUPPORT BY PLACING A POST (SPRAG) UNDER THE PLACE IN NEED OF SUPPORT.

**SPREADER** — 1). A PIECE OF TIMBER STRETCHED ACROSS AN OPENING AS A SUPPORT OF THE WALLS. 2). IN DRIFT SETS, IT WAS A 4" X 6" BOARD ABOUT TWO FEET ABOVE THE POST BOTTOMS TO MAINTAIN THE CORRECT DISTANCE BETWEEN POSTS OF SUCCESSIVE SETS. BOOM SPREADERS WERE 4" X 6" X 3' PIECES AND BOLTED TO THE LAGGING UNDER THE CAP PIECE, WHICH WAS TO MAINTAIN THE CORRECT DISTANCE BETWEEN THE BOOMS. THE 4'10" LAGGING UNDER THE CAP WAS TO ALLOW THE POSTS TO BE SET UNDER THE CAP.

**SPREADER SCAB** — A 2' X 10" X 5' 2" LAGGING NAILED TO AND UNDER THE CAP IN A DRIFT SET TO KEEP THE POST FROM MOVING TOWARD THE DRIFT CENTER.

**SPRING** — TO BLAST LIGHTLY USING SMALL AMOUNTS OF POWDER WITH VERY LITTLE DISPLACEMENT OF THE BLASTED MATERIAL. IN THE SACRAMENTO PIT, THE LARGE DIAMETER, CHURN DRILL HOLES WERE SPRUNG TO ALLOW FOR THE INTRODUCTION OF MORE POWDER INTO THE HOLES FOR BETTER FRAGMENTATION.

**SPUD WRENCH** — TYPICALLY A TRACK WRENCH FOR TIGHTENING TRACK BOLTS, BUT ALSO USED TO REFER TO ANY OF THE SEVERAL OTHER WRENCHES WITH A POINTED END THAT ARE USED TO ALIGN HOLES TO ALLOW FOR THE EASY INSERTION OF A BOLT OR RIVET.

**SQUEEZING GROUND** — SOFT CLAYS, SUCH AS FOUND IN MANY OF THE EARLY ORES MINED, AS WELL AS THOSE IN THE DIVIDEND FAULT ZONE, RESPONDED TO MINING IN AN ALMOST PLASTIC MANNER AND PUT TREMENDOUS PRESSURE ON THE SUPPORTING TIMBERS. SO MUCH SO THAT THEY WOULD SOON SQUEEZE ANY OPENING CLOSED, CRUSHING THE HEAVIEST OF TIMBERS. THESE ENVIRONMENTS WERE CALLED "SQUEEZING GROUND."

**SQUARE TIMBER** — TIMBER THAT HAS BEEN ROUGH CUT TO HAVE A SQUARE OR RECTANGULAR CROSS SECTION. THE GREAT MAJORITY OF MINE TIMBER USED AT BISBEE WAS CLASSIFIED AS "SQUARE TIMBER" THE REMAINDER WAS ROUND TIMBER.

**SQUARESET** — THE MOST COMMON FORM OF TIMBERING USED IN THE UNDERGROUND STOPES AT BISBEE. WHILE EXPENSIVE AND USED HUGE AMOUNTS OF TIMBER, IT PROVIDED THE MAXIMUM DEGREE OF SUPPORT, FLEXIBILITY AND, MOST IMPORTANTLY, SAFETY.

A SET OF TIMBERS USED TO PROVIDE SUPPORT IN A STOPE IN AN UNDERGROUND MINE. AT BISBEE, THE SQUARESETS WERE FIVE FEET BY FIVE FEET, CENTER TO CENTER WITH THE ADJOINING SETS. EACH TIMBER SET CONSISTS OF TWO VERTICAL POSTS AND TWO EACH HORIZONTAL MEMBERS KNOWN AS A CAP AND GIRT. THE TIMBER ENDS ARE FRAMED TO ALLOW ADJOINING TIMBERS TO INTERLOCK. THEY ARE FRAMED AT MUTUAL RIGHT ANGLES, AND WHEN JOINED WITH OTHER SETS FORM A CONTINUOUS TIMBER FRAMEWORK THAT CONFORMS TO THE IRREGULAR SHAPE OF THE STOPE. THE POSTS ARE 7'4" HIGH, WHILE THE CAPS AND GIRTS ARE FIVE FEET AND FOUR FEET SEVEN INCHES LONG, RESPECTIVELY. CAPS AND GIRTS ARE PLACED ON TOP OF THE POSTS, A LINE OF CAPS BEING AT RIGHT ANGLES TO A LINE OF GIRTS. SQUARE SETS SHOULD GIVE A CLEAR OPENING OF AT LEAST 5 FEET EACH WAY BETWEEN POSTS TO AFFORD SUFFICIENT WORKING SPACE IN THE STOPE, AND A CLEAR HEIGHT OF 6½ FEET IS

ABOUT THE MINIMUM HEIGHT DESIRABLE. THIS SYSTEM OF TIMBER SUPPORT CAN BE ADAPTED TO LARGE AND IRREGULAR OREBODIES RESULTING IN AN ELABORATE NETWORK EXTENDING THE FULL HEIGHT AND WIDTH OF A STOPE.

**SQUARESET STOPING** — THE MOST COMMONLY USED STOPING METHOD USED AT BISBEE. IT IS A METHOD OF STOPING IN WHICH THE WALLS AND BACK OF THE EXCAVATION ARE SUPPORTED BY A SYSTEM OF INTERLOCKING FRAMED TIMBERS (SQUARESETS). A SQUARESET OF TIMBER CONSISTS OF TWO VERTICAL POST AND TWO HORIZONTAL MEMBERS SET AT MUTUALLY RIGHT ANGLES. THE MINING PROCESS IS SLOW AND ONLY ENOUGH ORE IS EXCAVATED TO PROVIDE ROOM FOR INSTALLATION OF EACH SUCCESSIVE SET OF TIMBER. THE STOPES ARE USUALLY MINED OUT IN FLOORS OR HORIZONTAL PANELS, AND THE SETS OF EACH SUCCESSIVE FLOOR ARE FRAMED INTO THE TOP OF THE PRECEDING FLOOR. SQUARESET STOPING WAS IDEALLY SUITED TO THE SOFT ORES IN THE IRREGULAR SHAPED OREBODIES MINED EARLY ON AT BISBEE.

**STAND PIPE** — EVERY DIAMOND DRILL HOLE STARTED WITH THE PLACEMENT OF A TWO INCH PIPE WHICH WAS GROUTED IN PLACE FOR SEVERAL FEET TO GIVE STABILITY OF THE HOLE COLLAR AS THE GROUND WAS ALWAYS FRACTURED A BIT BY MINING. WHERE WATER MIGHT BE HIT BY THE HOLE, THE STAND PIPE WOULD BE SECURELY GROUTED IN PLACE, EVEN HELD BY ADJACENT ANCHOR BOLTS, AND A VALVE PLACED ON THE PIPE, WHICH COULD BE TURNED OFF AFTER THE DRILL RODS WERE REMOVED TO STOP THE WATER FLOW, IF NECESSARY. MORE THAN ONCE, UNEXPECTED HEAVY WATER FLOWS WERE HIT BY DIAMOND DRILLING. THE STANDPIPE WITH IT VALVE GAVE THE ABILITY TO CONTROL THE WATER FLOW.

**STANDARDS** — THE FACTORS CONSIDERED AS THE CONDITIONS FOR A BASE PERFORMANCE IN THE DETERMINATION OF BONUS. THIS ALWAYS INCLUDED CONSIDERING GROUND CONDITIONS, DRILLING SPEEDS, TYPE OF TIMBERING OR OTHER SUPPORT, AS EXAMPLES. THESE WERE OF SUPREME IMPORTANCE TO THE MINER AS IF NOT PROPERLY SET, HE, HIS PARTNER AND THE OPPOSITE SHIFT WOULD MAKE LITTLE, IF ANY BONUS.

**STARTER STEEL** — DRILL STEEL SETS CAME IN GRADUATED SIZES, IN BOTH LENGTH AND BIT DIAMETER. THIS WAS THE CASE FOR BOTH HAND AND MACHINE STEELS. THE STARTER STEEL WAS THE SHORTEST IN LENGTH TO AID IN COLLARING THE HOLE, AS WELL AS HAVING THE GREATEST BIT DIAMETER. THIS LATTER FEATURE ASSURED THAT ALL SUBSEQUENT DRILL STEELS COULD ENTER THE HOLE, AS THEY WERE SUCCESSIVELY SLIGHTLY SMALLER IN DIAMETER.

**STATION** — 1). THE POINT AT WHICH A LEVEL STARTS OFF THE SHAFT, AND IS AN ENLARGEMENT OF AN ENTRY, DRIFT, OR LEVEL AT A SHAFT AT WHICH CAGES STOP TO RECEIVE AND DISCHARGE CARS, PERSONNEL, AND TEMPORALLY STORE MATERIAL. 2). AN UNDERGROUND STATION CAN ALSO BE ANY LOCATION WHERE STATIONARY ELECTRICAL EQUIPMENT IS INSTALLED. THIS INCLUDES PUMP STATIONS, VENTILATION BLOWERS, BATTERY-CHARGING STATIONS, ETC. 3). STORAGE AREAS CUT INTO THE CROSSCUT SIDE CAN ALSO BE REFERRED TO AS STATIONS, SUCH AS A TIMBER STATION WHERE TIMBER WAS STORED.

**STEEL** — ALWAYS A REFERENCE TO DRILL STEEL, BE IT HAND STEEL OR MACHINE STEEL. THE LATTER USED FOR ROCK DRILLING WITH JACKLEGS, DRIFTERS, STOPERS OR PLUGGERS AND IS THE HOLLOW STEEL BAR THAT CONNECTS THE HAMMER WITH THE BIT.

**STEEL CAR** — THE MINE CARS DESIGNED FOR THE TRANSPORT OF DRILL STEELS INTO AND FROM THE WORKING AREAS. AS THE AMOUNT OF DRILL STEEL DECREASED WITH THE INTRODUCTION OF DETACHABLE BITS, THESE USEFUL CARS WERE EMPLOYED TO TRANSPORT ANY NUMBER OF TOOLS AND WERE ALSO CALLED TOOL CARS.

**STEEL RACK** — REPLACEMENT DRILL STEEL WAS STORED NEAR WORK AREAS IN VERTICAL RACKS MADE OF LAGGING. THE STEELS WERE IN DIFFERENT COMPARTMENTS ACCORDING TO LENGTH.

**STEELWORKERS** — A REFERENCE TO THE UNITED STEELWORKERS OF AMERICA (USWA), THE UNION THAT REPRESENTED THE UNIONIZED UNDERGROUND EMPLOYEES AT BISBEE FOLLOWING ITS MERGER WITH THE MINE MILL IN 1967. IT WAS A FAR MORE RADICAL UNION WITH MUCH LESS OF A DIRECT CONNECTION WITH THE MINING INDUSTRY.

**STEMMING** — INERT MATERIAL PACKED BETWEEN THE EXPLOSIVE CHARGE AND THE OUTER END OF THE BLASTHOLE. STEMMING WAS USED TO HELP CONTAIN THE EXPLOSIVE FORCE IN THE HOLE. UNDERGROUND, NONFLAMMABLE ROCK WOOL WAS USED, WHILE ON THE SURFACE AND IN BOTH PITS, EXCESS DRILL HOLE CUTTINGS WERE SHOVELED INTO THE LOADED BLASTHOLES. ALSO REFERRED TO UNDERGROUND AS TAMPING.

**STENCH** — IN THE EVENT OF A MINE FIRE, A DISTINCTIVE ODOR WAS RELEASED INTO THE COMPRESSED AIR SYSTEM TO WARN THE MEN OF THE DANGER. IT WAS LIKE NO OTHER SMELL ONE WOULD FIND ANYWHERE AND WHEN DETECTED, ALL PERSONS UNDERGROUND WERE TO FOLLOW THE PRESCRIBED EVACUATION PLAN FROM THE AREA. DRILLS WERE HELD PERIODICALLY SO AS TO FAMILIARIZE THE MEN WITH THE ODOR AS WELL AS EVACUATION ROUTE AND PROCESS.

**STICK** — A TERM USED TO REFERENCE A CANDLESTICK, SEE WHICH.

**STICK LAMP** — WHEN CARBIDE LAMPS BEGAN TO REPLACE CANDLES AS THE SOURCE OF LIGHT FOR UNDERGROUND MINERS, AN EFFORT WAS MADE TO REPLICATE THE CANDLESTICK FORMAT. A HEAVY WIRE FRAME WITH A LOOP HANDLE AND A POINTED END WAS MADE TO ACCOMMODATE THE SMALL, CAP LAMP SIZE CARBIDE LAMPS TO GIVE THE NEW LIGHT FORM A FAMILIAR FEEL. THIS ALLOWED THE CARBIDE LAMP IN THE HOLDER TO BE STUCK INTO THE TIMBER, JUST AS THE EARLIER CANDLESTICKS HAD BEEN USED. THESE BECAME KNOWN AS STICK LAMPS. BEFORE TOO LONG, THE STICK WAS ABANDONED IN FAVOR OF CAP LAMPS AND STOPE LAMPS.

**STICKS** — THE RACK, GEAR CUT SUPPORTS FOR THE BUCKET ON AN ELECTRIC SHOVEL. THEY ARE SUPPORTED BY THE HOIST CABLE ATTACHED TO THE BUCKET AND DRIVEN BY THE PINION GEARS ON THE BOOM AND THE CABLES THAT CONTROL THE BUCKET.

**STICK OF POWDER** — A SINGLE PIECE OR “STICK,” OF DYNAMITE.

**STINGER** — THE PNEUMATIC PISTON OF AN AIRLIFT OR JACKLEG DRILL.

**STOCKPILE** — BROKEN ORE HEAPED ON A SURFACE, PENDING TREATMENT OR SHIPMENT.

**STOPE** — 1). ANY EXCAVATION IN A MINE, OTHER THAN DEVELOPMENT WORKINGS, MADE FOR THE PURPOSE OF EXTRACTING ORE. THE OUTLINES OF THE OREBODY DETERMINE THE OUTLINES OF THE STOPE. 2). THE TERM IS ALSO APPLIED TO BREAKING GROUND BY DRILLING AND BLASTING OR OTHER METHODS. TO MINE ORE IN AN OREBODY BY DRIVING HORIZONTALLY A SERIES OF WORKINGS OR FLOORS, ONE IMMEDIATELY OVER THE OTHER, OR VICE VERSA. WHEN THE FIRST FLOOR IS BEGUN AT A LOWER CORNER OF THE BODY OF ORE TO BE REMOVED, AND, AFTER IT HAS ADVANCED A CONVENIENT DISTANCE, THE NEXT FLOOR IS COMMENCED ABOVE IT. THIS IS CALLED OVERHAND STOPING. WHEN THE FIRST MINING FLOOR BEGINS AT AN UPPER CORNER, AND THE SUCCEEDING ONES ARE BELOW IT, IT IS CALLED UNDERHAND STOPING. THE TERM STOPING IS LOOSELY APPLIED TO ANY SUBTERRANEAN EXTRACTION OF ORE EXCEPT THAT WHICH IS INCIDENTALY PERFORMED IN DEVELOPMENT WORK, WHICH IS

PERFORMED FOR THE PURPOSE OF OPENING THE MINE. 3). COMMONLY APPLIED TO THE ACT OF ORE MINING, BUT DOES NOT INCLUDE THE ORE REMOVED IN SINKING SHAFTS AND IN DRIVING LEVELS, DRIFTS, AND OTHER DEVELOPMENT OPENINGS. TO STOPE IS TO MINE ORE FROM AN OREBODY

**STOPE ENGINEER** — THIS WAS A MINING ENGINEER, TASKED WITH OVERSEEING THE PROGRESS OF A NUMBER OF STOPES IN A PART OF THE MINE, OR HIS “RUN.” HE WAS TO ASSIST IN KEEPING THE STOPE IN ORE THROUGH SAMPLING AND DEFINITION OF THE ORE BOUNDARIES BASED ON DRILL OF OTHER INFORMATION, SURVEY THE STOPE WITH A BRUNTON AND TAPE, TRANSFER BOTH THE SURVEY AND SAMPLE INFORMATION TO MAPS IN THE OFFICE. IT WAS ALSO HIS RESPONSIBILITY TO ASSURE THAT ADJOINING STOPES OR OTHER WORKINGS, SUCH AS CROSSCUTS ABOVE, WERE LOCATED AND THAT NO ACCIDENTAL BREAKTHROUGHS OCCURRED.

**STOPE LAMP** — A VARIETY OF CARBIDE LAMP, TOO LARGE AND HEAVY TO FIT ON THE MINER’S CAP, WHICH WAS INTENDED TO BE HUNG NEARBY USING THE LARGE HOOK ATTACHED TO THE LAMP BALE. THESE LARGE LAMPS PROVIDED MORE OVERALL LIGHT THAN THE SMALLER, CAP LAMPS. STOPE LAMPS WERE MORE WIDELY USED BY THE MINERS THAN THE CAP LAMPS. THE MINERS WERE RESPONSIBLE TO PURCHASE WHICHEVER LAMP THEY CHOSE AND ANY REPAIR PARTS NEEDED OVER TIME, WHILE THE COMPANY PROVIDED THE CARBIDE.

**STOPPED OUT** — 1). WHEN AN OREBODY OR AN AREA OF THE MINE IS EXHAUSTED BY MINING, IT WAS REFERRED TO AS BEING STOPED OUT. 2). WHEN A MINER IS NO LONGER ABLE TO PERFORM THE RIGOROUS TASK NEEDED TO DO THE JOB BECAUSE OF INJURY, THE ACCUMULATIVE AFFECTS OF HARD LABOR OR JUST AGE, HE WAS SAID TO BE STOPED OUT. A LUCKY FEW WERE GIVEN THE JOB OF CHANGE ROOM ATTENDANT, LAMPMAN, FIREBUGS, OR WATCHMEN. THERE WERE FEW OLD MEN WORKING UNDERGROUND AS MINERS, AS THE YEARS OF DIFFICULT LABOR TOOK THEIR TOLL.

**STOPER** — A LIGHT PERCUSSIVE DRILL INCORPORATING A PNEUMATIC CYLINDER TO PROVIDE SUPPORT AND THRUST WHILE DRILLING STEEPLY UPWARD. THESE WERE THE FIRST PNEUMATIC ROCK DRILLS USED AT BISBEE AND WERE NON-ROTATING, DRY MACHINES; APPROPRIATELY CALLED “WIDOW MAKERS,” AS THE CONTINUED INHALATION OF DRILL DUST EVENTUALLY DISABLED AND KILLED MANY A MINER. BY THE LATE 1910s, MOST STOPERS WERE WET MACHINES, WHICH GREATLY ENHANCED THE SAFETY OF USING THE STOPER. BY 1950, ALL STOPERS WERE ALSO SELF-ROTATING, FURTHER MAKING THESE DRILLS EASIER TO USE. THESE DRILLS WERE USED IN RAISE WORK UNTIL THE MINES CLOSED. SEE ALSO WET STOPER AND DRY STOPER.

**STORAGE RAISE** — A LARGER DIAMETER RAISE DRIVEN FROM A MAIN HAULAGE LEVEL THROUGH TO THE LEVEL ABOVE TO PROVIDE STORAGE FOR THE ORE FROM STOPES ABOVE AND TO ALLOW FOR A MORE OR LESS CONSTANT SOURCE OF ORE WHEN OTHER SOURCES MAY NOT BE PRODUCING THE DESIRED QUANTITY.

**STREET CLOTHS** — THE NORMAL, EVERYDAY NON-WORK CLOTHS WHICH WERE WORN TO THE MINE AND CHANGED OUT OF BEFORE REPORTING TO WORK AND WHICH WILL BE PUT ON AGAIN, FOLLOWING A SHOWER AT THE END OF THE SHIFT TO GO OUT ONTO THE STREET.

**STRIKE** — THE DIRECTIONAL COURSE OR BEARING OF THE OUTCROP OR AN INCLINED BED, VEIN, OR FAULT PLANE ON A LEVEL SURFACE; THE DIRECTION OF A HORIZONTAL LINE PERPENDICULAR TO THE DIRECTION OF THE DIP.

**STRINGER** — 1). A LONG, HEAVY TIMBER, USUALLY PLACED HORIZONTAL BUT SOMETIMES INCLINED, SUPPORTING OTHER MEMBERS OF A TIMBERING SCHEME. 2). ALSO, THE HORIZONTAL CROSSPIECE IN SQUARE SET TIMBERING. 3). GEOLOGICALLY, A THIN MINERAL

VEINLET OR FILAMENT, USUALLY ONE OF A NUMBER, OCCURRING IN A DISCONTINUOUS SUB PARALLEL PATTERN IN HOST ROCK.

**STRIP** — TO UNCOVER, BY MINING, BY REMOVING THE OVERLYING MATERIAL, USUALLY WASTE OR LOW-GRADE.

**STRIPPING RATIO** — THE RATIO OF TONS REMOVED AS WASTE RELATIVE TO THE NUMBER OF TONS OF ORE REMOVED FROM AN OPEN PIT MINE. THE TERM REALLY MEANS THE WASTE TO BE REMOVED TO ALLOW FOR THE MINING OF ORE, BUT WAS OFTEN ERRONEOUSLY EMPLOYED TO REFER TO INCLUDED WASTE WITHIN THE ORE AS WELL. A STRIPPING RATIO OF ONE TO ONE (1.0:1.0), MEANS ONE TON OF WASTE MUST BE REMOVED FOR EVERY TON OF ORE MINED. SEE ALSO WASTE TO ORE RATIO.

**STUB SWITCH** — A TYPE OF RAIL SWITCH WITH TWO SETS OF RAILS WITH FLAT ENDS THAT BY MEANS OF A THROW, ONE SET OF RAILS ARE ALIGNED WITH A STATIONARY SET OF RAILS WITH FLAT ENDS. THESE WERE USED WITH MIXED SUCCESS UNTIL THE LATE 1920S WHEN THEY WERE REPLACED BY THE FAMILIAR FEATHER POINT OR SURFACE RAILROAD TYPE SWITCH.

**STULL** — 1). A TIMBER PROP SET BETWEEN THE RIBS OF A STOPE, OR SUPPORTING THE BACK. A STULL CAN BE A SINGLE POST, ONE WITH A CROSS PIECE FORMING A "T" (T STULL) OR ONE WITH A CROSS PIECE SUPPORTING SEVERAL THICKNESSES OF LAGGING TO CATCH A LARGER AREA (UMBRELLA STULL). 2). THE ACT OF PLACING THE STULL - TO STULL.

**STULL RAISE** — A RAISE DRIVEN IN GOOD GROUND WITH JUST THE HORIZONTAL STULLS PLACED IN HITCHES CUT IN THE WALL ROCK OR SUPPORTED BY 4" X 6" POST AND NO SIDE LAGGING USED FOR TIMBERING, EXCEPT AS NEEDED TO SEPARATE THE RAISE INTO TWO COMPARTMENTS.

**STULL UP** — THE ACT OF PLACING TIMBER STULLS UNDERNEATH GROUND THAT IS IN NEED OF SUPPORT.

**SUBLEVEL** — AN INTERMEDIATE LEVEL BETWEEN MAIN LEVELS USUALLY DEVELOPED TO AID IN ORE EXTRACTION. SEE ALSO INTERMEDIATE LEVEL.

**SUBSIDENCE CRACKS** — SURFACE CRACKS WHICH OCCUR ALMOST VERTICALLY ABOVE MINED OREBODIES AND WHICH RESULT FROM THE SUBSIDENCE OF THE OVERLYING LIMESTONE BECAUSE THE ORE HAD BEEN REMOVED. AT BISBEE, MANY SUCH CRACKS ARE STILL CLEARLY VISIBLE IN QUEEN HILL.

**SUGAR SULFIDE** — IN MORE THAN A FEW INSTANCES, UNCONSOLIDATED, GRANULAR PYRITE WAS HIT. THIS MATERIAL WAS SAND LIKE AND WOULD FLOW THROUGH ANY OPEN SPACE. ALL LAGGING HAD TO BE INSTALLED SKIN TO SKIN WITH ANY KNOT HOLES COVERED BY NAILING A WEDGE OVER IT. DRIVING HEADINGS THROUGH THIS MATERIAL WAS DIFFICULT AND WAS ONLY POSSIBLY BY USING SPILING. ALSO CALLED PYRITE SAND.

**SULFIDE** — A COMPOUND OF SULFUR AND SOME OTHER ELEMENT OR ELEMENTS. AT BISBEE, THE ORES WERE ORIGINALLY DEPOSITED AS SULFIDES, GENERALLY COPPER SULFIDES (CHALCOCITE, COVELLITE) AND COPPER/IRON SULFIDES (BORNITE, CHALCOPYRITE). SOME WERE OXIDIZED, FORMING CARBONATES, OXIDES OR ELEMENTAL COPPER, BUT MOST OF THE ORE MINED UNDERGROUND WERE PRIMARY SULFIDES. THE MOST COMMON SULFIDE MINERAL AT BISBEE WAS THE NON-ORE PYRITE, AN IRON SULFIDE.

**SUMP** — 1). AN UNDERGROUND EXCAVATION WHERE WATER ACCUMULATES BEFORE BEING PUMPED TO SURFACE. ALL PUMP STATIONS HAD THEM 2). THE VERY BOTTOM OF THE SHAFT WAS ALSO CALLED A SUMP AND NEEDED SOME PUMPING AS WELL, BUT THERE WAS A DIFFERENCE. EVERYTHING THAT FELL DOWN THE SHAFT ENDED UP IN THE SHAFT SUMP, THUS IT HAD TO BE CLEANED PERIODICALLY. MUCKING THIS SHAFT SUMP WAS ONE OF THE LEAST PLEASANT OF ALL MINING TASK, AS IT WAS ALWAYS WET, SHOVELING WAS HARD AND LITTLE ROCKS SEEMED TO ALWAYS FALL FROM THE BUCKET WHEN HOISTED AND THERE WAS ONLY ONE PLACE THEY WOULD GO - DOWN ON TOP OF THOSE WORKING IN THE SUMP.

**SUNRISE** — THE SUNRISE SHAFT.

**SUNSHINE STOPE** — A TERM USED BY UNDERGROUND WORKERS WHEN REFERRING TO THE OPEN PIT MINE. IT WAS THE “SUNSHINE STOPE.”

**SUPER SWITCH** — THESE WERE MADE FOR MUCKING IN CROSSCUTS AND WERE A PAIR OF PARALLEL TRACKS WELDED TO A STEEL PLATE ABOUT 15 FEET LONG WITH SWITCHES AT BOTH ENDS THAT WENT FROM DOUBLE TRACK TO SINGLE TRACK. IT SAT, TEMPORARILY, ON TOP OF THE SINGLE TRACK ALREADY IN PLACE. EMPTY CARS WERE ON ONE SIDE, LOADS ON THE OTHER. THE MUCKING MACHINE OPERATOR WOULD HOOK TO AN EMPTY, ADVANCE ON TO THE SLIDE RAILS TO MUCK AND WHEN THE CAR WAS FULL, KICK THE SWITCH TO PUT THE FULL CAR ON THE LOAD SIDE, THEN ADVANCE A BIT, KICK THE SWITCH TO THE OTHER SIDE AND GET AN EMPTY TO CONTINUE THE PROCESS. THE MOTOR CREW ON THE OTHER END, WOULD PUT FRESH EMPTIES ON THE EMPTY CAR SIDE AND PULL THE LOADED CARS FROM THE LOAD SIDE. THE SUPER SWITCH COULD HOLD ABOUT FOUR “H” STYLE CARS ON EACH SIDE. WHEN MUCKING WAS COMPLETE, THE SUPER SWITCH WAS STOOD ON EDGE AT THE SIDE OF THE CROSSCUT UNTIL THE NEXT BLAST WAS TO BE MUCKED WHEN IT WAS MOVED FORWARD AND SET ON TOP OF THE RAIL TO BEGIN ANEW.

**SUPERGENE ENRICHMENT** — A MINERAL DEPOSITION PROCESS IN WHICH NEAR-SURFACE OXIDATION PRODUCES ACIDIC SOLUTIONS THAT LEACH METALS, CARRIES THEM DOWNWARD, AND RE-PRECIPITATES THEM AS SULFIDES ON THE SULFIDE MINERALS BELOW, THUS ENRICHING THEM. THIS WAS THE PROCESS THAT MADE THE OTHERWISE LOW-GRADE PORPHYRY MINERALIZATION IN THE TWO PITS ECONOMIC, IT HAD BEEN SUPERGENE ENRICHED BY CHALCOCITE OR OTHER SIMILAR MINERALS BEING DEPOSITED ON PREEXISTING SULFIDES. ALSO CALLED SECONDARY ENRICHMENT.

**SUPERGENE** — SAID OF A MINERAL DEPOSIT OR ENRICHMENT FORMED NEAR THE SURFACE, COMMONLY BY DESCENDING SOLUTIONS; ALSO, SAID OF THOSE SOLUTIONS AND OF THAT ENVIRONMENT. THE ORES OF THE SACRAMENTO AND LAVENDER PITS WERE LARGELY SUPERGENE IN NATURE. ABSENT THIS NATURAL ENRICHMENT, NEITHER OF THESE OPEN PIT MINES WOULD HAVE BEEN TRULY ECONOMIC. ALL OF THE OXIDE ORES MINED AT BISBEE WERE SUPERGENE DEPOSITS AS WERE A GOOD MANY CHALCOCITE ORES. SEE ALSO SECONDARY.

**SUPERINTENDENT’S LAMP** — A STYLE OF CARBIDE LAMP WITH A PAIR OF FOLDING HANDLES ON THE BACK, SO THAT IT COULD BE EASILY CARRIED IN THE HAND. AS THIS LAMP STYLE DID NOT HAVE A HOOK FOR HANGING OR FITTING ON THE CAP, IT COULD NOT BE EFFICIENTLY USED FOR TYPICAL MINER’S WORK. THIS LAMP STYLE WAS GENERALLY USED BY MOST MINE SUPERVISORS AS WELL THE MINE TECHNICAL STAFF.

**SUPPLY DEPARTMENT** — THE PURCHASING AND WAREHOUSING DEPARTMENT, WHERE THE WAREHOUSE WAS CALLED THE “SUPPLY.”

**SUPPORT** — 1).THE ALL IMPORTANT FUNCTION OF KEEPING THE MINE WORKINGS OPEN. AS A VERB, IT REFERS TO THIS FUNCTION. 2). AS A NOUN IT REFERS TO ALL THE EQUIPMENT AND MATERIALS—TIMBER, ROOF BOLTS, AND/OR STEEL THAT ARE USED TO CARRY OUT THIS FUNCTION.

**SURVEY BUST** — AN ERROR MADE IN SURVEYING. EVEN THE SLIGHTEST OF ERRORS WOULD BECOME VERY SIGNIFICANT AS THE DISTANCE FROM THE ERROR POINT INCREASED, BECAUSE OF THE DIVERGENCE FROM THE ACTUAL POINT AND THE BELIEVED POINT, GREW WITH DISTANCE. THIS MADE THE CONNECTION OF TWO WORKINGS COMING FROM DISTANCE POINTS PROBLEMATIC AT BEST.

**SURVEY CREW** — A TWO-MAN CREW FROM THE ENGINEERING DEPARTMENT, WHICH SURVEYED THE MINE WORKINGS TO A HIGH DEGREE OF ACCURACY FOR PLOTTING ON THE MAIN MAPS. THEY ALSO DIRECTED THE DEVELOPMENT HEADINGS, RAISES, DRIFTS AND CROSSCUTS, THROUGH PERIODICALLY ESTABLISHING LINES FOR THE DEVELOPMENT CREWS TO USE AS A VISUAL GUIDE TO DIRECT THEM IN DRIVING THE HEADING AHEAD.

**SWAMPER** — A TERM GENERALLY APPLIED TO ANY HELPER SUCH AS, “MY SWAMPER.” HOWEVER, IT WAS MOST COMMONLY USED FOR THE MOTORMAN’S HELPER, THE MOTOR SWAMPER.

**SWELLING GROUND** — THE VERY SOFT CLAYS ASSOCIATED WITH SOME OF THE THOROUGHLY OXIDIZED ORES WOULD EXTRUDE INTO ANY OPENING, FROM ANY DIRECTION, INCLUDING FROM THE BOTTOM OF THE WORKING, LIFTING THE TRACK, GIVING THE IMPRESSION THAT THE GROUND WAS SWELLING. ALSO, SEE HEAVING.

**SWING** — THE MOVEMENT ON THE CIRCLE GEAR BY AN ELECTRIC SHOVEL. ONCE THE BUCKET WAS FULL, IT WOULD SWING TO THE TRUCK AND TRIP THE BUCKET TO EMPTY IN THE WAITING TRUCK. IT WOULD THEN SWING BACK THE DIGGING PIT TO LOAD THE BUCKET AGAIN.

**SWING SHIFT** — THE SECOND OR NIGHT SHIFT OF WORK, WHICH LASTED FROM 3:00 PM TO 11:00 PM ON THE SURFACE AND FROM 4:00 PM UNTIL MIDNIGHT UNDERGROUND.

**SWITCH** — 1). A MINE SWITCH IS A DEVICE FOR ENABLING A MOTOR AND/OR CARS TO PASS FROM ONE TRACK TO ANOTHER. 2). THE TERM SWITCH IS ALSO FREQUENTLY USED IN A LOOSE SENSE TO APPLY TO THE WHOLE SIDETRACK OR TURNOUT, AND A CAR STANDING ON A SIDETRACK IS FREQUENTLY SAID TO BE STANDING ON THE SWITCH. 3). A LEVER USED TO ENERGIZE OR DE-ENERGIZE ELECTRICAL LINES OR CABLES.

**SWITCH HOUSE** — ELECTRIC POWER LINES INTO THE PIT HAD DROP CABLES TO SMALL, PORTABLE SWITCH HOUSE, WHERE THE POWER CABLES TO THE SHOVELS AND DRILLS WERE LITERALLY PLUGGED INTO. FOR OBVIOUS SAFETY REASONS, POWER LEAVING THE SWITCH HOUSES WAS ALWAYS DISCONNECTED BY MEANS OF A BREAKER SWITCH BEFORE ANY OF THE HUGE, HIGH VOLTAGE, PLUG TYPE CONNECTORS WERE ADDED OR REMOVED.

**SWITCH POINT** — A PAIR OF MOVABLE TONGUES OR RAILS FOR DIVERTING A TRAIN FROM ONE TRACK TO ANOTHER.

**SWITCH THROW** — THE ARRANGEMENT OF LEVERS AND WEIGHTS BY MEANS OF WHICH A SWITCH IS THROWN FOR THE STRAIGHT TRACK OR THE TURNOUT OR VICE VERSA.

**SWITCHTENDER** — IN THE SACRAMENTO PIT, MEN WERE STATIONED AT STRATEGIC SWITCHES ON THE RAILROAD LINE TO THROW THE SWITCH AS DIRECTED BY THE DISPATCHER,

VIA TELEPHONE, AND THUS ROUTE THE TRAIN TO ITS INTENDED DESTINATION, SUCH AS A GIVEN SHOVEL, THE CONCENTRATOR OR A WASTE DUMP.

**T STULL** — A SUPPORT STULL CONSISTING OF A HEAVY VERTICAL POST WITH A SECOND HEAVY TIMBER PLACED ON TOP FORMING A “T” TO ADD SUPPORT TO A WIDER AREA. IT IS THEN WEDGED TIGHT TO THE BACK. THE TOP PIECE OF THE “T” IS HELD IN PLACE BY LAGGING SCABBED, VERTICALLY, ON TWO OPPOSING SIDES OF THE POST.

**TAG OUT** — WHEN IT WAS NECESSARY TO WORK ON THE ELECTRICAL SYSTEM, TROLLEY, COMPRESSED AIR, WATER OR ANYTHING ELSE WHERE THE TURNING ON OR ACTIVATION OF A SYSTEM COULD CAUSE INJURY TO THOSE WORKING ON THE SYSTEM, TAGS WERE PLACED AT THE POINT IT COULD BE ACTIVATED OR TURNED ON TO PREVENT A PERSON UNAWARE OF THE ACTIVITY FROM DOING SO. THE PLACING OF THE TAGS AND TURNING OFF OR DEACTIVATING THE SYSTEM TO BE REPAIRED WAS CALLED “TAG OUT.” NEEDLESS TO SAY, IGNORING A TAG, OR NOT PLACING A TAG WHEN NECESSARY WERE SERIOUS AND DANGEROUS ACTIONS.

**TAIL CAR** — THE LAST MINE CAR IN THE TRAIN. THIS CAR WAS TO BE EQUIPPED WITH EITHER A LIGHT OR REFLECTOR FOR SAFETY REASONS, AS IT WAS NOT UNCOMMON FOR THE MOTOR TO PUSH A TRAIN INTO A WORKING AREA AND, WHILE THE SWAMPER WAS TO PRECEDE THE TRAIN, THE TAIL LIGHT OR REFLECTOR WAS AN ADDED SAFETY FEATURE. THE SWAMPER OFTEN RODE THE TAIL CAR WHEN BEING PULLED, HOLDING ONTO A HAND PROTECTOR AND STANDING ON A CAR STEP.

**TAIL LIGHT** — THE LIGHT OR REFLECTOR PLACED ON THE END OR TAIL CAR OF AN UNDERGROUND TRAIN.

**TAIL ROOM** — THE DISTANCE DRIVEN BEYOND A RAISE TO ACCOMMODATE MINE CARS FOR LOADING. THIS WAS USUALLY A MINIMUM OF SIX CAR LENGTHS TO ALLOW AN ENTIRE TRAIN TO LOAD FROM THE RAISE.

**TAILINGS** — THE REJECT FROM FROTH FLOTATION CELLS. THIS IS A FINELY GROUND, POWDER LIKE MATERIAL FROM WHICH THE ORE MINERALS HAVE BEEN SEPARATED. NOT TO BE CONFUSED WITH MINE ROCK WASTE, WHICH IS SOMETIMES ERRONEOUSLY, CALLED TAILINGS AS WELL OR WITH SLAG, WHICH IS THE WASTE FURNACE PRODUCT FROM SMELTING.

**TAILINGS GRADE** — THE COPPER CONTENT OF THE TAILINGS AS IT LEAVES THE CONCENTRATOR FOR DISPOSAL. THIS WAS SOMETHING CONSTANTLY MONITORED, TO ASSURE THAT THE RECOVERY SYSTEM WAS FUNCTIONING AS DESIRED. ALSO COMMONLY CALLED TAILS ASSAY, REFLECTING THE ASSAY VALUE OF THE TAILINGS.

**TAILINGS POND** — THE DISPOSAL REPOSITORY WHERE THE FINELY GROUND, NON-ORE MATERIAL WAS DEPOSITED, HYDRAULICALLY, FOLLOWING SEPARATION FROM THE ORE MINERALS BY FROTH FLOTATION. THE WATER USED TO TRANSPORT THE TAILINGS WAS MADE TO POND BY THE STRATEGIC PLACEMENT OF THE TAILINGS DISCHARGE POINTS. MUCH OF THIS WATER WAS RECOVERED FOR REUSE.

**TAILS** — TAILINGS.

**TAILS ASSAY** — SEE TAILINGS GRADE.

**TAILOR MADE** — COMMERCIALY PRODUCED CIGARETTES. THESE WERE TYPICALLY FORBIDDEN BECAUSE OF THE FIRE HAZARD, AS A DISCARDED “TAILOR MADE” WOULD CONTINUE TO BURN WHERE AS ONE ROLLED BY HAND WOULD GO OUT ALMOST IMMEDIATELY.

**TAKING WEIGHT** — SAID OF TIMBER, WHICH IS SHOWING SIGNS OF BEING UNDER SUBSTANTIAL PRESSURE FROM THE ROCK IT IS SUPPORTING. THIS IS OFTEN A PRELUDE TO COLLAPSE, REQUIRING REPAIR WORK OR ADDING ADDITIONAL SUPPORT TIMBERS.

**TALC** — A GENERIC NAME APPLIED TO ANY OF THE SEVERAL LIGHT COLORED CLAY MINERALS, USUALLY KAOLINITE. NO TRUE TALC HAS BEEN IDENTIFIED AT BISBEE.

**TALKING TIMBER** — GROUND AROUND AN UNDERGROUND OPENING, WHICH IS MOVING IS SAID TO BE “WORKING.” AS THIS GROUND WAS TYPICALLY TIMBERED, THE TIMBER WOULD MAKE CREAKING AND POPPING SOUNDS AND WAS SAID TO BE “TALKING” TO THE MINERS. A DISCONCERTING, BUT SELDOM DANGEROUS EVENT AS THE GROUND EVENTUALLY REACHED EQUILIBRIUM.

**TALLY BOARD** — A WOODEN BOARD WITH THREE COLUMNS OF TEN HOLES, THE LEFT COLUMN REPRESENTED 0 - 9, THE MIDDLE COLUMN 10 - 90 AND THE RIGHT 100 - 1000. WOODEN PEGS ARE USED TO MARK NUMBER OF CARS DUMPED INTO A CHUTE OR, IN THE CASE OF A HAULAGE LEVEL, THE NUMBER OF CARS PULLED FROM THE CHUTE.

**TAMP** — AFTER THE FIRST, AND PRIMED, STICK OF POWDER WAS PLACED IN A BLASTHOLE, AS EACH SUBSEQUENT STICK OF DYNAMITE WAS INSERTED INTO THE BLASTHOLE, IT WAS PUSHED IN WITH A LOADING STICK AND, THEN, PUSHED HARD ENOUGH TO COMPRESS IT SOMEWHAT AND HAVE IT EXPAND TO FILL THE HOLE. THIS WAS TO TAMP. THIS ACTION PREVENTED DYNAMITE FROM FALLING BACK OUT OF VERTICAL OR UPWARD INCLINED HOLES. IT ALSO ASSURED GOOD CONTACT BETWEEN THE INDIVIDUAL PIECES OF POWDER TO ASSURE DETONATION AS ONLY THE FIRST STICK HAD A BLASTING CAP INSERTED.

**TAMPING** — 1). THE ACT OF PACKING A DRILLED HOLE WITH A CARTRIDGE OF INERT MATERIAL SUCH AS ROCK WOOL ON TOP OF THE LOADED EXPLOSIVES BEFORE BLASTING, TO HELP CONTAIN THE FORCE OF THE BLAST. 2). THE INERT MATERIAL PLACED IN A BLASTHOLE. SEE ALSO STEMMING.

**TAP A CHUTE** — TO EXTRACT ROCK FROM A CHUTE. SEE ALSO PULL A CHUTE.

**TENON** — THE CUT POINT, SETBACK OR SHOULDER WHERE THE FRAMED PIECES OF SQUARESET TIMBER JOIN TOGETHER.

**THICKENER** — A LARGE, ROUND TANK USED IN CONCENTRATING OPERATIONS TO SEPARATE SOME OF THE LIQUID FROM THE SOLIDS. THE CLEAR FLUID OVER FLOWS FROM THE TANK AND IS RECOVERED FOR REUSE, WHILE THE FINELY GROUND ROCK PARTICLES SINK TO THE BOTTOM AND LEAVE THE THICKENER AS A HIGH SOLIDS SLURRY. BOTH CONCENTRATES AND TAILINGS WERE THICKENED.

**TIE** — 1). ONE OF THE TRANSVERSE WOODEN SUPPORTS TO WHICH RAILROAD RAILS ARE SPIKED TO KEEP THEM IN LINE, SET AS TO GAUGE, AND ON GRADE. 2). IN TIMBERING, A BEAM OR TIMBER TO HOLD TWO PIECES AT A SPECIFIED DISTANCE APART, SUCH AS IN SIX-POST RAISE SETS.

**TIE IN** — 1). THE CONNECTION OF TWO HEADINGS DRIVEN FROM DIFFERENT POINTS, SUCH AS VERTICAL RAISES DRIVEN ON TWO DIFFERENT LEVELS BEING CONNECTED. MUCH OF THE CAMPBELL SHAFT, FROM THE 1800 LEVEL TO THE 600 FOOT DEPTH, WAS DEVELOPED BY THE TIE IN OF MULTIPLE RAISES, DRIVEN FROM DIFFERENT LEVELS. THE CAMPBELL TIE IN WAS NEAR PERFECT, A TESTAMENT TO THE GOOD SURVEY WORK BY THE ENGINEERS INVOLVED. 2).

THE CONNECTING OF PRIMACORD BRANCH LINES TO THE MAIN LINE PREPARATORY TO A BLAST IN THE LAVENDER PIT.

**TIE PLATE** — 1). THE SMALL STEEL PLATE USED WITH ROCK BOLTS AND TIGHTENED, FAST AGAINST THE ROCK TO HELP SUPPORT THE IMMEDIATE AREA. 2). IN THE SACRAMENTO PIT, THESE WERE SPECIALLY DESIGNED, STEEL PLATES WITH SQUARE HOLES FOR THE SPIKES, WHICH SAT UNDER THE RAIL TO PREVENT THE RAIL FROM WEARING INTO THE TIE.

**TIMBER** — 1). ANY OF THE WOODEN PROPS, POSTS, SPRAGS, COLLARS, LAGGING, STEEL JOISTS OR BEAMS, ETC., USED TO SUPPORT MINE WORKINGS. 2). ALSO, TO SET OR PLACE TIMBERS IN A MINE IS TO TIMBER.

**TIMBER CHAIN** — A CHAIN MADE FOR HOISTING TIMBER. IT CONSISTED OF LARGE, FAIRLY LIGHTWEIGHT LINKS AND AN OPEN “C” TYPE HOOK, WHICH WOULD SLIDE ALONG THE CHAIN AND TIGHTEN AROUND THE TIMBER WHEN UNDER TENSION, ALLOWING IT TO BE HOISTED.

**TIMBER DOGS** — AN IRON BAR, WITH SPIKED ENDS AT RIGHT ANGLES TO THE BAR AXIS, WITH WHICH TIMBERS ARE HELD TOGETHER AND STEADIED BY DRIVING THE SPIKED ENDS INTO TWO, ADJOINING TIMBER PIECES.

**TIMBER JACK** — A SCREW JACK TO RAISE AND HOLD THE CAPS WHILE POSTS ARE BEING SET, USUALLY DURING MAINTENANCE.

**TIMBER SAW** — A VERY COARSE TOOTHED HANDSAW USED TO CUT MINE TIMBER. IN TIME, THE HANDSAWS WERE REPLACED WITH PNEUMATIC CHAIN SAWS WHERE MUCH TIMBER WAS TO BE CUT AND MODIFIED FROM THE STANDARD LENGTHS AND OR FRAMING PATTERNS PROVIDED.

**TIMBER SLIDE** — A PART OF ONE COMPARTMENT IN EVERY RAISE WAS LINED WITH THIN PLANKING TO MAKE IT SMOOTH FOR THE HOISTING OF TIMBER AND OTHER SUPPLIES, WHILE DRIVING THE RAISE AND, LATER INTO THE STOPE, WHICH THE RAISE WAS DRIVEN TO SERVE.

**TIMBER STATION** — TIMBER WAS OFTEN STORED IN PLACES CONVENIENT TO THE STOPES AND OTHER WORKINGS FOR READY ACCESS. THESE WERE OFTEN SILL LEVEL STOPE AREAS OR CHAMBERS CUT INTO THE CROSSCUT WALLS SPECIFICALLY FOR THIS REASON. SMALL PATCHES OF ORE ALONG A CROSSCUT WERE OFTEN REMOVED AND THE OPEN SPACE USED AS A TIMBER STATION, OTHERWISE THESE SMALL ORE OCCURRENCES DID NOT JUSTIFY THE SETUP WORK NEEDED TO MINE THEM.

**TIMBER TRUCK** — A FLAT TRUCK USED ON THE MINE RAILS, PRINCIPALLY FOR HAULING TIMBERS INSIDE A MINE, BUT ALSO USED TO TRANSPORT A WIDE ASSORTMENT OF HEAVY OR BULKY ITEMS.

**TIMBER YARD** — EACH MINE HAD A SECTION OF IT YARD DEDICATED TO TIMBER STORAGE, AS SO MUCH WAS USED AND THE LONG DELIVERY TIME BETWEEN THE ORDER DATE AND RECEIVED DATE, REQUIRED LARGE STOCKS. THESE YARDS WERE INVARIABLY SERVICED BY A RAILROAD AND NEAR THE MINE SAWMILL AND FRAMING SHOP FOR EASE OF HANDLING WHEN NEEDED. AS TRANSPORTATION IMPROVED, CENTRAL TIMBER YARDS WERE ESTABLISHED AND EACH MINE STORED ONLY A MODEST AMOUNT OF FRAMED AND BUNDLED TIMBER.

**TIMBERMAN** — A MINER SKILLED IN THE REPAIR OF TIMBER INCLUDING FRAMING, ERECTING, AND SECURING TIMBERS SET IN MINE WORKINGS. GOOD TIMBERMEN WERE ALWAYS SCARCE AND HELD IN HIGH REGARD. THE CRAFT OF THE TIMBERMAN IS GRADUALLY BECOMING EXTINCT.

**TIMBERMAN SWAMPER** — A TIMBERMAN'S ASSISTANT.

**TIMEKEEPER** — THIS MAN HANDED EVERY MAN HIS BRASS AS HE REPORTED TO WORK AND COLLECTED IT WHEN RETURNED AT SHIFT'S END. HE PLACED THE BRASS ON THE BOARD TO KEEP TRACK OF THE MEN'S PRESENCE. WHEN THE MEN WERE UNDERGROUND, THE TIMEKEEPER MADE AN ACCOUNTING OF EVERY PERSON'S TIME AS TO HOW MANY HOURS WORKED, WHERE HE WORKED AND, IF APPROPRIATE NOTE ANY CHANGE IN PAY GRADE. HE THEN ASSIGNED THE APPROPRIATE CODES FOR ACCOUNTING AND COSTING PURPOSES.

**TIP** — TO DUMP AND EMPTY, SUCH AS TO TIP A SKIP OR CAR.

**TOE** — IN OPEN PIT MINING, IT IS THE BOTTOM OF A BENCH WHERE IT MEETS THE HORIZONTAL PART OF THE NEXT BENCH BELOW.

**TOE HOLES** — BLASTHOLES DRILLED INTO THE TOE OF AN OPEN PIT BENCH. THESE WERE SMALL DIAMETER HOLES AND BLASTED SIMULTANEOUSLY WITH THE LARGE DIAMETER BENCH HOLES ABOVE. TOE HOLES WERE A COMMON PART OF THE BLASTING SCHEME IN THE SACRAMENTO PIT, BUT SELDOM USED IN THE LAVENDER PIT BECAUSE OF IMPROVED BLASTING TECHNIQUES.

**TOILET CAR** — AS THE NAME IMPLIES, THE MINE CAR SPECIFICALLY MADE FOR USE AS AN UNDERGROUND LATRINE. THESE WERE ABOUT  $\frac{3}{4}$  FILLED WITH A WATER/CREOSOTE MIX TO REDUCE THE SMELL, AS THE CREOSOTE FLOATED ON TOP OF THE WATER. THE CARS WERE SCATTERED THROUGHOUT THE MINES AT LOCATIONS CONVENIENT TO THE WORKING AREAS AND CHANGED OUT ON A REGULAR BASIS. WHILE LESS THAN COMFORTABLE AND PLEASANT TO USE, THEY WERE A VAST IMPROVEMENT OVER THE LARGE CARBIDE CANS OR EMPTY POWDER BOXES USED WITH LIME FOR SO LONG.

**TOOL CAR** — A MINE CAR BUILT SPECIFICALLY TO TRANSPORT TOOLS, SUCH AS PICKS AND BARS AS WELL AS DRILL STEELS. THEY TYPICALLY WERE ALL STEEL IN CONSTRUCTION AND DIVIDED INTO FOUR COMPARTMENTS TO ACCOMMODATE AND SEGREGATE A VARIETY OF TOOLS OR STEEL LENGTHS. AFTER THE CONVERSION TO DETACHABLE BITS, THE NEED TO TRANSPORT SO MUCH STEEL DIMINISHED AND THE CARS BECAME LESS COMMON THOUGH THEY WERE USED TO THE END OF MINING FOR THE OTHER TOOLS.

**TOOL NIPPER** — A PERSON WHO SUPPLIED THE WIDE VARIETY OF TOOLS TO THE VARIOUS WORKING PLACES AND LEVELS OF A MINE AND COLLECTED DULLED TOOLS AND BAD ORDER DRILLS FOR TRANSPORT TO THE SURFACE FOR REPAIR.

**TOP** — TO THE UNDERGROUND MINER AT BISBEE THIS WAS THE SURFACE, OUTSIDE OF THE MINE.

**TOP SLICE** — A METHOD OF STOPING IN WHICH THE ORE IS EXTRACTED BY EXCAVATING A SERIES OF HORIZONTAL TIMBERED SLICES ALONGSIDE EACH OTHER, BEGINNING AT THE TOP OF THE OREBODY AND WORKING PROGRESSIVELY DOWNWARD; CAUSING EACH SLICE TO CAVE WHEN MINING ON THAT LEVEL IS COMPLETE. THE SLICES ARE CAVED BY BLASTING OUT THE TIMBERS, BRINGING THE WASTE ABOVE DOWN UPON THE BOTTOM OF THE SLICE THAT HAS BEEN PREVIOUSLY COVERED WITH A FLOOR OR MAT OF TIMBER TO SEPARATE THE CAVED MATERIAL FROM THE SOLID ORE BENEATH. SUCCEEDING LOWER SLICES ARE MINED IN A SIMILAR MANNER UP TO THE OVERLYING MAT OR GOB, WHICH CONSISTS OF AN ACCUMULATION OF BROKEN TIMBERS AND LAGGING FROM THE UPPER SLICES AND OF CAVED CAPPING. SEVERAL VARIATIONS ON THE STANDARD TOP SLICE STOPING WERE EMPLOYED AT BISBEE. THESE WERE THE MITCHELL TOP SLICE SYSTEM AND THE RUCKER SLICE, SEE WHICH.

**TOPLANDER** — BEFORE THE INTRODUCTION OF SKIPS, THE TOPLANDER TOOK THE LOADED CARS FROM THE CAGE, TRAMMED AND DUMPED THEM INTO THE ORE BINS, THEN RETURNED THEM EMPTY TO THE CAGE TO BE LOWERED. THEY ALSO LOADED RAILROAD CARS WITH ORE FROM BINS BY RAISING AND LOWERING CHUTE DOORS. WHEN SKIPS CAME INTO USE, THE TOPLANDER WAS ONLY RESPONSIBLE FOR LOADING THE RAILROAD CARS, USUALLY PERFORMED ON NIGHT SHIFT AND GRAVEYARD SHIFT. THIS WAS NOT A SIMPLE JOB, AS HE ALSO HAD TO DROP THE LOADS AWAY FROM THE CHUTES AND DROP AN EMPTY INTO PLACE, USUALLY BY GRAVITY WITHOUT LOSING CONTROL OF THE CAR.

**TRACK** — 1). UNDERGROUND, THE “TRACK” IS THE FLOOR. 2). THE MINE RAILS, IN PLACE, ARE ALSO REFERRED TO AS THE TRACK. 3). IN THE OPEN PIT, THE CATERPILLAR CRAWLERS ON ALL TYPES OF EQUIPMENT (SHOVELS, DOZERS, DRILLS) ARE CALLED TRACKS.

**TRACK BALLAST** — THE LOOSE ROCK TAMPED BETWEEN THE TRACK TIES TO HELP HOLD THE TRACK IN PLACE. IN PARTS OF THE UNDERGROUND MINES AND THE SACRAMENTO PIT, SMELTER SLAG WAS OFTEN USED FOR TRACK BALLAST BECAUSE IT WAS HEAVY AND DURABLE.

**TRACK BOLT** — A ROUND HEADED BOLT WITH AN OVAL COLLAR THAT FITS INTO THE HOLE OF A FISHPLATE AND WHICH WAS USED IN FASTENING LENGTHS OF RAIL TOGETHER.

**TRACK COPPER** — THE HIGH COPPER — LOW PH MINE WATERS QUICKLY REPLACED ANY IRON OR STEEL ITEM WITH COPPER. IT WAS COMMON IN LITTLE USED OR ABANDONED AREAS, WHERE THE COPPER RICH WATERS PONDED, FOR THE STEEL MINE RAILS (TRACK) TO BE REPLACED BY COPPER AND TO SERVE AS A NUCLEUS FOR ATTRACTIVE GROWTHS OF NEAR PURE COPPER. WHILE THESE COPPER MASSES SELDOM LOOKED LIKE THE MINE RAIL THEY REPLACED, THEY WERE STILL CALLED “TRACK COPPER”, IN REFERENCE TO THEIR ORIGIN. IT IS NOT UNCOMMON TO SEE SUCH MATERIAL REPRESENTED AS NATIVE COPPER, WHICH IS INCORRECT, AS IT IS TRULY POST-MINING COPPER.

**TRACK BONDING** — TROLLEY MOTORS DEPENDED ON ELECTRICAL CONNECTIVITY OF THE RAILS. TO ACHIEVE THIS CONNECTIVITY, COPPER BONDING CABLES ARE ATTACHED TO EACH RAIL AT THE POINT OF CONNECTION, AS THE STEEL FISHPLATES ARE NOT TOTALLY RELIABLE IN THIS REGARD.

**TRACK GANG** — IN THE SACRAMENTO PIT, THIS WAS THE CREW WHICH MADE PANELS OF RAIL, PUT THEM IN PLACE, MOVED THEM AS NECESSARY AND MAINTAINED ALL OF THE RAIL IN THE MINE AND DUMP AREAS. A SIMILAR FUNCTION WAS PERFORMED IN THE LAVENDER PIT BY A MUCH SMALLER GROUP, AS ONLY THE WASTE DUMP HAD RAIL. THIS WAS THE LOWEST JOB IN THE OPEN PIT MINE AND A DIFFICULT ONE, AS THEY CONTINUALLY HAD TO MOVE THE TRACK ON THE NUMBER SEVEN DUMP AS IT WAS EXPANDED AS WELL AS MAINTAIN THE REST OF THE TRACK ALONG THE ROUTE.

**TRACK GAUGE** — 1). THE INSIDE DISTANCE BETWEEN THE MINE RAILS. 2). A SHORT T SHAPED, STEEL BAR WITH ANGLE CLIPS ON EACH END WITH THE DISTANCE BETWEEN THE CLIPS EQUAL TO THE DESIRED DISTANCE BETWEEN TRACK RAILS AND USED TO ACCURATELY SPACE THE RAILS FOR SPIKING.

**TRACK HAMMER** — A SPECIAL HAMMER MADE TO DRIVE THE SPIKES IN THE UNDERGROUND MINE. IT IS SMALLER AND SHORTER THAN THE TYPICAL SPIKE MAUL USED IN NORMAL RAILROAD TRACK CONSTRUCTION.

**TRACK SPIKE** — A HEAVY STEEL, NAIL-LIKE SPIKE OF SQUARE CROSS SECTION WITH ONE FLANGED SIDE THAT IS DRIVEN INTO A WOODEN TIE TO HOLD A FLANGED RAIL. TRACK SPIKES WERE DRIVEN ON BOTH SIDES OF THE RAIL IN AN OFFSET MANNER SO AS NOT TO SPLIT THE TIE. DIFFERENT SIZE SPIKES WERE USED FOR DIFFERENT RAIL SIZES.

**TRACK TIE** — WOODEN BEAMS OF ABOUT 36 INCHES IN LENGTH AND WITH A 4" X 6" CROSS SECTION, WHICH ARE PLACED ON THE CROSSCUT BOTTOM WITH A REGULAR SPACING OF ABOUT TWO FEET, DEPENDING ON THE RAIL SIZE. THE RAIL IS TO THE APPROPRIATE GAUGE AND THEN SPIKED TO THE TIES TO HOLD IT IN PLACE. DIRT AND ROCK BALLAST IS THEN PLACED BETWEEN THE TIES TO SECURE THEM IN PLACE.

**TRACK WRENCH** — THESE WRENCHES WERE DESIGNED FOR TRACK USE ONLY AS THE OPENING PERFECTLY FIT THE SQUARE NUTS OF THE TRACK BOLT AND THE HANDLE WAS POINTED TO USE AS A TOOL TO LINE UP THE HOLES IN THE TWO FISHPLATES AND THE RAIL. ALSO, COMMONLY CALLED A "SPUD WRENCH" IN REFERENCE TO ITS POINTED OR SPUD END.

**TRAIN** — 1). UNDERGROUND, THE TROLLEY MOTOR AND THE CARS. 2). IN THE SACRAMENTO AND LAVENDER PITS, THE HAULAGE RAILROAD UNITS CONSISTING OF THE LOCOMOTIVE AND THE SIDE-DUMP ROCK CARS.

**TRAIN/SHOVEL PIT** — AN OPEN PIT MINE WHERE STANDARD GAUGE RAILROAD EQUIPMENT IS USED FOR HAULAGE AND STEAM OR ELECTRIC POWER SHOVELS ARE USED FOR LOADING THE BROKEN ROCK INTO THE RAIL CARS. THE SACRAMENTO PIT WAS AN EXAMPLE OF SUCH A MINE.

**TRAM** — TO MOVE ANY MINE CAR OR TRUCK EITHER PUSHING BY HAND OR PULLING MULE OR MOTOR.

**TRAMMER** — A PERSON WHO LOADS MINE CARS FROM STOPE CHUTES AND DELIVERS THEM TO THE SHAFT OR ANOTHER POINT BY PUSHING BY HAND. HE ALSO HANDLED CARS LOADED BY THE SHOVELERS IN CROSSCUTS.

**TRAMMING** — THE MOVEMENT OF LOADED AND EMPTY MINE CARS. THIS WAS PERFORMED IN BISBEE BY HAND, ANIMAL OR ELECTRIC TROLLEY MOTOR.

**TRAMP** — TO TRAMP A MINER WAS TO FIRE HIM. HE WOULD THEN MOVE ON TO THE NEXT MINING CAMP TO FIND WORK.

**TRAMP MINER** — IT WAS NOT UNCOMMON FOR GOOD MINERS TO MOVE QUITE OFTEN, ROAMING FROM MINING CAMP TO MINING CAMP, GET WORK, STAY AWHILE, THEN MOVE ON. SOME WORKED THE NORTH COUNTRY IN THE SUMMER AND ARIZONA IN THE WINTER. BECAUSE OF THEIR ITINERATE LIFE STYLES, THEY WERE CALLED TRAMPS. WHILE THE MINING COMPANIES COVETED THEIR SKILLS, THEY WERE TROUBLED BY THE SHORT TIME THEY WOULD STAY AS THEY WERE HARD TO REPLACE, THUS, THE COMPANIES LOOKED FOR WAYS TO BUILD A STABLE WORKFORCE, ONE, WHICH WOULD REMAIN IN TOWN.

**TRAMWAY** — GENERALLY REFERRED TO AS AN "AERIAL TRAMWAY." A SYSTEM FOR THE TRANSPORTATION OF MATERIAL, SUCH AS ORE OR ROCK, IN BUCKETS SUSPENDED FROM PULLEYS OR GROOVED WHEELS THAT RUN ON A CABLE, USUALLY STATIONARY. THE SHATTUCK MINE WAS THE ONLY ONE AT BISBEE TO USE A TRAMWAY. ORE WAS TRANSPORTED DOWN IN THE BUCKETS WHILE SUPPLIES AND MATERIALS SUCH AS TIMBER WERE SENT UP. MEN ALSO RODE IN THE BUCKETS TO REACH THE MINE, BUT IT WAS PRACTICE NOT NECESSARILY APPROVED OF BY MANAGEMENT BECAUSE OF THE SAFETY CONCERNS.

**TRANSFER RAISE** — ONE OF A SERIES OF INTER-CONNECTED RAISES USED TO TRANSFER MATERIAL FROM LEVEL TO LEVEL, IF NOT FOR SEVERAL LEVELS. TYPICALLY, THERE WERE CHUTE DOORS ON EACH LEVEL TO CONTROL THE FLOW OF MATERIAL AND NOT OVER FILL THE LOWER PART OF THE SYSTEM. AT BISBEE, THERE WERE ALWAYS ACCESS CROSSCUTS TO THE INDIVIDUAL TRANSFER POINTS ON EACH LEVEL.

**TRICHITE** — A NAME COMMONLY APPLIED BY THE MINERS TO CHALCOTRICHITE THE ACICULAR VARIETY OF CUPRITE.

**TRICONE BIT** — A ROLLER BIT WITH THREE CONE-SHAPED CUTTERS IN THE HEAD OF THE BIT. THIS TYPE OF BIT WAS USED ON THE ROTARY BASTHOLE DRILLS IN THE LAVENDER PIT.

**TRIM CUT** — A SERIES OF BASTHOLE, USUALLY PARALLEL TO AN OPENING TO EXPAND AN OPENING OR TO TRIM OFF A POINT. SIMILAR TO A SLAB ROUND, BUT TYPICALLY SMALLER.

**TRIP** — 1). TO OPEN THE BUCKET ON AN ELECTRIC SHOVEL. 2). TO OPEN A SWITCH ON AN ELECTRICAL LINE. THIS WAS DONE MANUALLY TO ALLOW FOR THE DISCONNECTING OF POWER CABLES TO SHOVELS AND OTHER ELECTRICALLY POWERED EQUIPMENT IN THE LAVENDER PIT.

**TRIPLE CALL** — WHEN MEN NEEDED TO USE THE CAGE TO MOVE FROM LEVEL, THEY WOULD RING THE CALL BELL USING THE ESTABLISHED NUMBER AND SEQUENCE OF BELLS TO INDICATE THE LEVEL THEY WERE ON AND THEN WAIT FOR THE CAGER TO HAVE A MOMENT BETWEEN HIS OTHER DUTIES TO COME TO THE INDICATED LEVEL. THE WAIT WAS OFTEN A LONG ONE, AS THE CAGERS HAD ONLY A LIMITED AMOUNT OF TIME TO LOWER THE SUPPLIES INTO THE MINE. HOWEVER, A SELECT FEW OF THE SENIOR MANAGEMENT TEAM HAD THE PRIVILEGE OF RINGING THE LEVEL CALL BELL THREE TIMES, SUCCESSIVELY, THE SACROSANCT “TRIPLE CALL”, WHICH WOULD BRING THE CAGER TO THE LEVEL AT THE VERY FIRST OPPORTUNITY.

**TRIPPER CAR** — A DOUBLE PULLEY THAT TURNS A SHORT SECTION OF A CONVEYOR BELT UPSIDE DOWN IN ORDER TO DUMP ITS LOAD INTO A SIDE CHUTE OR RAIL CAR. A TRIPPER CAR SYSTEM WAS USED AT THE SACRAMENTO MINE IN LOADING RAILROAD CARS FOR SHIPMENT TO THE SMELTER. THE SAME WAS EMPLOYED TO LOAD RAIL CARS WITH DRIED CONCENTRATE FROM THE LAVENDER PIT CONCENTRATOR.

**TROLLEY** — TO THE MEN UNDERGROUND, THIS ALWAYS MEANT THE BARE COPPER WIRE IN THE BACK, WHICH PROVIDED POWER TO THE MOTOR. IT CARRIED 240 VOLTS OF DIRECT CURRENT AND WAS VERY MUCH RESPECTED, AS EVEN THE SLIGHTEST CONTACT WAS MUCH LIKE A FORCEFUL HIT FROM A BIG MAN - IT KNOCKED YOU DOWN. FEW CARRIED A BAR OR OTHER CONDUCTING MATERIAL ON THEIR SHOULDER, A SECOND TIME, AFTER IT CONTACTED THE TROLLEY ONCE.

**TROLLEY BREAKER** — ON THE STATION OF EVERY LEVEL THERE WAS AN EMERGENCY CUTOFF SWITCH TO BREAK ELECTRICAL POWER FEED TO THE TROLLEY SYSTEM IN CASE OF EMERGENCY OR REPAIR. ALL UNDERGROUND PERSONNEL WERE REQUIRED TO KNOW ITS LOCATION AND HOW TO OPERATE IN THE EVENT SOMEONE CAME INTO CONTACT WITH THE TROLLEY WIRE AND COULD NOT BE REMOVED OR THE TROLLEY OTHERWISE GROUNDED.

**TROLLEY BREAKER TRIP SWITCH** — EVERY TROLLEY MOTOR HAD AN EMERGENCY TROLLEY BREAKER SWITCH, WHICH WAS TO BE PULLED IN AN EMERGENCY INVOLVING CONTACT WITH THE TROLLEY WIRE. WHEN PULLED, THE TRIP SWITCH WOULD GROUND THE TROLLEY WIRE, CAUSING THE TROLLEY BREAKER ON THE STATION TO TRIP AND KILL ALL POWER TO THE TROLLEY SYSTEM ON THE LEVEL.

**TROLLEY HANGER** — THE SUPPORT FOR THE TROLLEY WIRE WHICH WAS A CLAMP TIGHTENED BY A COPPER WEDGE. THE HANGERS WERE INSULATED FROM THE LAG SCREW USED TO ATTACH THEM TO THE TIMBER OR TO A WOODEN PLUG INSERTED IN A DRILL HOLE IN THE BACK.

**TROLLEY POLE** — EVERY TROLLEY MOTOR HAD A WOODEN POLE WITH A BRASS WHEEL, WHICH CONTACTED THE TROLLEY WIRE CONDUCTING THE ELECTRICITY TO A HEAVY CABLE ALONG THE POLE, THEN TO THE MOTOR. THE POLE WAS SET IN A SPRING-LOADED SOCKET TO MAINTAIN CONTACT WITH THE TROLLEY WIRE. WHEN CHANGING DIRECTIONS, IT WAS NECESSARY TO SWING THE TROLLEY POLE AROUND SO THAT IT WAS ALWAYS TRAILING AND NEVER LEADING AS IT TENDED TO BOUNCE OFF THE TROLLEY AND BE BROKEN, IF POINTED IN THE DIRECTION OF TRAVEL. WHILE IT WAS TECHNICALLY AGAINST THE SAFETY RULES TO SWING A TROLLEY POLE WHEN IN MOTION, FEW MOTORMEN EVER FULLY STOPPED TO DO SO AND A GOOD MANY POLES WERE BROKEN WHEN JAMMED AGAINST THE RIB OR BACK WHEN THE MOTORMAN MISJUDGED THE SPACE AVAILABLE TO SWING THE POLE.

**TROLLEY SLIDE** —STOPE CHUTES WHERE THE TROLLEY WIRE WAS PRESENT TO ALLOW THE MOTOR TO PASS BY, WERE EQUIPPED WITH A SLIDING ARRANGEMENT, WHICH ALLOWED THE TROLLEY TO BE MOVED SO AS TO ALLOW SAFE ACCESS TO THE CHUTE. THE SLIDE WAS PROTECTED ON EACH SIDE BY WOODEN PLANKS TO PREVENT ACCIDENTAL CONTACT BY A PERSON ON THE LOADING STAND AT THE CHUTE. SEE ALSO CHUTE DODGER.

**TRUCK BED** — IN THE PIT, THIS WAS A REFERENCE TO THE BACK PART OR DUMP BOX OF A HAUL TRUCK.

**TRUCK/SHOVEL PIT** — AN OPEN PIT MINE WHERE HAUL TRUCKS WERE USED IN COMBINATION WITH POWER SHOVELS TO PERFORM MINING. THE LAVENDER PIT WAS AN EXAMPLE OF THIS COMBINATION.

**TRUCK/TRAIN TRANSFER** — THE WASTE HAUL TO NUMBER SEVEN DUMP WAS TOO FAR FOR THE EARLY, 25-TON HAUL TRUCKS TO BE ECONOMIC. A POINT NEAR THE EDGE OF THE LAVENDER PIT HAD A PLATFORM UPON WHICH THESE HAUL TRUCKS WOULD DRIVE AND, WITH THE AID OF A SPOTTER, BACK UP TO A TRAIN OF OPEN, 100 TON RAILROAD CARS ON THE TRACK BELOW AND DUMP THE WASTE OR LEACH MATERIAL FROM THE HAUL TRUCK INTO THE RAIL CAR. A DIESEL ELECTRIC LOCOMOTIVE WOULD HAUL THE FULL TRAIN TO THE APPROPRIATE SECTION OF THE DUMP AND EMPTY THE CARS OVER THE EDGE.

**TRUCKS** — 1). MINE CARS HAD TWO PARTS, THE TRUCKS A FRAME WITH THE WHEELS ATTACHED, AND THE TUB, THE CONTAINER FOR THE ROCK. 2). THE STANDARD SIZED RAIL CARS USED IN THE SACRAMENTO PIT AND THE WASTE HAUL FOR THE LAVENDER PIT HAD TWO SETS OF FOUR WHEEL TRUCKS ON WHICH SET THE DUMP BODY.

**TUB** — THE PART OF THE MINE CAR THAT HELD THE ROCK AND WHICH SET ON THE TRUCKS.

**TUGGER** — A SMALL PNEUMATIC HOIST USED TO RAISE MATERIALS UP, INTO A STOPE OR A RAISE. ALSO CALLED AN AIR HOIST.

**TUNNEL** — A HORIZONTAL, OR NEAR-HORIZONTAL, UNDERGROUND PASSAGE, ENTRY, OR HAULAGEWAY, THAT IS OPEN TO THE SURFACE AT BOTH ENDS. A TUNNEL (AS OPPOSED TO AN ADIT) MUST PASS COMPLETELY THROUGH A HILL OR MOUNTAIN. TRUE TUNNELS WERE FEW AT BISBEE WITH THE HIGGINS AND 7<sup>TH</sup> LEVEL SOUTHWEST THE ONLY TRUE ONES. A SHORT TUNNEL WAS DRIVEN NEAR THE C. & C. SHAFT TO DELIVER WATER TO THE COPPER QUEEN CONCENTRATOR, BUT WAS NEVER USED FOR MINING.

**TURBO DRILL** — A DRIFTER TYPE ROCK DRILL MANUFACTURED BY THE DENVER ROCK DRILL COMPANY AND FIRST INTRODUCED IN 1917, WITH A VERY DIFFERENT CONSTRUCTION, WHICH SEPARATED THE ROTATION FROM THE PISTON AND WHICH BECAME THE BASIS FOR FUTURE ROCK DRILL DESIGNS.

**TURN SHEET** — A STEEL PLATE PLACED ON THE SHAFT STATION OR SURFACE TO ALLOW FOR THE EASY TURNING AND MANEUVERING OF MINE CARS TO AND FROM THE CAGES AND THE PAIR OF RAILS TO BE USED. THEY WERE ALSO LAID ON THE TRACK AT THE FACE OF A CROSSCUT BEFORE BLASTING TO PROVIDE A SMOOTH FLOOR FOR SHOVELING THE BROKEN ROCK INTO CARS. IN THIS LATTER USE, THEY WERE ALSO CALLED MUCK SHEETS

**UMBRELLA STULL** — A SUPPORT USED TO COVER A WIDER AREA, WHICH INCORPORATES A “T” STULL WITH A DOUBLE LAYER OF SIX FOOT LONG LAGGING ON TOP OF THE “T” STULL, WHICH IS THEN SECURELY WEDGED TO THE BACK.

**UNDERGROUND PATROLMAN** — THE OFFICIAL TITLE FOR FIREBUGS (SEE WHICH), THAT PATROLLED POTENTIAL FIRE AREAS ON A DAILY BASIS.

**UNIT COSTS** — THE TOTAL COSTS PER UNIT, USUALLY REFERRING TO THE COSTS PER TON MINED, COSTS PER TON PROCESSED OR COSTS PER POUND OF COPPER PRODUCED.

**UPCAST** — A SHAFT UP WHICH THE VENTILATING CURRENT OF AIR RETURNS TO THE SURFACE. ALSO CALLED A FAN SHAFT, AS HUGE FANS WERE SOMETIMES SET OVER THE SHAFT OR IN A CONNECTING CROSSCUT. THE DENN, SAGINAW, BORAS, GARDNER, GALENA AND DALLAS SHAFTS WERE ALL UPCAST, BUT ONLY THE DENN AND GALENA HAD FANS SET OVER THE SHAFT WHILE THE SAGINAW HAD A HUGE FAN ON THE 1800 LEVEL.

**V-CUT** — THE CENTERLINE BLASTHOLES IN A DRILL PATTERN ARE INCLINED SUCH THAT THE ENDS OF EACH ARE CLOSE TO THE SAME POSITION IN THE ROCK, FORMING A HORIZONTAL “V.” THE CENTER TWO HOLES ARE BLASTED FIRST, FORMING A VOID FOR THE REST OF THE HOLES IN THE PATTERN TO BREAK INTO.

**VENT BAG** — AN ENCLOSED CLOTH OR OTHER FABRIC AIRWAY TO CONDUCT AIRFLOW FROM A FAN TO A GIVEN AREA OR LOCATION.

**VENT FAN** — A SMALL, AUXILIARY FAN INSTALLED UNDERGROUND FOR VENTILATING HEADINGS THAT ARE NOT ADEQUATELY VENTILATED BY THE AIR CURRENT PRODUCED BY THE MINE-VENTILATION SYSTEM. AN AUXILIARY FAN IS USUALLY FROM 18 INCHES TO THREE FEET IN DIAMETER. IT IS DRIVEN BY COMPRESSED AIR OR ELECTRICITY. THE AUXILIARY FAN CAN BE USED TO FORCE VENTILATE TO THE WORKPLACE.

**VENT PIPE** — THIN-WALLED, GALVANIZED STEEL PIPING 12 TO 24 INCHES IN DIAMETER FOR CONDUCTING AIR TO OR FROM A FACE IN A CROSSCUT OR A RAISE OR INTO A STOPE. THE TUBING EXTENDS FROM AN AUXILIARY FAN TO WITHIN A FEW YARDS OF THE FACE TO BE VENTILATED. AT BISBEE, MOST OF THE VENT PIPE AND ALL OF THE FITTINGS WERE MADE IN THE TIN SHOP.

**VENTILATION ENGINEER** — THE INDIVIDUAL RESPONSIBLE FOR DESIGN AND UPDATE OF THE VENTILATION SYSTEM FOR THE SEVERAL, INTERCONNECTED MINES. HIS TASK WAS TO DISTRIBUTE THE AIR IN THE MINE EFFICIENTLY AND ECONOMICALLY TO WHERE IT WAS NEEDED. TO DO THIS, VENTILATION SURVEYS WERE CONDUCTED BY THE VENTILATION ENGINEER. THEY MAY BE CLASSIFIED AS QUALITATIVE, QUANTITATIVE, AND PRESSURE SURVEYS. QUALITATIVE SURVEYS DETERMINE THE PROPORTION OF UNDESIRABLE GASES (RADON, CARBON MONOXIDE), OR DUST, IN THE AIR THAT IS BEING CIRCULATED THROUGH THE MINE. IN HOT AND HUMID AREAS, THEY DETERMINE THE CONDITIONS OF AIR TEMPERATURE AND HUMIDITY. QUANTITATIVE SURVEYS DETERMINE THE QUANTITY, OR VOLUME, OF AIR BEING CIRCULATED THROUGH THE MINE WORKINGS. THIS IS DONE BY MEASURING THE VOLUME OF AIR PASSING AT DIFFERENT POINTS IN THE CIRCUIT BY MEANS OF AN ANEMOMETER, TO INVESTIGATE THE EXISTING AIR DISTRIBUTION, PARTICULARLY TO THE INDIVIDUAL FACES. PRESSURE SURVEYS MEASURE THE PRESSURE ABSORBED AND THE RESISTANCE OF THE CROSSCUTS AND FACES

INCLUDED IN THE SURVEY. THIS ENABLES DETERMINATION OF THE POWER REQUIRED TO CIRCULATE THE AIR IN THE DIFFERENT SECTIONS OF THE CIRCUIT AND THAT IS EXPENDED IN VENTILATING INDIVIDUAL AREAS OF THE MINE.

**VENTILATION RAISE** — A RAISE DRIVE FOR THE SPECIFIC PURPOSE OF AIDING IN THE VENTILATION OF AN AREA. IT WAS COMMON TO DRIVE SUCH RAISES FROM A STOPE TO A CROSSCUT ABOVE TO IMPROVE AIR FLOW.

**VENTILATION SHAFT** — A SHAFT DEVELOPED FOR THE SOLE PURPOSE AIDING IN THE VENTILATION OF MINE WORKINGS. THE OAKLAND SHAFT WAS ONE SUCH SHAFT AT BISBEE, AS IT WAS DEVELOPED TO VENTILATE THE FIRE AREA IN THE BRIGGS MINE BY ALLOWING THE TOXIC AND CORROSIVE FIRE GASSES TO BE ROUTED TO THE SURFACE WITHOUT GOING THROUGH A SHAFT USED BY MEN.

**VERDE CHUTE** — THE TYPE OF CHUTE ASSEMBLY AND DOOR USED AT BISBEE AFTER 1940. THESE WERE COPIED AFTER THOSE USED AT THE UNITED VERDE BRANCH AT JEROME, ARIZONA. THEY WERE SAFER TO USE AND QUICKER TO INSTALL THAN THE PREVIOUS TYPES USED BY ANY OF THE COMPANIES.

**VERTICAL SIDELINE** — AN AGREEMENT REACHED BY ADJACENT MINING CLAIM HOLDERS BY WHICH THE VERTICAL, DOWNWARD PROJECTION OF THE CLAIM SIDELINES WAS THE BOUNDARY TO WHICH MINING COULD TAKE PLACE. THIS WAS THE AGREEMENT REACHED BY THE COPPER QUEEN AND THE C. & A., UNDER THE GUIDANCE OF JAMES DOUGLAS, WHICH PRECLUDED THE BITTER AND PROTRACTED LITIGATION, WHICH WOULD CERTAINLY HAVE TAKEN PLACE WITHOUT THIS AGREEMENT.

**WAD** — A GENERIC TERM APPLIED TO ANY OF THE BLACK, EARTHY MANGANESE OXIDES. MUCH OF THE MATERIAL CLASSIFIED AS “WAD” IS ACTUALLY ROMANÈCHITE, A COMMON OXIDE ZONE MINERAL AT BISBEE.

**WADE HAMPTON** — THE WADE HAMPTON MINE NEAR DON LUIS, WHICH STARTED AS AN UNSUCCESSFULLY EFFORT TO EXPLOIT A SURFACE LEAD OUTCROP. LATER, THE SILICEOUS OUTCROP NEARBY WAS MINED WITH SMALL, OPEN PIT TYPE EQUIPMENT, FOR SMELTER FLUX, IN PART BECAUSE OF ITS PRECIOUS METAL CONTENT.

**WALL PLATE** — THE HEAVY HORIZONTAL TIMBERS IN A SHAFT SET RUNNING ON THE LONGER SIDE OF THE RECTANGULAR SHAFT.

**WALL ROCK** — THE ROCK ADJACENT TO, ENCLOSING, OR INCLUDING THE OREBODY. THE TERM IMPLIES MORE SPECIFIC ADJACENCY THAN HOST ROCK OR COUNTRY ROCK.

**WARREN COMPANY** — A LOCAL COMPANY FOUNDED AND CONTROLLED FOR MANY YEARS BY THE C. & A., WHICH WAS EXPRESSLY SET UP TO BRING PUBLIC TRANSPORTATION TO THE AREA AND TO DEVELOP THE WARREN TOWN SITE. IT BUILT THE STREET TROLLEY RAILWAY, WHICH OPENED UP THE POSSIBILITY OF LIVING OUTSIDE OF THE CROWDED CANYONS OF BISBEE AND FURTHER FROM THE MINES. THE WARREN COMPANY WAS THE FORCE BEHIND DESIGNING WARREN AS AN IDEAL COMMUNITY AND, WITH THE COPPER QUEEN, HELPED FINANCE THE BUILDING OF HOMES FROM 1906 UNTIL THE MID 1920S. THIS IS ANOTHER EXAMPLE OF THE MINING COMPANIES CONTRIBUTING TOWARD THE DEVELOPMENT OF THE BISBEE AREA AS A DESIRABLE PLACE TO WORK AND TO LIVE.

**WASTE** — 1). BARREN ROCK OR SUB MARGINAL ORE THAT HAS BEEN MINED, BUT IS NOT OF SUFFICIENT VALUE TO WARRANT TREATMENT, BUT WHICH MUST BE REMOVED TO ACCESS ORE. 2). IN THE MINE SHOPS, WASTE WAS A MAT OF FIBERS REJECTED FROM TEXTILE MILLS AND USED FOR CLEANING OIL AND GREASE FROM MACHINERY DURING REPAIR.

**WASTE POCKET** — A STORAGE RAISE OR ENLARGE EXCAVATION INTO WHICH WASTE ROCK IS DUMPED FOR EXTRACTION BELOW BY EITHER A SKIP FOR HOISTING TO THE SURFACE OR INTO MINE CARS FOR TRANSPORT TO OTHER AREAS OF THE MINE FOR GOBBING.

**WASTE TO ORE RATIO** — THE RATIO OF THE NUMBER OF TONS OF WASTE MOVED TO THE NUMBER OF TONS OF ORE MINED. THE WASTE REFERRED TO IN THIS RATIO WAS TYPICALLY INCLUDED WASTE, THE WASTE WITHIN THE OREBODY, NOT THAT BARREN MATERIAL OVERLYING THE ORE, REMOVING THIS WAS STRIPPING OR PRESTRIPPING. SEE ALSO STRIPPING RATIO.

**WARREN** — THE WARREN SHAFT.

**WATER COOLER**— AS THE NAME IMPLIES, THESE WERE FOR COOLING DRINKING WATER. THESE WERE LARGE, HIGH CAPACITY, ELECTRIC UNITS LOCATED ON EVERY ACTIVE SHAFT STATION AS WELL AS IN HIGH TRAFFIC WORK AREAS INSIDE THE MINE. MINERS FILLED THEIR CANTEENS AT THESE AND THE MOTOR CREWS FILLED THE WATER KEGS HERE AS WELL, ON OCCASION.

**WATCHMAN** — A SECURITY PERSON WHO WALKED THROUGH THE MINE YARD AREAS AT NIGHT, PUNCHING KEYS AT CRITICAL POINTS TO SHOW HE HAD MADE HIS ROUNDS. THEY WERE ALSO STATIONED AT THE MINE GATES TO CONTROL ACCESS AND PREVENT THEFT. THESE WERE ALMOST ALWAYS MINERS, WITH MANY YEARS SERVICE WHO, FOR ONE REASON OR ANOTHER, COULD NO LONGER SUSTAIN THE RIGORS OF UNDERGROUND WORK.

**WATERCOURSE** — A NATURALLY OCCURRING OPENING WHICH SHOWS SIGNS OF HAVING SERVED AS A CONDUIT FOR GROUND WATER OR ONE WHICH CONTINUES TO DISCHARGE WATER. IN MANY INSTANCES, THESE WERE LINED WITH CALCITE CRYSTALS AND WERE OFTEN VERY BEAUTIFUL AS WELL AS THE SOURCE OF ATTRACTIVE MINERAL SPECIMENS. A GREAT MANY WATER COURSES WERE HIT IN THE MINES OVER THE YEARS AND THE FEW WHICH CONTAINED ANY WATER, QUICKLY DRIED UP.

**WATER DITCH** — THE DRAINAGE DITCH ALWAYS CUT BETWEEN THE RAIL AND THE RIB IN CROSSCUTS TO CARRY THE EXPECTED FLOW OF GROUND WATER OR DRAINAGE FROM SAND FILL AND KEEP IT OFF THE TRACK, AS MUCH AS POSSIBLE. KEEPING THESE DITCHES FREE OF MUD WAS A CONSTANT, DIFFICULT AND DIRTY CHORE, ASSIGNED TO THE LOWEST GRADE MUCKER. SEE ALSO PISS DITCH.

**WATER DOOR** — IN AREAS WHERE THERE WAS THE POTENTIAL TO HIT LARGE VOLUMES OF WATER WITH DEVELOPMENT MINE WORKINGS, ALL ACCESS AREAS WERE FITTED WITH MASSIVE CONCRETE FRAMES TO 12 FEET THICK AND WELL KEYED INTO THE SURROUNDING ROCK. CAST IRON OR STEEL DOORS UP TO TWO INCHES THICK AND BOWED TOWARD THE WATER SIDE, THEN GUSSETED WITH HEAVY STEEL RIBBING WERE PLACED ON MACHINED STEEL FRAMES SET IN THE CONCRETE. THE DOORS WERE HELD CLOSED BY FOUR MASSIVE BOLTS, ONE AT EACH CORNER, WHICH WERE TIGHTENED UPON CLOSING. THESE DOORS WERE BUILT TO WITHSTAND THE HIGHEST PROBABLE PRESSURE OF WATER, WHICH COULD BE ENCOUNTERED, IN SOME CASES EQUAL TO 2,000 FEET OF STATIC HEAD.

**WATER HOSE** — THE WATER HOSE OBVIOUSLY WAS CONNECTED TO THE WATER LINE AND USED TO WET DOWN THE MUCK PILE, RIBS AND BACK BEFORE MUCKING. BY MEANS OF AN ADAPTOR AND A SMALL DIAMETER TUBING, WITH A SMALL VALVE (GOOSENECK), IT WAS ATTACHED TO THE ROCK DRILL FOR DUST CONTROL AND HOLE CLEANING.

**WATER KEG** — WOODEN KEGS WERE USED TO PROVIDE DRINKING WATER NEAR THE WORK AREAS. THEY CONTAINED ABOUT 10 GALLONS AND HAD A STANDARD HOSE BIB TYPE FAUCET TO WHICH WAS CONNECTED A DRINKING FOUNTAIN TYPE ARRANGEMENT. THE WATER

IN THESE WAS ALWAYS COOL AS THE KEGS WOULD SWEAT AND EVAPORATION COOLED THE KEG. THEY WERE FILLED ON THE SURFACE OR, LESS OFTEN, AT THE WATER COOLERS ON THE SHAFT STATIONS. THE MOTOR CREWS DELIVERED THE KEGS, DAILY, TO THE WORKING AREAS.

**WATER NEEDLE** — A THIN, TUBULAR INSERT IN ROCK DRILLS, WHICH CONNECTED TO THE WATER INPUT POINT, SLID INTO THE SHANK OF THE DRILL STEEL, AND DELIVERED WATER TO BIT TO PREVENT DUST GENERATION AND REMOVE CUTTINGS. THIS SIMPLE DEVICE MADE PNEUMATIC DRILLS SAFE TO USE BY TOTALLY ELIMINATING THE DUST PROBLEM ASSOCIATED WITH THESE DRILLS.

**WATER SPRAYS** — 1). IN CROSSCUTS, THE TWO INCH WATER PIPE WAS FITTED WITH A SPRAY HEAD, WHICH WAS USED TO CONTROL DUST DURING BLASTING. IT WAS TURNED ON AND POINTED TOWARD THE CENTER OF THE FACE AFTER THE ROUND HAD BEEN SPIT. 2). IN THE PIT, WATER SPRAYS WERE PLACED ABOVE THE DIGGING PIT AND POINTED TOWARD THE MUCK THE SHOVEL WAS WORKING, AGAIN FOR DUST CONTROL.

**WATER TRUCK** — DUST CONTROL ON THE HAUL ROADS AND BENCHES WAS AN IMPORTANT CONCERN AND A FULL TIME JOB FOR SEVERAL WATER TRUCKS. THESE WERE CONVERTED MUCK TRUCKS WITH LARGE TANKS REPLACING THE TRUCK BED. THEY SPRINKLED THE MILES OF ROADS AND WORKING BENCHES DAY AND NIGHT, BUT IN A MANNER, WHICH NEITHER MADE THE RAMPS SLIPPERY NOR WITH SO MUCH WATER, THAT IT WOULD ERODE THE ROAD SURFACE.

**WATER WAGON** — A WATER TRUCK.

**WEDGE** — 1). A WEDGE-SHAPED PIECE OF WOOD USED TO TIGHTEN TIMBER SETS AGAINST THE BACK AND RIBS BY DRIVING THE WEDGE BETWEEN THE TIMBER AND A WOODEN BLOCK IN CONTACT WITH THE ROCK. 2). A WEDGE-SHAPED FRACTIONAL MINING CLAIM.

**WEST OREBODY** — THE WESTERN PORTION OF THE SACRAMENTO STOCK COMPLEX, WHICH HOSTED THE ORES, MINED BY THE SACRAMENTO PIT MINE.

**WET ASSAY** — A TYPE OF ASSAY PROCEDURE THAT INVOLVES THE USE OF A LIQUID, GENERALLY AN AQUEOUS SOLUTION OF THE MATERIAL BEING TESTED, TO WHICH ANOTHER LIQUID IS ADDED, IN MEASURED AMOUNTS, WITH THE RESULTING COLOR CHANGE INDICATING THE METAL CONTENT. MOST COPPER ASSAYS AT BISBEE WERE MADE USING A WET PROCESS WITH A COLORIMETRIC RESPONSE INDICATING THE COPPER CONTENT.

**WET DOWN** — 1). THE ACT OF SPRAYING WATER ON BROKEN ROCK TO REDUCE DUST, BOTH BEFORE AND DURING MUCKING. 2). A COMMON TERM TO DESCRIBE URINATING, BY SAYING "I NEED TO WET DOWN THE MUCK PILE."

**WET STOPER** — A STOPER USED WITH A HOLLOW HEX DRILL STEEL, THROUGH WHICH WATER WOULD PASS TO CONTROL THE DRILLING DUST. THESE WERE A GREAT IMPROVEMENT OVER THE DRY STOPERS (WIDOW MAKERS), WHICH FOGGED THE CLOSE MINE ATMOSPHERE WITH FINE DRILL DUST.

**WET TONS** — THE GROSS WEIGHT, IN TONS, OF BROKEN ROCK OR CONCENTRATES WHICH INCLUDES THE CONTAINED MOISTURE.

**WFM** — AN ACRONYM FOR THE WESTERN FEDERATION OF MINERS, A UNION THAT UNSUCCESSFULLY ATTEMPTED TO UNIONIZE THE MINERS AT BISBEE ON SEVERAL OCCASIONS

DURING THE FIRST DECADE OF THE 20<sup>TH</sup> CENTURY. IT LATER BECAME THE INTERNATIONAL UNION OF MINE, MILL AND SMELTER WORKERS.

**WHIP CHECK** — THE TERM USED TO DESCRIBE A SAFETY CHAIN USED TO SECURE THE END AIR HOSE TO A PNEUMATIC PIECE OF EQUIPMENT AS IT PREVENTED THE HOSE FROM WHIPPING ABOUT AND POTENTIALLY HURTING SOMEONE, IF CAME LOOSE. SEE ALSO SAFETY CHAIN.

**WHEAT LAMP** — THE TRADEMARK OF THE SEALED LEAD-ACID BATTERY, CAP LAMP MANUFACTURED BY KOEHLER, WHICH REPLACED THE EDISON CAP LAMP AT BISBEE IN 1964. THESE RUGGED AND DEPENDABLE LAMPS REMAINED IN USE UNTIL THE MINES CLOSED.

**WHIM** — A VERTICAL DRUM TURNED BY HORSEPOWER OR STEAM POWER USED TO RAISE ORE OR WASTE ROCK FROM A MINE. THESE WERE USED IN THE EARLY SINKING STAGES AT MANY OF THE FIRST VERTICAL SHAFTS DEVELOPED AT BISBEE.

**WHITE IRON** — A TERM OCCASIONALLY EMPLOYED TO REFERENCE MASSIVE PYRITE, WHICH WAS OFTEN VERY LIGHT IN COLOR.

**WIDOW MAKER** — THE NAME WAS GENERALLY APPLIED TO STOPERS, BUT ANY OF VERY FIRST ROCK DRILLS, WHICH WERE DRY MACHINES. THIS MEANT THERE WAS NO DUST SUPPRESSION AND THEY GENERATED HUGE CLOUDS OF DUST, WHICH THE MINERS BREATHED. THE STOPERS WERE THE WORST AS THE MINER WAS DIRECTLY BELOW THE DRILL HOLE AND CONSTANTLY COVERED WITH THE VERY FINE ROCK DUST. IN AREAS WHERE SILICA WAS PRESENT IN THE ROCK, THIS WAS PARTICULARLY BAD. OVER TIME, THE EXPOSURE TO SILICA DUST CAUSED IRREVERSIBLE SILICOSIS (PNEUMOCONIOSIS) WHICH RESULTED IN DISABILITY OR, ALL TOO OFTEN, DEATH OF THE MINER. MANY WOMEN WERE PREMATURELY WIDOWED BECAUSE OF THESE DRILLS, THUS THE NAME.

**WIGGLE TAIL** — THE EARLY STOPERS WERE NAMED “WIGGLE TAILS” AS PNEUMATIC PISTONS WITH WHICH THEY APPLIED THE UPWARD PRESSURE WERE LOOSE FITTING WHEN FULLY EXTENDED AND AS THEY WERE NON ROTATING MACHINES, THE MINER HAD TO ROTATE THEM IN A CIRCULAR MOTION, WHICH CAUSED THEM TO WIGGLE MORE THAN JUST A LITTLE.

**WINDING ENGINE** — THE EARLY HOIST AT BISBEE USED FLAT ROPE AND THE HOIST HAD NARROW, SPOOL-LIKE DRUMS WHERE THE ROPE WOULD WIND WHEN HOISTING AND UNWIND WHEN LOWERING. ALL WERE POWERED BY STEAM ENGINES, THUS THESE WERE REFERRED TO AS WINDING ENGINES.

**WINDLASS** — A HAND OPERATED DEVICE USED FOR HOISTING THAT IS LIMITED TO SMALL-SCALE DEVELOPMENT WORK AND PROSPECTING BECAUSE OF ITS SMALL CAPACITY. IT IS ESSENTIALLY A ROUND WOODEN DRUM OR A SECTION OF TREE TRUNK SET HORIZONTALLY ON ROUGH BEARINGS WITH HANDLES AT EACH END AND USED TO RAISE OR LOWER BUCKETS OF ROCK IN EXPLORATORY WORK. MANY OF THE SHAFTS AT BISBEE WERE STARTED WITH THIS SIMPLE HOIST.

**WINZE** — A VERTICAL OR STEEPLY INCLINED OPENING INSIDE AN UNDERGROUND MINE DRIVEN DOWNWARD.

**WIRE ROPE** — A ROPE MADE OF TWISTED STRANDS OF WIRE FOR HOISTING IN SHAFTS AND UNDERGROUND APPLICATIONS, INCLUDING MUCKING. WIRE ROPES ARE MADE FROM MEDIUM CARBON STEELS. ALL STEEL CABLES USED AT BISBEE WERE ALWAYS REFERRED TO AS WIRE ROPE.

**WOBBLY** — A MEMBER OF THE RADICAL, ANARCHIST LABOR UNION; THE INTERNATIONAL WORKERS OF THE WORLD, WHICH FOMENTED A STRIKE AT BISBEE IN 1917. THIS STRIKE RESULTED IN THE BISBEE DEPORTATION WITH THE WOBBLIES BEING FORCIBLY REMOVED FROM THE TOWN. SUPPORTERS AND SYMPATHIZERS WERE FREQUENTLY LUMPED INTO THIS CATEGORY EVEN THOUGH THEY WERE NOT MEMBERS OF THE UNION.

**WOODEN TRACKS** — THE FIRST MINE RAILS USED AT BISBEE WERE SIMPLY FOUR INCH BY FOUR INCH, WOODEN STRINGERS FACED AND TOPPED ON THE INSIDE EDGE WITH A 1/4 X 1 1/2 INCH METAL STRAP. THE STRINGERS WERE PLACED ON TIES THAT HAD BEEN MORTISED TO RECEIVE THEM. WOODEN WEDGES WERE THEN DRIVEN IN THE MORTISE AND PARALLEL TO THE STRINGER TO HOLD THEM IN PLACE.

**WOLVERINE** — THIS WAS TYPICALLY A REFERENCE TO THE WOLVERINE NUMBER 2 MINE.

**WOLVERINE AND ARIZONA** — THE WOLVERINE AND ARIZONA MINING COMPANY THAT OPERATED THE WOLVERINE #2 MINE. IT WAS ONE OF THE VERY FEW SUCCESSFUL SMALL MINING COMPANIES IN THE WARREN MINING DISTRICT, TYPICALLY OPERATING ONLY WHEN COPPER PRICES WERE HIGH.

**WORKING** — 1). ANY ACTIVE MINING AREA WAS CALLED A WORKING. 2). IN ADDITION, WHEN TIMBER IS BEING SQUEEZED BY PRESSURE FROM THE BACK AND/OR THE RIBS, IT EMITS CREAKING NOISES AND IS SAID TO BE "WORKING." SEE ALSO TALKING.

**WORKING GROUND** — GROUND AROUND AN UNDERGROUND OPENING, WHICH IS MOVING IS SAID TO BE "WORKING." AS THIS GROUND WAS TYPICALLY TIMBERED, THE TIMBER WOULD MAKE CREAKING AND POPPING SOUNDS AND WAS SAID TO BE "TALKING."

**WORKING FACE** — ANY PLACE IN A MINE WHERE MATERIAL IS EXTRACTED DURING A MINING CYCLE.

**WORKING PLACE** — THE ASSIGNED POINT OF LABOR WHERE THE INDIVIDUAL WAS TO PERFORM HIS TASK.

**WORKING THE GROUND** — USING A POINTED STEEL BAR TO MOVE UNCONSOLIDATED GROUND ASIDE WHILE DRIVING SPILING.

**WORKINGS** — THE ENTIRE SYSTEM OF OPENINGS IN A MINE DEVELOPED FOR THE PURPOSE OF EXPLORATION AS WELL AS FOR EXPLOITATION.

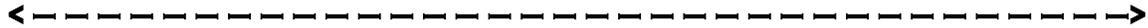
**WORKS** — A PLANT OR FACILITY. THE SMELTER WAS CALLED THE REDUCTION WORKS, WHILE A HOIST HOUSE WAS THE HOISTING WORKS, FOR EXAMPLE.

**WRITE-IN** — A TERM USED TO DESIGNATE A TEMPORARY ASSIGNMENT. THE TEMPORARY ASSIGNMENT WOULD BE WRITTEN IN ON THE EMPLOYEE'S TIME SHEET TO ASSURE THAT HE WAS PAID AT THE APPROPRIATE, USUALLY HIGHER, RATE FOR THE TEMPORARY WORK.

**XC** — THE COMMONLY USED ABBREVIATION FOR THE WORD CROSSCUT. CROSSCUTS TYPICALLY HAD WOODEN SIGNS POST AT THE BEGINNING WITH THE WORKING NUMBER OF THE WORKING FOLLOWED BY THE LETTERS "XC."

**ZONE OF OXIDATION** — THE UPPER, NEAR SURFACE PORTION OF AN OREBODY THAT HAS BEEN OXIDIZED BY NEAR SURFACE CONDITIONS. AT BISBEE, THE ZONE OF OXIDATION WAS LARGELY IRREGULAR AND MORE OR LESS PARALLEL TO THE ANCIENT, CRETACEOUS PERIOD SURFACE. THUS IN THE EAST-MOST MINES, WHICH WERE COVERED BY A THOUSAND FEET OR MORE OF CRETACEOUS SEDIMENTS,, IT WAS QUITE DEEP, EXTENDING DOWN TO PARTS OF THE 2566 LEVEL ALONG MAJOR FAULTS.

## SPANISH MINING TERMS



THE BELOW ARE THE MORE COMMON SPANISH MINING TERMS WHICH BECAME A PART OF THE MINING LEXICON AT BISBEE WHEN MEXICAN AMERICANS ENTERED THE UNDERGROUND WORKFORCE DURING WORLD WAR II AND STAYED. JUST LIKE THEIR ENGLISH COUNTERPARTS, THE MEANING AS APPLIED TO MINING MAY NOT CORRESPOND WITH THE GENERAL USAGE OF THE WORD OR TERM OUTSIDE THE CONTEXT OF MINING AT BISBEE. SOME WORDS MAY ALSO REFLECT THE MERGING OF SPANISH AND ENGLISH INTO "SPANGLISH", AS WAS CALLED AND IS SO COMMON IN THESE ENVIRONMENTS AND THUS, BE NOT A GENERALLY ACCEPTED WORD IN EITHER LANGUAGE, BUT THEY WERE ACCEPTED AND UNDERSTOOD BY THE MEN WHO USED THEM UNDERGROUND. THEREFORE, THEY ARE APPROPRIATELY INCLUDED AS MINING TERMS.

FOR GREATER DETAIL ON THE ENGLISH MEANING OF A PARTICULAR WORD, THE READER IS REFERRED TO THE MORE DETAILED GLOSSARY ABOVE.

**ACERO** — DRILL STEEL

**BONOS** — BONUS

**BOTAS** — BOOTS

**CABLE** — CABLE

**CAÑUELA** — FUSE

**CAPITAN** — CAPS

**CARBURO** — CARBIDE

**CASCO** — HARDHAT

**CHIVA** — SPIKE PULLER

**CHUTE** — CHUTE

**CLAYO** — NAIL

**COMPAÑERO** — PARTNER

**CUÑA** — WEDGE

**DESCARRILADO** — OFF THE TRACK

**ESCALERA** — LADDER

**ESTRELLA** — DRILL BIT

**FICHA** — TAG

**FRENTE** — FACE

**FULMINANTES** — BLASTING CAPS

**HACHA** — AXE

**HOYOS** — HOLES

**HUMO** — SMOKE

**LAGUINE** — LAGGING

**LÁMPARA** — A MINE LAMP

**LÁMPARA DE CARBURO** —  
CARBIDE LAMP

**MAQUINA** — MACHINE

**MARRO** — DOUBLE JACK

**MINERAL** — ORE

**MORA** — MOTOR

**MOTORISTA** — MOTORMAN

**MULA** — MULE

**PALA** — SHOVEL

**PICO** — PICK

**PÓLVORA** — POWDER

**POLVORÍN** — POWDER MAGAZINE

**POSTE** — POST

**RASERO** — RAISE MAN

**RIELES** — RAILS

**STOPE** — STOPE

**TALLAS** — TIES

**TECHO** — BACK, ROOF

**TIMBERO** — TIMBERMAN

**TRONADA** — BLASTED OR MUCK PILE

**TRONADURA** — BLAST

**TUBO** — PIPE

**VELADOR** — FIRE BOSS

**VELAS** — CANDLE

**VESGAR** — TO MUCK

**VÍA (TRAQUE)** — TRACK

**ZORRA** — TOOL NIPPER

## REFERENCES CONSULTED

THE VAST MAJORITY OF THE DEFINITIONS GIVEN ABOVE ARE BASED ON PERSONAL EXPERIENCE GAINED WHILE WORKING UNDERGROUND AT BISBEE AND WITH THE KIND ASSISTANCE OF OTHERS WHO ALSO WORKED IN THESE MINES. THE VOLUMINOUS LITERATURE ON MINING AT BISBEE WAS EXTENSIVELY REVIEWED AND HAS SERVED AS A SOURCE OF SOME OF THE TERMS AS WELL AS THEIR DEFINITIONS. A NUMBER OF DOCUMENTS WERE CONSULTED IN DEPTH TO ASSURE DEFINITION CORRECTNESS. THIS INCLUDED A COMPLETE READ OF BELOW LISTED PUBLICATIONS AND NOTING THE CONTEXT, IN WHICH THE WORD IS USED, COUPLED WITH AN INTIMATE PERSONAL KNOWLEDGE OF THE PARTICULAR ACTIVITY DISCUSSED. BELOW ARE THE MORE IMPORTANT OF THE CONSULTED DOCUMENTS:

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**PHELPS DODGE CORPORATION (1955) CODE OF SAFE PRACTICE FOR RAISE MINING. COPPER QUEEN BRANCH MINES DIVISION, BISBEE, ARIZONA, 25 P.**

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**PHELPS DODGE CORPORATION (1956) CODE OF SAFE PRACTICE FOR STOPE MINING. COPPER QUEEN BRANCH MINES DIVISION, BISBEE, ARIZONA, 56 P.**

**PHELPS DODGE CORPORATION (1956) CODE OF SAFE PRACTICE FOR UNDERGROUND HAULAGE. COPPER QUEEN BRANCH MINES DIVISION, BISBEE, ARIZONA, 41 P.**

**PHELPS DODGE CORPORATION (1957) CODE OF SAFE PRACTICE FOR PRIMARY & SECONDARY BLASTING, REVISED -1962. COPPER QUEEN BRANCH MINES DIVISION, BISBEE, ARIZONA, 23 P.**

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**MEN AND MULES UNDERGROUND AT BISBEE, C-1910, THE MUSCLE THAT MINED AND MOVED THE MILLIONS OF TONS OF COPPER ORE WON FROM THE HARD LIMESTONES. THIS PHOTO WAS TAKEN AT MULE BARN IN AN AREA SUPPORTED BY HEAVY, SQUARESET TIMBERING, INDICATING THAT IT WAS AT THE EDGE OF A STOPE. THE MAN AT THE LEFT HAS USED FIRE FUSE AS A BELT, A COMMON, BUT UNWISE PRACTICES. A CANDLESTICK CAN BE SEEN SUSPENDED BY WIRE FROM THE COLLAR OF THE MULE IN THE CENTER, WHILE THE MAN AT THE FAR RIGHT HAS ONE IN HIS HAND AS WELL AS FOUR EXTRA CANDLES IN THE INSIDE POCKET OF HIS JUMPER.**

PHOTO: GRAEME – LARKIN COLLECTION

THE MINING TERMS, AS USED AT BISBEE, DURING ITS NEAR-CENTURY OF OPERATION, ARE BASED IN THE RICHNESS OF MERGING CULTURES FROM OTHER MINING REGIONS IN THE U. S. WITH THOSE OF EUROPE AND NEARBY MEXICO. MANY OF THE TERMS THAT EVOLVED IN THE MINES HERE ARE DESCRIPTIVE AND SIMPLE, WHILE OTHERS ARE SEEMINGLY UNRELATED, IF NOT CONFUSING.

THIS WAS THE LANGUAGE OF A BISBEE MINER, A TONGUE NATIVE TO NONE, BUT COMMON TO ALL. HEREIN ARE MANY OF THE WORDS AND PHRASES USED BY THOSE WHO CHOSE TO LABOR IN THIS DIMLY LIT WORLD. SOON, ALL TOO SOON, THE MEN WHO SPOKE THIS LANGUAGE OF MINING AT BISBEE WILL ALL BE GONE. THE INTENT OF THIS WORK IS TO PRESERVE SOMETHING OF THIS TONGUE BEFORE IT IS LOST FOREVER.