The 38th Intercollegiate Mining Competition
March 30th - April 3rd
Montana Tech
Butte, MT

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**Please make note that these rules are subject to change. They will be finalized at the end of the Captain’s Meeting, before competition begins. All teams will be updated if/when the rules change.

**Please bring all comments, questions, and concerns to the Captain’s Meeting before competition.
Team Competition

Each team shall consist of a minimum of 5 competitors, with the option of having a 6th alternate competitor. Teams may interchange competitors for each event as they please. Each competitor may only be a member of one team.

Five competitors will be required for the following events:
- Swede Saw
- Mucking
- Gold Panning
- Track Stand
- Hand Steel (Single Jack) Drilling

Two competitors will be required for the following events:
- Surveying
- Jackleg Drilling

Individual Competition

On Sunday, April 3rd, individual competitions in each event will be held. No one will be permitted to compete in individual events prior to or after April 3rd. This competition is open to all competitors as well as the general public. Registration for the individual competition will be open at 7:00 AM on the morning of the event. An informal awards presentation will be held at the conclusion of the competition. The rules for the individual competition are provided at the end of this packet.

Competition Equipment

Teams may bring any equipment that they wish to use for any event in the competition, with the exception of jackleg drilling equipment. Equipment must be made available for use by other teams during the ENTIRE competition. Outside equipment must be checked in with a designated official no later than 12:00 PM on practice day, March 31st. Any equipment not checked in will not be permitted to use in the competition.

All equipment that is checked in will be inspected for compliance with the rules before it is made available for use. If a piece of equipment is deemed to be in violation of the rules, the owner will be notified and the equipment will not be used. Once equipment is checked in for an event, it will not be allowed to leave the competition field and cannot be used for any other event. At the end of each day, officials will store equipment for safety from tampering and theft. Anyone caught tampering with or stealing equipment of another team will be immediately disqualified from the competition, and the legal implications will be left to the discretion of the owner of the equipment. In the event a piece of equipment fails, the owner of the equipment will be notified and given the chance to repair the equipment. Once repairs are made, the equipment will be re-inspected to ensure compliance with the rules. If something is broken by another team,
it is up to the two teams to reconcile the cost. Note that ALL equipment is brought at your own risk, and Montana Tech does not take responsibility for items damaged during the competition.

All equipment will be made available for pick up at the conclusion of the Men’s Event on Saturday, April 2nd. If the team plans on competing in individual events and would like to use their equipment, that equipment will be available for pick at the conclusion of the Individual Events on Sunday, April 3rd.

Safety Equipment
All competitors are to comply with the safety regulations including any safety related directions given by a Mining Competition Official. They are in place to protect everyone involved. Everybody must follow the safety regulations on the practice and competition days. Repeated failure to follow safety related directions from a competition official may result in disqualification from an event or from the competition entirely. Competitors are expected to provide their own personal protection equipment. Earplugs will be available to everyone. If, during an event, any PPE falls off a competitor, that competitor MUST stop and put respective PPE back on before being allowed to continue.

Steel toed shoes, safety glasses, full-length pants, and short or long-sleeved shirts are required for all events. See event descriptions for additional PPE requirements. Please note that the weather in March/April can be vary quite drastically and you should plan for cool to cold and possibly wet conditions.

Judging
With the addition of the Alumni/Open Division in 2004, it has become increasingly difficult for host schools to ensure adequate judges are available for the event. The result has been that we must utilize judges that are either competing on an Alumni team or have possibly never seen the event before. Some competitions have actually resulted in having different event judges throughout the day with different interpretations of the rules. To ensure this does not occur, MT Tech has added some clarification to some rules and we are committed to finding at least one “head event judge” for each event that will be present throughout the competition and practice day. Other judges may rotate in and out but our intention is to keep the judging as consistent as possible. If your chaperone/advisors are willing to lend a hand, please have them contact Scott Rosenthal (srosenthal@mtech.edu).

Head to Head Competition
In the past, several of the events were held as head to head competitions where two teams competed in the same event at the same time. We feel this generated energy and increased the competitive nature of the event. With our new competition site, we anticipate returning to this style of competition for the following events: Track Stand, Mucking, Hand Steel Drilling, and Swede Saw. As this should cut the time required for each event in half, we also intend to schedule the events so that we can maximize the ability of spectators and other teams to cheer for their favorite teams in these matchups.
Team Event Scoring System

The teams will be divided into Men’s, Women’s, Co-Ed, and Alumni / Company Divisions. Co-Ed teams should consist of at least two competitors of each sex. Five person events shall be completed by at least two competitors of each sex; two person events shall be completed by at least one member of each sex.

Points will be awarded to each team for each event completed. If a team is disqualified, they receive last place points for that event. Points will be awarded in terms of the team’s position within their division. The first place team for each event will receive one point; the second place team will receive two points, and so forth.

Should an event position be tied, a tie-breaking coin flip will be conducted by the head judge. Points will then be summed and the team with the lowest score will be declared the overall winner for that division. Should two teams have the same first-place final score (every event score totaled together), a tie breaker will be applied. The tie breaking event will be based on the closest time or measurement between the two teams, in the following four events: track stand, mucking, hand steel, or swede saw. The two teams will re-compete in that event, and the winner will be the overall winner. Note that in order to compete in the tie-breaker, the teams must be present at the final score tally to be conducted at the competition site at the conclusion of Saturday’s events. If a team is not prepared to compete within 30 minutes of this tally, they will forfeit the tie breaker.

For an example of scoring, see below:

- Consider 2 men’s teams:
  - Team A:
    - 1st place in 4 events @1 point each = 4 points
    - 2nd place in 3 events @ 2 points each = 6 points
    - Total = 10 points
  - Team B:
    - 1st place in 3 events @1 point each = 3 points
    - 2nd place in 4 events @ 2 points each = 8 points
    - Total = 11 points
  Team A is the winner.

Individual Event Scoring System

The competition will be divided into a Men’s and a Women’s division. Once all competitors have competed in an event, points will be awarded to each person. If an individual is disqualified, he or she will receive the maximum number of points for that event. Points will be awarded in terms of the individual's position within his or her division. The first place competitor for each event will receive only one point, the second place team will receive 2 points, and so forth. Should an event position be tied, a one on one event tie-breaker will be arranged. Points will then be summed and the competitor with the lowest score will be declared the overall winner for that division.
Team Event Rules

Swede Saw

The following PPE will be required for this event:

- Hard Hat
- Steel Toed Boots
- Safety Glasses
- Gloves are Highly Recommended

Five members from each team will participate in this event. Using two 36-inch bow saws, competitors will alternate cutting through a 6-inch x 6-inch timber. The cumulative time will be used for scoring. The team with the fastest time wins.

Each team will be given a 28-inch section of wood, divided into seven 4-inch sections. Two sections may be discarded at the discretion of the team. Sections may be discarded due to poor quality, knots, or any other reason the team decides on. The discarded sections will be denoted by an ‘X’ through that section. One extra bow saw will be available should one of the other two break. Teams will have the option to replace one blade before time starts. Should a blade break during the competition, the clock will continue to run while the saws are swapped. Once the saw is swapped, the competitor may continue with the same cut. If the competing team before your team breaks a blade, that blade will be replaced with a new blade by the judge. That blade replacement will not count towards your one blade replacement.

Time will start once the first competitor’s blade comes in contact with the timber. When one competitor finishes sawing through the timber, the next competitor may begin sawing. There may only be one saw in contact with the block of wood at a time. The time will end when the 5th competitor completely saws through the timber. After the team competes, they are required to pick up their cut blocks and discard them in the designated pile.

If a competitor breaks out of his or her designated 4-inch section, he or she will be advised by the judge to re-start. If the two discarded blocks, marked with an ‘X’, have not yet been cut away, a competitor will be allowed to cut into the next section. Should this happen a second time, the team will be disqualified. Penalties will also be given for competitors using a saw to hit a piece of wood off the section: the saw should be used as a saw, not an ax.

The following penalties will be applied accordingly:

- 2 “breakouts”
- Hitting or chopping at a piece of timber
- 2 saws in contact with the timber at one time
- ≥ 1.5-inch deviation on cut

Disqualification
1 minute
Disqualification
15 seconds
Mucking
The following PPE is required in this event:

- Hard Hat
- Steel Toed Boots
- Safety Glasses
- Gloves are Highly Recommended

Five members from each team will compete in this event, three of which will be muckers (shovelers) and two will be screeders. The team will be given a 10-minute time period to prepare the muck pile before time is started. After this period, the muck pile may not be touched by any member of the team until time is started. This includes shovelers situating themselves on top of the muck pile, however, they may situate themselves on/in the pile during the 10-minute preparation period.

The event begins by tramming the empty cart down the track and back to the muck pile. Muckers may start filling the cart once it is returned to the start. The cart MUST touch the bumper before muckers may begin shoveling. Only two muckers will be allowed to shovel material at any one time. The teams may alternate shovelers at their discretion. The two screeders can only touch muck that is within the plane of the ore cart. The judge will give the indication that the cart has been filled and leveled. The full cart is then trammed down the length of the track and back again. Time will stop when the full cart touches the bumper at the start of the track (by the muck pile). The fastest overall time wins.

While tramming the cart, the cart must start touching the backstop at the muck pile end and must touch the backstop on the far end before returning and touching the original backstop. Competitors must not be within the tracks in front of the moving ore cart. Failure to comply will result in disqualification of the team from that event. This rule is to ensure the safety of all competitors. Teams must make an effort to slow the cart before changing directions or stopping. Hitting the bumper with enough force to dislodge the bumper will result in a penalty and derailing of a cart will result in disqualification from the event.

The women teams will fill the cart to a designated line roughly two-thirds of the volume of a full cart. Men and co-ed teams will fill the cart to the brim. Also, in the co-ed division, at least one woman will be required to circuit into the shoveling routine.

The following penalties will be applied accordingly:

- Person in front of a moving cart on tracks  Disqualification
- More than two members shoveling simultaneously  Disqualification
- Derailing of cart  Disqualification
- Dislodging the bumper  20 seconds/occurrence
- Screeders shoveling muck from pile with their hands into cart  20 seconds/occurrence
- Shoveling before cart touches bumper  20 seconds
Gold Panning

The following PPE is required in this event:

- Steel Toed Boots
- Safety Glasses

Five members of each team are required for this event. Each competitor will be given a gold pan with approximately one coffee can full of material containing 5 flattened lead pellets. When a competitor has found all five pellets and placed them in the judge’s hand, the competitor will call ‘time’. The maximum time to pan is five minutes. The cumulative time for all five competitors will be added together with the lowest team time declared winner. Teams may choose to pan in groups of two or three with the others acting as spotters.

All competitors will start with his or her pan on the lip of the gold pan trough. Once the judge signals, timing will start and the competitor will be allowed to pan for the pellets. The competitor is responsible for placing each pellet in the judge’s hand. Each pellet that is lost in the panning process or in the process of getting the pellet from the pan into the judge’s hand will result in a five-minute penalty. The competitor is responsible for placing each pellet in the judge’s hand. Once a competitor has completed their pan, they can help one another spot pellets. No one may touch another competitor’s pan or material. The team will be immediately disqualified from that event. The sixth team member is not allowed to act as a spotter. This event is intended to be “wet” panning and the use of “dry” panning techniques will result in a penalty per occurrence, competitors must submerge their pan before removing any material.

The following penalties will be applied accordingly:

- Lost Pellet 5 minutes/occurrence
- Contact with competitor’s material or pan Disqualification
- Recovering Pellets/Removing Material through Dry Panning 5 minutes/occurrence
Survey

The following PPE is required in this event:

- Hard Hat
- Steel Toed Boots

Two members of each team will compete in the surveying event. An antique transit will be used. No EDM’s, Theodolites, or Total Stations will be permitted. The hosting team will provide all equipment, except calculators. Teams may bring their own calculators and materials (i.e. clipboards, calculation sheets, and pens). Calculation sheets and non-programmable calculators may only be used. No programmable calculators, or cell phones, can be used.

Judges will inspect survey equipment prior to each use and again at the end. The surveyors are responsible for damages to the equipment while in their possession. While walking to different stations, the transit must be secured back in the box to ensure minimal damages.

Each team will be given their equipment and coordinates of an initial “A” station (Northing, Easting, Elevation) and a back azimuth. The competitors will then have to transfer the coordinates through an intermediate “B” station to a final “C” station. Each team will be given 45 minutes in which to take measurements and 15 minutes to complete calculations.

Equipment will be boxed up and secured at the beginning of the event, or while transportation of equipment. Judges will record a starting time at which the team will begin. Time will be stopped when the crew has completed its survey and all equipment is boxed properly and returned to the judge. The judge will check equipment. If not properly stowed, the judge will indicate a problem and time will resume until the problems are corrected. The judge will not specifically identify the problem; it will be the team’s responsibility to find and correct the issue.

Each team will be provided a bag full of these items:

- 1 antique transit
- 1 tripod
- 1 steel tape measure
- 1 rod
- Plum bobs
- 2 pair of finger tensioners
- 1 magnifying glass

Teams will be ranked by their error according to the total error of closure between their calculated coordinates for their “C” station and the actual “C” station coordinates as determined by the judges. The judge will have the right to disqualify any team who is being reckless with equipment or causing damage to the equipment. Any team intentionally interfering with equipment or survey stations will also be disqualified. Should two teams obtain the same error, the time to complete the measurements and calculations will be taken into consideration to determine the rankings.

The following penalties will be applied accordingly:

- Recklessness with equipment: Disqualification
- Overtime for measurements: Disqualification
- Every minute overtime for calculations: +3 feet to error
Track Stand

The following PPE is required in this event:

- Hard Hat
- Steel Toed Boots
- Safety Glasses
- Gloves are Highly Recommended

Four members from each team will compete in the track stand event while the fifth member will act as a coach/foreman for the team. The coach can only give instructions, point out problems, and help keep the team running smoothly. The coach is not allowed to touch any tools or materials. No team member may work on the same tie as someone driving spikes with a double jack, the first instance will result in a warning and the second will result in disqualification. In the co-ed division, at least 2 women are required to participate in the construction and tear down with at least 1 of those women participating in driving spikes.

The teams must install 2, 15 feet lengths of 40 pound per yard rail on five ties. The rails must be connected to an existing piece of rail by means of four fish plates and eight bolts. Bolts must be tightened to a minimum of 35 foot-pounds. All equipment necessary will be provided, although personal equipment can also be used if made available to everyone.

The rails must be held in place on the ties by 4 spikes per tie (1 on each side of each rail). Twenty-one spikes will be given to each team; one spike will be a spare in case of breakage or loss. The track must be kept to a gauge along its length with a provided track gauge, which will be made available to the teams for using during the event. Due to variations in the rail, the gauge will only be judged at a specific location specified by the event judge prior to setup.

Teams will be timed for both the construction and tear down of the track. Prior to timing, teams will be given ten minutes beforehand to level and prepare the ground where the track will be constructed. The coach cannot touch any materials during this time. The teams will then stand behind a designated line with all of their materials and equipment. A judge will indicate time starting and the team will then be able to bring all material and tools past the line and construct the rail. Once the track has been constructed, all members (including coach) and tools are to be moved behind the line again, and the coach will be required to call ‘time’ before the judge stops the clock. The coach does not have to remain the same for both construction and disassembly, but has to remain one of the five members participating in this event.

The team’s track will then be inspected for quality and any penalties will be recorded. If any team member travels under or over a piece of elevated rail during the event, they will be disqualified.

Teams will then be timed in the same way on the dismantlement of the rail section. Teams will not be allowed to elevate the section of rail in order to hit the ties loose; doing so will result in disqualification and possible payments for damages to rails. All materials including tools should be removed behind the line prior to the coach calling ‘time’ for tear down. Throwing tools or equipment will result in immediate disqualification, throwing is defined as
dropping beyond the straight arm reach of the individual. Any items left on the field will incur time penalties, including pieces of broken ties that are larger than a spike.

Time for construction and tear down of the rail will be added, along with any incurred penalties. The team with the fastest total time wins.

The following penalties will be applied accordingly:

- Traveling under or over an elevated rail  Disqualification
- Throwing tools or equipment  Disqualification
- Elevating constructed track (Jacking the rails)  Disqualification
- Coach touches anything  Disqualification
- Working on the same tie as a double jack  Warning/Disqualification
- Any item left in front of the line  10 sec / item
- Spike not driven into tie  10 sec / spike
  - (1 popsicle stick thickness at all areas between the spike head and tie)
- Spike not used at all  30 sec / spike
- Bolts not tight enough (35 ft-lb)  15 sec / bolt
- Not using spike or fish plates in correct manner  30 sec / occurrence
- Hanging ties  20 sec / tie / side
  - (2 popsicle sticks completely between the tie and rail)
- Gauge not properly aligned  20 sec
- Spike left in tie after disassembly  20 sec / spike
Jackleg Drilling

The following PPE is required in this event:

- Hard Hat
- Steel Toed Boots
- Safety Glasses
- Gloves
- Hearing Protection
- No Loose Fitting Clothing
- Long-sleeved Shirts or Kevlar Forearm Protectors (to be provided)

Two members from each team are required for this event; one driller and one assistant. The drillers will have three minutes each to drill as far as possible into a high square and a low square. Each square will be 6-inches x 6-inches and will be allocated to teams at random. The teams will drill into the blocks using a 4-feet steel with a cross bit. The clock will not stop for a stuck steel. The driller and assistant may choose who drills the high and low holes.

Before time is started, the driller and assistant will be allotted 3 minutes to set up the drill and determine the placement of the air leg. Before the 3 minutes is up the drill must be behind the designated line with the steel out of the chuck.

If the driller is male, the assistant may not touch the drill or the steel during the event, the assistant may only help by moving hoses. The assistant is not allowed to help remove the steel by pulling on the hoses. If the driller is female, the assistant may help with collaring the hole, by touching the steel. For female drillers, if the assistant makes contact with anything besides the steel or hoses, the longest hole will be deducted from your total length. For the co-ed division, each team must have one male and one female driller.

While drilling, it is mandatory that the driller does not straddle the airleg. Failure to do so will result in the air being turned off. The air can be turned off at any time, based on the judge’s discretion with regards to unsafe operations. Hands in pinch points or guards will be considered unsafe operations. In the event of breaking out of the sides of the block, drilling into another hole, or drilling outside of the designated square, teams will be penalized.

The team that drills the deepest after penalties have been deducted will be the winner. Holes will be measured to the 1/8th of an inch.

The following penalties will be applied accordingly:

- Unsafe operation of jackleg    Air turned off
- Air being shut off twice    Disqualification
- Straddling the air leg    Air turned off
- Driller aided incorrectly by assistant    Longest hole deducted/occurrence
- Drilling out of designated square    12 inches deducted by length
- Drilling out of side of block    Hole not counted
- Drilling into another hole    Hole not counted
Hand Steel (Single Jack) Drilling
The following PPE is required in this event:
- Hard Hat
- Steel Toed Boots
- Safety Glasses
- Gloves are Highly Recommended

Five members from each team are required to compete in this event. Each member will be given two minutes to drill as deep as possible into a 4 inch square painted on a concrete block.

The hosting team will provide a set of steels and hammers for the event. A set of three drill steels will be provided. The steels will have a maximum length of twelve inches. Steels must have the appropriate chisel width to create a 7/8-inch diameter hole within a +/- 16th tolerance. Steels and hammers will be provided, but personal steels and hammers are also allowed, as long as they are made available to everyone. The drilling medium will consist of concrete blocks constructed using aggregate no larger than ½ inch diameter.

Water may be used to flush the holes while drilling. After the last member has finished, the team will have one minute to flush out the holes and remove chips. Plugs will be provided to prevent chips from entering completed holes.

Male competitors will be required to use a 4-pound hammer while female competitors may use either 3-pound or 4-pound hammer.

Should a team drill into another hole, that hole’s length will not be counted in measuring total length, and a new hole will be required to be started. Time will not be restarted. All competitors will be required to hold the steel while it is being struck with the hammer. The judge will indicate when the steel is not properly held. On the second offense, the competitor will be disqualified and must forfeit the remainder of his time. Should a team member strike the side of the steel with a hammer, the next member will be required to take over drilling and the team will lose the remaining amount of time that the driller had remaining.

All holes will be measured from the surface of the concrete block to the base of the hole to the 32nd of an inch. The deepest total length wins.

The following penalties will be applied accordingly:
- Steel not held when struck (2nd offense) Disqualification of person
- Striking side of steel with a hammer Disqualification of person
- Steel stuck in hole (after 1-minute flush) Hole not counted
Individual Event Rules

Swede Saw
Individuals will begin from behind a designated line. Once time starts, the individual competitor will run up to the timber with their saw, cut their section, and return behind the line. Once the individual passes behind the line time will stop.

Mucking
Competitors will be required to fill a two-ton, side-dump ore cart to a designated line in as little time as possible. The competitor may choose to start the ore cart tipped or upright. Screeders will be responsible for tipping the cart up and leveling the muck. Time will be recorded by the judges. Individuals will not be required to tram the cart neither empty nor full. The individual may pick two screeders of his or her choice.

Jackleg Drilling
The driller may pick an assistant of his or her choice to help with hoses. Women may have a nipper. The driller will have 3 minutes to drill as far as they can into one square. Multiple holes may be drilled if the driller should finish drilling the length of the steel before time is finished.

Single Jack
The individual will have 5 minutes to drill as deep as possible using a hammer and steels. The driller may choose a watering assistant of his or her choice. Competitors may use their own sets of steels and will not be required to make them open for public use. A set of steels will be provided by the competition staff.

Spike Driving
Individuals will begin behind a designated line, and once time starts the individual will set and drive 2 spikes, one spike on each side of a section of rail. Time will stop when the competitor is back across the line. The judge will inspect the spikes to ensure they are installed correctly. Penalties for incomplete set up will be 15 seconds per infraction. Improper use or installation will be decided by the judges and will result in disqualification. The competitor with the fastest time and least penalties wins.

Gold Pan
Competitors will be given a gold pan with dirt. Judges will place 5 flattened lead pellets in the dirt. Starting with the pan on the ledge of the gold pan trough, competitors will pan for and find the five pellets in as little time as possible. Competitors are responsible for picking up and placing the pellets in the judge’s hand. Loss of a pellet from the pan to the judge’s hand will be counted as a penalty on the competitor. Penalty for a lost pellet is 5 minutes per pellet. Competitors may not search the trough for lost pellets. Competitors will be responsible for calling time once they have completed their search.